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1999

# Private computer training in Papua New Guinea: from chaos to order

Musawe Sinebare

*University of Wollongong*

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# **Private Computer Training in Papua New Guinea: From Chaos to Order**

**A Thesis submitted in fulfilment of the requirements for the award of  
the degree of**

**Doctor of Philosophy  
(Ph.D)**

**from**

**The University Of Wollongong**

**by**

**Musawe Sinebare**

**Dip.S.T., B.Ed *UPNG*, M.Ed *Birm*, M.InfoTech *W'gong***

**Faculty of Education**

**1999**



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## **Abstract**

Information Technology (IT) education and training in Papua New guinea (PNG) like those in many developing countries has not been formally introduced into the public school system. The demand from public and private sector employers for personnel with IT knowledge, experience and qualifications from the workplace is growing rapidly as the workplace is gradually applying computing skills to improve efficiency. PNG nationals from the public sector educational institutions, particularly school leavers from the secondary school level (which constitute that population) urgently require education and training opportunities in computer application skills and IT in general.

In PNG, only the universities, some post-secondary institutions and the private training organisations are conducting some form of formal computer related courses. Since entry to universities is highly competitive and often a limited number of study places are available, the majority of the school leavers and employees who require computer skills training often resort to the short-term computer related courses conducted by private computer training organisations. The private computer training organisations are registered as a 'commercial organisation' but conduct computer or IT related education and training programs as a 'private training organisation'. Such a scenario is allowed and facilitated by the current policy and regulatory framework which promotes unregulated, uncoordinated and ad hoc IT education and training environment in the country.

The private computer training organisations, their computer training courses or programs and their present practices under the existing policy framework were examined. The existing government policies and regulations with a potential to facilitate IT education and training in PNG were analysed in view of the current computer training organisations, training programs, and their pedagogical details examined. It emerged that the private computer training in PNG is chaotic under the present policy and regulatory framework. There is neither a specific policy formulated nor a curriculum guideline provided to cater for IT education and training in the country.

Several recommendations based on the research findings, are put forward for implementation by various existing authorities as well as recommendations for a new authority and new structures under which IT education and training can be facilitated. The thrust of the recommendations strongly supports the view that IT education and training in PNG be given national attention by the government because of the potential in using IT in many socio-economic aspects of the country and more importantly because of its potential to create a knowledge industry within the country. In order for

this to occur, the government must play the pivotal role in formulating a national IT Policy for implementation by both public and private sector. Further, necessary administrative and physical infrastructure should be established as a matter of priority in order for IT education and training to be promoted, applied, and implemented. In addition, the many recommendations made must be implemented within the suggested policy and curriculum framework.

Several implications of the many recommendations put forward are suggested. If the recommendations are implemented then IT education and training in the country would be planned, coordinated, and delivered in accordance with the suggested policy and curriculum framework. On the other hand if the recommendations are not implemented then the status quo would be maintained. A Ripple-Effect theory is postulated which attempts to model the current chaotic private computer training organisations and their respective training programs as well as predict the future private computer training scenario under the proposed IT Policy and IT Curriculum framework.

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# **Chapter 1**

## **The Research Problem**

### **1.0 Introduction**

This chapter describes and presents the context of the research problem. The background discussion include; presentation of PNG's socio-economic indicators in order to highlight the economic context, existence of the limited opportunities for computer skills training, shortage of personnel with computer related qualifications and expertise; inadequacies in the computer education and training organisations in PNG (in both the public and private sector institutions), the role of private computer training providers and the government's policy initiatives which either directly or indirectly affect private computer training organisations. Thus the chapter provides a description of the context of the research problem and what issues are of concern.

Section 1.1 highlight the socio-economic context of PNG. Sections 1.2 to 1.5 set out the overall context of the research problem. Section 1.6 provides a summary of the inadequacies of the current government policy initiatives and framework which implicitly or explicitly applies to private computer training. Section 1.7 highlights the policy environment under which private computer training programs are conducted, while section 1.8 justifies the rationale for conducting this study. In section 1.9, the research questions being investigated in the study are presented before summarising the chapter in section 1.10.

## **1.1 Socio-Economic Context**

PNG has a population of nearly 4 million people. The majority of them (over 80%) live in rural areas with a subsistence economy while the minority live in urban or semi-urban areas in the modern sector. The modern sector is growing rapidly and more and more people though still dependent on their land (through subsistence activities), are shifting towards the modern sector. PNG can be best described as having a dual economic system with about 80% of the population living in the rural/subsistence sector while 20% live in the modern sector.

There are serious economic indicators which do not favour PNG compared to many similar developing countries. The following socio-economic indicators will highlight some of these basic facts about PNG. For example, maternal mortality rate of 370-600 for every 100,000 live births (Havis 1999, p. 18), a national literacy rate of 65% for males and 38% for females, the people per doctor ratio of 4000 to 1, the infant mortality rate of 83 per 1000 births, the ratio of the number of hospital bedspaces to the number of people in the country is 1 to 260, access to safe drinking water by a mere 34% of the population, and an annual population growth rate of 2-3% (Instituto del Tercer Mundo, 1992, p.474).

Further, PNG's per capita GNP is US\$890 and between 80%-90% of foreign investment are dominated by Australia, USA, United Kingdom, Canada and Malaysia in that order of foreign equity held in the country (Bank of PNG, 1998). On the face value, the GNP per capita value for PNG compared to other developing economies is favourable. However, it must be stressed that not all the 80% of the population (i.e. rural dwellers) benefit directly from the economic activities. The 80%-90% of the foreign investors and few PNG nationals (top bracket of public service and politicians) benefit from it.

PNG mainly produces and exports primary products including coffee, cocoa, copra, tea, palm oil and mineral ore such as gold and copper. There is very little manufacturing industry to manufacture the primary commodities within the country. As one prominent local Businessman stated recently<sup>1</sup>, PNG's formal economy is controlled by less than 20% of the people in the country (mostly foreigners in this category) while 80% are in subsistence sector (they are mostly PNG nationals). The wealth of the nation is in the hands of a very few people who control so much wealth and wield so much power in deciding where to invest and what to invest in.

Given the above socio-economic indicators and economic realities coupled with general break down of law and order in the country, the downturn in the economy, the falling commodity prices, and the falling value of the Kina, the PNG government prioritises and allocates its limited financial resources into improving the social sector such as education and health services.

The government cannot do justice to service all sectors of the economy. Information technology education for one is seen by the government as falling within the realm of the private training organisations, technical colleges and universities (Rapepe, 1994). Hence, the government does not see that it has any role of training students for computer related jobs in particular and IT education in general. It has therefore established the National Training Council to oversee job oriented training conducted by the private training organisations (computer related training being one of the training programs offered). Computer training is being offered by the private training providers as a commercial activity. Hence the computer education and training market<sup>2</sup> is being determined by those who require computer related skills which are relevant to the

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<sup>1</sup> Personal communication with Sir Akapite Wamiri on 23 January, 1999 at the Bird of Paradise Hotel, Goroka, PNG. [Sir Akapite is one of the few local Businessman and millionaire among the 20% of the people who control the economy of PNG].

<sup>2</sup> Market size of the Computer Education/Training market is difficult to establish. There is a lack of PNG Business Database to date. However, there is no doubt that the market does exist as demonstrated by the number of advertisements carried in the newspapers daily.

various jobs. Hence, private training providers are competing for this market with very little government intervention except for establishing a National Training Council which oversees the private training organisations and their training programs or courses.

There is now a trend in which the PNG government is committed to rationalising its commercial entities such as Telekom PNG, Post PNG, PNG Banking Corporation, PNG Electricity Commission and a host of others. The government hopes to commercialise, corporatise or even privatise these entities and has already called for expressions of interest from interested parties to bid for the right to provide advisory and administrative services on privatisation (*The National*, Feb 17, 1999). The shift to privatise the government's commercial arms is mainly due to pressures from the international communities such as the International Monetary Fund (IMF) and the Asian Development Bank which provide loans to PNG. Recently, the IMF has been critical of the government's management of the economy, law and order, political corruption, poor economic policies and fiscal management (Kong, 1999; Manning, 1999; Hriehwazi, 1999a, Hriehwazi, 1999b). IMF has also recommended big changes to PNG's monetary and fiscal policies to save it from economic collapse. Among the changes recommended include abolishing slush funds for politicians, a higher rate than the planned for value added tax, higher gaming related taxes and increased excise on petroleum exports (*PNG Post Courier*, March 11, 1999).

The government approach now in an attempt to contain the budget within the present economic condition by cutting economic sectors and prioritising social sector is a temporary measure. Furthermore, corporatising and privatising is an option for a developed economy and would stimulate economic growth by allowing private investors to take care of the costs thereby reduce/release the burden on government expenditure. This then would enable the government to concentrate on governing the nation rather than running a business which may have an unfair advantage over the private sector (Orere, 1999). However, if private investors are predominantly foreign, as is the case



now, there is no way GNP per capita will improve for all citizens of PNG. Perhaps, the best the government could do is to corporatise all profitable commercial entities rather than privatise them where ownership is lost to the hands of few PNG or foreigners at this stage of the economic development of PNG.

Private training organisations are allowed to conduct computer related education and training in PNG because the government does not encourage such opportunities at the public school level. It is seen by the government as an activity falling outside of its responsibility of providing basic education for the majority of children who have to be prepared for rural and subsistence economy after they leave school at various stages of their education (Rapese, 1994). The government also accepts the fact that it cannot provide all the skills training required to service the workforce and therefore encourages private sector participation in complementing the government's human resource development efforts. Encouraging the private sector helps increase the human resource development in computer related training and at the same time allows the private provider to participate and benefit from the economic development of the country.

## **1.2 Demands for Computer Education and Training**

Computer systems (micros, minis and mainframes) have been used widely in PNG by government departments, statutory authorities and private sector organisations such as banks, airlines, insurance firms, and business enterprises to achieve their specific needs and serve their individual purposes. The modernisation of both the private and public sector computer systems requires personnel who are adequately educated and qualified to manage the computer systems in the workplace.

The number of job vacancies advertised in PNG's newspapers (*PNG Post Courier*, *The National* and *The Independent*.), attest to the demand by employers who attempt to

recruit the best possible candidates. For example, 25% of the advertisements under Positions Vacant in the *PNG Post Courier*, require prior education and qualifications in computing fields.<sup>3</sup> Such advertisements have become more common over the last few years. It is necessary to possess computing qualifications, knowledge and skills or 'core skills', as Loose (1997) termed it in order to be considered for any computing positions in the country.

There is consequent demand for computer education and training because the public education sector provides very limited opportunities for students to acquire any computer related skills. This demand is supported by the number of private training organisations being established in PNG. The government recognised this demand for computer training when it stated in its National Training Policy:

PNG needs more and better-trained computer professionals who can propel government and the nation as a whole towards a position where it may make best use of modern technological developments in terms of people's economic and social needs (Independent State of Papua New Guinea, 1989, p.62).

However, successive governments have made little attempt to address the acute shortage of computing professionals within the country, thus: (a) denying PNG nationals computer education and training opportunities, and (b) further widening the skills gap between the number of computing professionals available and the demands for such skills in the workplace.

An independent study conducted by Salt (1988), estimated that the number of computing positions showed a strong annual increase averaging 20 per cent between 1988 and 1991. For example, the highest growth rate of 38%, for microcomputer software specialists, was expected to more than double in the number of positions in the

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<sup>3</sup> Classified Section of *PNG Post Courier*, Wednesday, 3 September, 1997. [Online] Available URL: <http://www.datec.com.pg/postcour/PSTSTORY.nsf/4f135ead...> [Accessed 3 September, 1997].

subsequent years (Salt, 1988, p.8)<sup>4</sup>. Clearly, computing specialists for computing positions are continuing to be in high demand at present (*The National*, Aug 4, 1997). This trend should continue in the near future because little is done at present to meet computer skills demand by way of:

- a) formulating an appropriate policy about computer education and training in the country;
- b) encouraging, supporting, and regulating computer education and training initiatives undertaken by various training providers,
- c) formally introducing computer studies curriculum throughout the public education system; and
- d) coordinating training opportunities available to PNG through aid donors abroad in accordance with the expressed need.

About a decade ago, information technology related activities in PNG were underdeveloped (Karunaratne, 1988), and it was estimated that IT related activity as a percentage of GDP was 11% (Jussawalla, 1988; Lamberton, 1988). But this has changed with an estimated annual growth rate of 12 per cent (Iamo, 1993). Nevertheless, PNG like other developing economies was attempting to find its rightful place in the information technology arena by acquiring the latest computers and telecommunications technology (Karunaratne, 1988), and by sacrificing scarce resources to develop the necessary human resources to control and use the sophisticated technology (Samar, 1993). Much of the IT related training at undergraduate and postgraduate level in many fields was being obtained from overseas institutions at great

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<sup>4</sup> It is impossible to obtain the actual number of jobs in computing related fields available in PNG because such statistics is not available from official sources. Even the 1996 Labour Statistics obtained from the Department of Industrial Relations in March 1999 did not make any specific mention of 'Computing Professionals' as one of the occupations in its employment index (Industrial Relations Department (1996). **1996 Labour Statistics**, Ministry of Industrial Relations, Port Moresby, PNG). Further, Mr Robert Mendani, from the PNG Investment Promotion Authority confirmed that 'Information Technology' related field is classified under 'Business Sector' within IPA (personal communication, March 30, 1999). However, this may imply that the number of computer related jobs in PNG are small at this point in its development but certainly not insignificant. The number of job advertisements in the daily newspapers about computer related jobs and availability of computer related training programs indicate that 'computing professionals' is a growing occupation in high demand at this point in time.

cost to both the public and private sector (*The National*, June 16, 1997). The overseas programs are not always appropriate to the realities in PNG. It has been argued that:

... (trainees or students) are still being sent overseas by state and voluntary development agencies without being properly prepared for the reality of the education situation on the ground. As a consequence, they often rush headlong into adopting curriculum and pedagogical proposals eminently suitable for their country of origin in a society where they are totally inappropriate. Also, developing world students at overseas' universities are often slotted into courses designed to meet the needs of the developed world without much consideration being given to the appropriateness of such courses for educational practice in the developing world (O'Donoghue, 1994, p.74).

By providing undergraduate and post graduate IT studies in PNG, the students not only receive education or training that is directly relevant to their country but also engage in research activities which address the specific problems experienced in their country, and hence contribute towards finding solutions to these problems as well as promoting and encouraging the creation of local knowledge industries or intellectual properties through R&D work (Singh, 1994).

The literature on information technology and especially on computer related training in PNG is very sparse. Furthermore, the limited literature available does not describe computer related education and training in the private training organisations. The few resources that cover this field have been reviewed and will be cited in the appropriate context throughout the thesis.

### **1.3 Shortage of People with Computer Skills in PNG**

There is a critical shortage<sup>5</sup> of Papua New Guineans who are highly educated and sufficiently qualified to design, apply, manage and implement information technology systems in the public and private sectors. This situation is evident in the number of

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<sup>5</sup> There is no hard data available to demonstrate this shortage as the latest Labour Statistics obtained from the Department of Industrial Relations does not even mention Computer Professional as a one of the skills in most demand (Industrial Relations Department (1996). **1996 Labour Statistics**, Ministry of Industrial Relations, Port Moresby, PNG.) The number of advertisements in the newspapers certainly confirms that there is a need for computer skills in computer related jobs.

advertisements placed in PNG's two daily newspapers (*The Post Courier* and *The National*) as well as the only weekly newspaper (*The Independent*)<sup>6</sup>. This in turn leaves the country totally dependent on non-citizens who are expensive to maintain in the long term. There are limited avenues within the country's own educational establishments such as universities and colleges to develop human resources in computer related disciplines. The acute shortage of local computing personnel and limited opportunities for formal education and training of computing professionals in PNG is due to the government's failure to act swiftly on the acknowledged shortage of persons with IT knowledge and expertise (Commission for Higher Education, 1986, p.218). As well, the lack of coherent, all-encompassing and forward-looking government IT policy to plan and organise appropriate computer related training within the country has to a large extent contributed to this critical shortage of IT personnel.

Kali (1992)<sup>7</sup> expressed concern at the fact that the output of computer professionals from the PNG University of Technology (Unitech) could not adequately meet the high demand for personnel in computing positions in PNG (Karambi, 1992, p.18). Even the introduction of computer education and training in PNG by the private training organisations is insufficient to meet the country's IT personnel requirements. Sceptics are pessimistic that if by the year 2000 information technologists or computer scientists including systems analysts and programmers, are not trained in sufficient numbers, PNG will be totally dependent on expensive overseas expertise and thus continue to remain a *technocolony* of multinational corporations (Iamo, 1993).

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<sup>6</sup> 1 in 4 advertisements carried in PNG newspapers specifically advertise for personnel with qualifications, experience and knowledge in computer or IT related fields. Further, the Public Service training bids for Science and Technology related subjects (including Computer Science and Information Technology) are placed on priority for advance training at overseas universities mostly in Australia and New Zealand under development aid program. These are indications that computing professionals are in demand in PNG.

<sup>7</sup> Mr. John Kali was the Chairman of the PNG Information Technology Board in 1992 and as such was privy to many sources of information from which he expressed his concerns at the PNG IT Seminar in Port Moresby, PNG, 10-11 August, 1992.

The existing training programs in the private training organisations are generally designed to teach people how to use specific commercial application software. Private training organisations in PNG are still not producing systems and information analysts, computer programmers, computer scientists, software engineers and other high technology professionals, even though there is a greater need for these personnel (Salt, 1988).

The 'information technology activity' in PNG is too insignificant to register by the much used indicator in the world ranking (Kurian, 1997). The IT activity used as part of the indicators includes:- research and development in science and technology, number of patents held, number of scientist and engineers, and number of manufacturing industries. For example, PNG is not even mentioned in the world ranking of:

- a) the number of scientists and engineers in the top 109 countries;
- b) the number of trademarks and patents held to indicate the technological progress of a nation; and
- c) computers per thousand inhabitants and computing power (Kurian, 1997).

These indicate that the technological progress in general and IT in particular in PNG has been insignificant in the last decade. For this reason, computer education and training in particular in PNG is in an embryonic stage. While there exists huge potential to develop, apply and implement information technology in the country, the country's current level of computer development, computer education and training environment, and policy climate inhibits further progress.

#### **1.4 Computer Education at Public Educational Institutions**

Very little formal computer related education or training is provided in the country's publicly funded tertiary institutions. Initial introduction to computer studies has begun in one or two National High Schools at Years 11 to 12 level (Fova, 1994; Goodwin, 1994). At this stage, the emphasis is placed on using the computer as a *tool*, rather than *tutor* or *tutee* modes as popularised by Taylor (1980). Students have very minimalist

formal instruction in computer studies prior to entering university or tertiary institutions. But this level of computing background is grossly inadequate for those entering the universities, for example, students entering the engineering streams at PNG University of Technology (Unitech). The engineering academics at Unitech have voiced their concerns about the lack of prior computing knowledge (Bimari, 1994). The majority of the students have little practical knowledge and limited meaningful exposure as to how computers can be applied in different work environments until they graduate and enter the workplace. They therefore begin afresh by learning basic computer skills in order to use the software application skills meaningfully in their work. While some of them do master the appropriate skills, others barely manage the very basics of using a computer in their jobs (Thompson, 1994).<sup>8</sup>

Also little formal computer education and training opportunities exists in the public education sector (especially at upper and lower secondary school levels) for the majority of school leavers in PNG because of the extra-curricula nature of computer studies curriculum. The status of the Computer Studies Curriculum (CSC) in PNG is that:

- CSC is not introduced officially and will not be so under current priorities of the Government at the Primary School level;
- CSC is officially neither a core nor a non-core subject in the Provincial High Schools (ie. CSC has been an 'extra-curricula' activity only);
- CSC is an optional subject in the National High School curriculum subject to availability of teaching staff and resources; and
- CSC only exists at Universities under non-computing academic departments.

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<sup>8</sup> Personal Communication with Ms Bonnie Thompson, Education Officer, Foundation for the Peoples of the South Pacific, Port Moresby: Papua New Guinea (Letter dated 12/8/94).

Further, the following is true at the major tertiary institutions, for example;

- (a) the PNG Institute of Public Administration computer application courses are offered to selected public servants brought in for in-service training who do not have any prior computer education and training;
- (b) Unitech has an accounting degree program with an emphasis on commercial computer applications;
- (c) University of PNG has neither a computer science nor an IT degree program; and
- (d) only those school leavers with matriculation status (by passing grade 12 education) can be admitted to the university programs in PNG.

The number of students admitted to the university constitutes a very small number (146 students per 100 000 inhabitants or 1.46%) and out of these an even smaller proportion of students take up computing studies (Ryan, 1994b; Sukwianomb, 1986, p.73; *PNG Business*, Issue no. 248, 1994).<sup>9</sup> Allowing for the different university teaching programs to absorb the initial number of students entering the university and natural attrition over the university program results in an extremely small number of graduates graduating from the commercial computing program at Unitech (Salt, 1988).

The reasons for the lack of computer education and training in PNG are: (a) the absence of government-led IT policy for both public and private sector, and (b) government development priorities placed in areas other than Information Technology or computer education, for example; basic literacy and numeracy (Department of Education, 1985).

In the 1980's, the Ministry of Education had no formal computer education policy for its primary and secondary schools and had placed priorities in areas other than computers (Department of Education, 1985). Nearly a decade later, the Ministry of Education recognised the need for schools to make a start in creating computer awareness and

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<sup>9</sup> In PNG's very highly competitive and hierarchical education system, less than 2 per cent of those entering Primary School will matriculate at Grade 12 to continue onto Universities (Instituto del Tercer Mundo, 1992, p.474).



developing computer skills (Department of Education, 1993). However, the government had made no official provision for computer studies in the curriculum and no officers were appointed to either develop a computing curriculum or research for computer studies courses. The Ministry left the final decision on purchase and use of computers to the individual schools which indirectly favours the wealthy schools to procure computer hardware, software and other necessary equipment to establish computer laboratories, develop a computer studies curriculum, recruit and contract part time staff to teach computer studies, and hence provide their students with not only the core and non-core curriculum but also IT skills relevant in most workplaces (Fova, 1994; Goodman, 1994; Jayawickrama, 1994). Curriculum matters which have traditionally been determined by the Ministry had been, in this instance, 'decentralised' to each individual school. Through that decision, it further disadvantaged the less-wealthy schools which are struggling to provide basic educational necessities with their annual grants from the government.

Furthermore, even if computer studies are introduced by teacher computer-enthusiasts, it is often classified as 'extra-curricula' activity and must therefore be conducted outside of the official scheduled hours. For this reason and the ministry's own 'non-policy' stance on computer studies curriculum in education (Department of Education, 1985 & 1993), computer education and training has neither been formally accepted nor introduced into schools. On the other hand, some well-to-do schools like the International Education Agency (IEA) schools and other private schools actively use computers both as specialist subject of study and integrated computing skills throughout their school curriculum (Kalewa, 1985; Sinebare, 1990).

Public secondary schools have financial autonomy under their respective provincial governments to purchase computer hardware and software for administrative purposes such as record keeping, word processing and computation of school assessment (Sinebare, 1986 & 1990). Basic introductory expositions are conducted to provide

computer literacy in a few schools in 'extra-curricula' mode (Jayawickrama, 1994). Therefore, any coverage of the subject later in a student's education is normally developed on a weak foundation. At present, computer education and training remains solely the function of special institutions such as technical colleges, universities, or private training organisations, and on-the-job training during employment (Department of Education, 1993).

The University of Papua New Guinea (UPNG) and the PNG University of Technology (Unitech) offer some computer-related courses but these are normally undertaken as part of Business Studies and Accounting, Engineering, Mathematics, and Science degrees rather than the traditional 'Computer Science' or 'Information Technology' (IT) degree per se. Furthermore, there is neither a Computer Science nor an Information Technology academic Department especially established to teach and research into Information Technology at the two universities. For these reasons, any undergraduate and post graduate qualifications in computer related specialist education and training for PNG nationals have to be obtained from overseas universities, usually in Australia, United Kingdom, USA, and New Zealand.

The Accounting and Business Studies Department at Unitech established a degree program in computing with emphasis on commercial or business systems applications in 1977 with its first graduates in 1980 (Ryan, 1994a). Unitech revised its computer courses based on a report written by Salt (1988). That report was based on a survey of employers' perceptions about the appropriate university computing curriculum for PNG.

The survey analysed:

- (a) the current computing curriculum at Unitech;
- (b) the market for which the computing graduates will be employed;
- (c) perceptions of what the employers consider as an 'appropriate computing curriculum' at the university;
- (d) the curriculum requirements of the various computing professions; and

(e) the written comments from employers about the computing curriculum at the university.

Based on these analyses, several recommendations were made. The recommendations made influenced extensive revision to the computing curriculum at the Accounting and Business Studies Department at Unitech (Ryan, 1994a)<sup>10</sup>, on the application of commercial computing by graduates and the appropriate skills required by different categories like Microcomputer Software Specialists, Application Programmers, Systems Analysts and Designers, and Management positions in Computing in order to take up positions of responsibility in the area of information technology in the workforce (Salt, 1988).

### **1.5 The Role of Private Computer Training Providers**

Computing curriculum development and computer training programs are actively and aggressively being pursued by private training providers. The business or commercial arm of two universities in PNG,<sup>11</sup> have been involved in conducting computer related courses in direct competition with the private providers targeting the same market (*The National*, July 31, 1996, p.44; *PNG Post Courier*, July 12, 1996).

Since there were few computer education and training opportunities in PNG's public sector educational institutions, there was a huge demand for people with relevant IT and computing skills (Salt, 1988). This demand is acute at all levels of computing professions ranging from software application user level to middle and top management levels (Commission for Higher Education, 1986). For these reasons, PNG is experiencing an unprecedented increase in the number of commercially-run training organisations offering computer related courses which are conducted on short term part-time or full-time bases ranging from a few weeks to several months.

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<sup>10</sup> Personal Communication with Mr Ged Ryan, Lecturer, Accounting and Business Studies Department, Unitech, Lae: PNG. Letter dated 2.2.94.

<sup>11</sup> For example, Unisearch Pty Ltd., and Unitech Development and Consultancy Pty Ltd., respectively of UPNG and PNG University of Technology.

Even as recently as 1997, private training institutions were still being established to provide additional learning opportunities for the PNG public through the establishment of the *PNG Polytechnic* (Rei, 1997c), and the *Industrial Technology Training Centre* (*PNG Post Courier*, Aug 6, 1997). The content of their curriculums are not published, something common among the private training organisations in PNG. The objectives of the *PNG Polytechnic* are to train and educate grade 10 school leavers to be gainfully employed and to train and educate grade 12 leavers in business and information technology studies to proceed on to tertiary or further studies. Tertiary places are competitive on the one hand and less than 2 percent of the students entering primary school would be able to continue tertiary studies if they win places while on the other hand, there is increasing pressures from parents to obtain jobs and to support them financially. Any such opportunities to obtain short training to maximise their chances of obtaining jobs cannot be overlooked. The *Industrial Technology Training Centre* intends to train people to acquire skills that would help them to become self-sufficient in generating income for themselves. The courses include; industrial design, carpentry and joinery, fashion design, music and sewing. Many more private computer training organisations are in the proposal stage and will come on board soon (Investment Promotion Authority, 1997).<sup>12</sup>

The private training organisations operate on a commercial basis with neither formal standardisation of courses nor any guidelines to conduct computing training. Therefore, each training program has unique course structure, course content, assessment procedures, length of course, fees charged, qualifications awarded, and the respective academic credentials of the trainers conducting the training programs. The private training organisations have been offering computer related courses in isolation without formal policy guidelines prior to the enactment and adoption of the *National Training*

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<sup>12</sup> Investment Promotion Authority (1997). *Investment Papua New Guinea: Trade and Business News Update*, 4(8), August, p. 8. [A Newsletter of the Investment Promotion Authority].

*Policy* (Independent State of PNG, 1989), discussed further in the next section. Consequently, there is a wide disparity in the quality and standard of training conducted by the private sector. For example, one Managing Director of a reputable computer company stated:

(Computer courses are) typically run by a commercial body for profit. (They) are of little value as the duration of the course is short and is best utilised by the current employees as part of training to use a recently acquired software package...The course content is generally a re-organisation of the training material provided with the software (purchased) (Whitty, 1992).<sup>13</sup>

In 1993, steps were taken through the formulation and enactment of relevant policy guidelines, intended to regulate the training programs in the private training organisations. The private sector was seeking to provide the missing link in the severe shortage of personnel with computer and IT skills in the country. They provided alternative basic training especially for commercial applications which are in high demand locally as well as benefiting from engaging in a commercial activity.

The private sector has not only been quick to identify computer education and training as important skills but also conduct its own in-house training as the government chose to pay little attention to computer education and training in the public sector institutions (Sinebare, 1989). The private sector capitalised on this situation because: first; there is absence of appropriate government policies and guidelines covering computer education and training in PNG, second; there are loopholes in existing policies<sup>14</sup>, and third; there has been a lack of coordination between the relevant government departments and the private training organisations. This circumstance has lead the private training organisations to cash in on a lucrative business enterprise (*The National*, Nov 26, 1993,

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<sup>13</sup> Personal Communication with Mr John Whitty, General Manager of Computers and Communications Pty Ltd, Lae, PNG. [A Confidential Business Proposal to establish Computer Career Institute in PNG]. Copy of the Proposal was given to this author by Mr. J. Whitty in 1992.

<sup>14</sup> Personal Communication with Mr Wesley Tauwaole, Coordinator, Private Training Organisations, National Training Council Secretariat, Port Moresby: PNG, (Diary of Interview notes; July 2, 1996).

p.4).<sup>15</sup> The provision of private computer training is a very lucrative business enterprise and the private computer training providers target the PNG nationals for the following reasons:

- a) there is no access to computer education and training from the public school system by the time they leave secondary school;
- b) most of the jobs ranging from computer software application<sup>16</sup> user to middle management levels are normally reserved for PNG nationals and these are the jobs which require basic computer skills knowledge; and
- c) the advertisements placed in the newspapers in PNG about the private computer courses target PNG nationals with guarantees that the courses have been approved for Training Levy to encourage small to medium size companies to utilise these courses and claim tax exemptions.

Many PNG nationals are compelled by these circumstances to make personal sacrifices in order to enrol in the highly competitive commercially-run computer training organisations. The trainees hope to upgrade their qualifications, acquire necessary job skills, and thereby increase their chances of obtaining jobs in the private and public sectors while for the employers to claim tax exemption if they utilised the Internal Revenue Commission approved computer training programs conducted by private training organisations.

## **1.6 Government Policy Initiatives and their Inadequacies**

The PNG government through its various agencies has undertaken some policy initiatives which were intended to regulate Private Training Organisations operating in the country. For example; *The National Training Policy* (Independent State of PNG, 1989), and *The Accreditation and Higher Education in Papua New Guinea*

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<sup>15</sup> Mr Alphmeledy Joel, Labour and Employment Secretary [Quoted in *The National* (1993). 'Trainers not up to mark', Friday Nov 26, 1993, p. 4]

<sup>16</sup> This refers to the professional use of computer software applications such as wordprocessing, database, spreadsheet within the workplace constitute application usage.

(Commission for Higher Education (CHE), 1995a), were two policy initiatives undertaken by the government to regulate private training organisations in PNG (which includes computer related training organisations). These policies were intended to ensure that training courses offered by the private training organisations are regulated and given due recognition for the qualifications awarded, provided they satisfy the requirements of the Government as stipulated in the different policy documents.

### **1.6.1 National Training Council Act 1991**

The *National Training Council Act 1991* (NTCA-1991) (Independent State of PNG, 1991), was enacted in Parliament on May 22, 1991 to establish the National Training Council (NTC) which was responsible for formulating the National Training Policy and implementing it.<sup>17</sup>

Under Section 5 of NTCA-1991, the objectives of the Council are:

- (a) to foster the comprehensive development of training with regard to the needs and resources of the country;
- (b) to foster the co-ordination of training institutions so that the most effective use can be made of resources available for training and related purposes;
- (c) to foster the type of training which ensures increased productivity and capacity building in the workforce;
- (d) to plan and encourage the development of a system of training fitted to the requirements of the country and its peoples;
- (e) to establish, preserve and improve standards of training throughout the country;
- (f) to make the benefits of training available as widely as possible; and
- (g) to make the most effective use of resources available for training and related purposes in so far as this can be done by legislative and administrative measures; and
- (h) generally, to augment and support the role and functions of the Commission for Higher Education as specified in the Higher Education Act (Chapter 397) (Independent State of PNG, 1991, p.2).

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<sup>17</sup> Either the converse occurred where the National Training Policy was drafted in 1989 before the National Training Council Act 1991 was enacted (Govt of PNG, 1989), or that the Policy and the Act were simultaneously formulated but approved at different times.

Under Section 6 of the NTCA-1991, the functions of the Council are:

- (a) to be responsible for supervising and managing the implementation of the National Training Policy and for monitoring, reviewing and revising the National Training Policy when necessary;
- (b) to make recommendations on any issue related to training to the National Executive Council and, where appropriate, to provincial governments;
- (c) to provide guidelines to the National Executive Council, provincial governments and the Inservice Training Institutions' Governing Councils on any issue related to training;
- (d) to propose to all parties involved in the management of training ways of making training processes more efficient, the dissemination of information more effective and decision making more relevant to the national interest;
- (e) to set out priorities for the guidance of the State Service and statutory authorities in relation to the provision of people, finance and other resources for training;
- (f) to make comment on any proposals to be submitted to the National Executive Council on the allocation and sharing of public funds, aid monies and other training resources between national and provincial levels, the public and private sectors and unemployed persons;
- (g) to formulate and publish guidelines on human resource requirements, localisation and indigenisation issues, training policies and priorities for all sectors of the economy;
- (h) such other functions as are given to it under this Act or any other law (Independent State of PNG, 1991, p.3).

The objectives and functions of the Council cover all 'training' in general and do not specifically cover any particular subject or discipline, such as, computer related training and education. IT education and training has been a subset of the broader private training activity which comes under the jurisdiction of the *National Training Council Act 1991* and the *National Training Policy*. By the authority of the NTCA-1991 (Section 3), the National Training Council was established and under Section 5(g), the National Training Policy was formulated.



#### **1.6.1.1 National Training Policy and National Training Council**

The *National Training Policy* (Independent State of PNG, 1989), was formulated by the National Training Council (NTC) in 1989 to regulate the large number of private training organisations conducting a myriad of training programs in various subjects such as accounting and bookkeeping, office management & office procedures, security personnel, salesmanship, and within the last ten years, computer related training. Even though the Policy was formulated in 1989, it was implemented in 1993 after the NTCA-1991 came into effect.

The National Training Council comes under the Ministry of Industrial Relations and is serviced by a secretariat, known as the National Training Council Secretariat. The NTC is responsible for implementing the National Training Policy.

The Policy was designed to provide clear guidelines for planning, conducting, facilitating and evaluating private training organisations in PNG. The policy consisted of objectives for training, strategies and the actions to be applied by various government departments and statutory organisations in pursuit of providing relevant training and human resource development activity in the country.

The National Training Policy requires that all private training institutions and their trainers conducting any training activity be registered with the National Training Council in order to be recognised as ‘training institutions in PNG’ (Maibawa, 1993a<sup>18</sup>). The National Training Policy also established some criteria for accreditation of individual courses and registration of trainers.

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<sup>18</sup> Hon Castan Maibawa, MP, Minister for Labour & Employment, Ministerial Policy Statement No. 1/93, November 12, Port Moresby: PNG

The registration of training institution was based on six principles. The six principles stipulate that only registered training providers shall:

- a) be the only institutions allowed to provide a particular course or training programme;
- b) deliver training with personnel who meet minimum competency standards;
- c) deliver training in an environment which is adequate for the training aims, and which satisfies statutory requirements and industrial awards;
- d) be responsible and ethical in their relationships with students or trainees;
- e) provide evidence that students will be protected from financial exploitation; and
- f) be registered for a fixed term, not exceeding five years but subject to periodic review (National Training Council, 1993a, p.5-7).

The criteria for accrediting individual Courses are:

- a) *Relevancy*. The proposed course must be in line with the training needs and priorities of individuals, organisations, and indicate potential career paths, and employment opportunities;
- b) *Course Standards*. The proposed course should be worthy of the credential being offered such as certificates. The course must have a balance between theory and practical components, and ensure that the delivery mode or teaching methods used enhances learning;
- c) *Measurable*. The proposed course must indicate the minimum level of skills the trainees are expected to obtain;
- d) *Accessibility*. The courses should be accessible to everyone who are able to pay and should not be restricted on the basis of age, gender, race, social and educational background;
- e) *Assessable*. The course must be assessed using an appropriate assessment method to measure the attainment of the planned set of skills;

- f) *Monitoring and Evaluation*. There must be an appropriate mechanism by which the course can be monitored and evaluated to revise existing course and devise new ones (National Training Council, 1993a, p.8).

The criteria for Registration of Trainers are:

- a) *Qualification and Experience*. The trainer must possess educational qualifications and experience in specific field of specialisation;
- b) *Trainer's Qualification*. The trainer must possess in addition to the educational qualifications, a 'Trainer's qualification' or equivalent from a recognised institution;
- c) *Engagement in Other Activities*. Trainers must not involve in another income-generating activity and in the event of engaging part time trainers from the public or private sector, evidence of approval (eg, Work Permit ) is required;
- d) *Engagement of Non-Citizens*. Non-Citizens must have a valid Entry and Work Permit to conduct or deliver training. Consultants are likewise required to obtain prior approval from the NTC;
- e) *Capability*. All trainers must be physically and mentally fit to deliver training, be fluent in the language of instruction (ie English, Pidgin, Motu), and be of good character; and
- f) *Referees*. Written comments from no less than three referees on the trainer's competence, capability, and character is required at the lodgement of application seeking registration to practice (National Training Council, 1993a, p.9-10).

## **1.6.2 The National Accreditation Policy**

### **1.6.2.1 Accreditation and Higher Education in Papua New Guinea**

The national accreditation policy entitled, *Accreditation and Higher Education in Papua New Guinea* was formulated by the Commission for Higher Education (CHE), to establish accreditation of programs and institutions, and to ensure and develop quality and relevance in higher education in PNG. The policy document provides clear guidelines on the recognition of various academic awards acceptable to CHE,

standardising nomenclature to promote consistency, academic autonomy and audit, program accreditation, institutional partnerships, credit accumulation and transfer, access and program recognition, international recognition of academic awards, and implementation of the accreditation scheme (Commission for Higher Education, 1995a).

The accreditation policy covers:

... all programs and awards in higher education offered, advertised or delivered. (These include) all institutions and programs now declared or recognised under the Higher Education Act 1983; all institutions and programs established under their own Acts; *all institutions located in PNG* and claiming to teach a program leading to an *academic award*; and all offshore institutions which advertise through the media academic programs and awards to be delivered onshore through correspondence, tutorial, or other means (Commission for Higher Education, 1995a, p.1-3) (*emphasis added*).

The majority of the private computer training organisations award some form of 'certificate' to the trainees upon completion of a set program, thus satisfying *academic award* criteria and therefore falling within the scope of the above policy. The fact that the private training organisations are *located in PNG*, further meant that such training organisations fall under the scope of the above policy statement. However, there is no evidence<sup>19</sup> to suggest that the different certificates awarded by the private computer training organisation were endorsed by the Commission for Higher Education. Possible explanations for this are that: (a) the above policy is yet to implemented, and (b) a separate accreditation body within the National Training Council was to be responsible for accreditation of private training organisations (National Training Council, 1993a). The latter has neither been established nor its activities publicised.

### **1.6.3 PNG Information Technology Policy for the Public Service**

Like many ad hoc approaches undertaken to formulate policies in PNG, the *Information Technology Policy for the Public Service* was developed by the Information Technology

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<sup>19</sup> Observed by the researcher between the research period in June 1996 and the writing of this thesis in 1997.

Board of the Department of Personnel Management (1991). This policy was developed because the government recognised that computers would play an important role within the changing life and culture of the Public Service, and to assist in decision-making and delivery of services in PNG (Department of Personnel Management, 1991). The policy's objectives are to:

- improve productivity and efficiency of individuals and organisations within the public service;
- match the equipment used to PNG needs and conditions, to establish standards and to maintain corporate information systems; and
- promote human resource development.

The policy covers all public sector computer equipment and information systems acquired from government budgets, foreign aid funding or through other donor agencies and sources.

This policy exclusively addresses IT procurement, development, and applications within the Public Service and does not include the private sector. While this policy initiative has been applauded as a significant policy-decision, and for taking a bold action to introduce IT into the public service, it has raised more questions than it has provided answers. For example; How enforceable are the IT standards established, whether the right IT skills have been identified, whether the coverage of the IT Policy is wide enough, will the implementation of the policy change the organisational culture, and to what extent the policy will be implemented (Sinebare, 1993)?

The private computer training organisations appear to be indifferent to the existence of such a policy as they embark on pursuing their individual training and corporate goals. The private training organisations pursue their own interest by adopting training programs and training standards including procurement of hardware systems and standards other than those established for the public service. There is now a dichotomy

in the computer education and training scene in PNG because the public sector was supposed to implement the IT Policy for the Public Service, while the private training organisations do not have IT related policy guidelines to conduct computer education and training as well as pursuing their individual corporate goals.

The above situation poses several problems which are of concern in this thesis. First, human resource development in the computing field which has a lot of economic and social benefits has not been conducted in a planned and organised manner. Much of the private training conducted now is in response to short term human resource needs, especially in computer software application area. The long term human resource needs for computer related jobs such as software development or software engineering, systems analysts, information systems experts, and computer scientists have been largely ignored by the private providers because education of such specialists were traditionally and are still the responsibility of the universities. The universities on the other hand have not been graduating students in sufficient numbers in these fields to meet the workplace requirements. This lack of skilled graduates no doubt is the result of poor planning, coordination and execution of IT related education and training in both the private and public training institutions in the country.

Under such circumstances, training opportunities have been concentrated at the base of the IT skills pyramid (mostly for short training courses aimed at computer applications users). Progressing further up the pyramid, the IT skills at undergraduate and postgraduate level training have been in very short supply and therefore have to be recruited from abroad.

In addition, the different training programs conducted have wide disparities and contain serious discrepancies in the individual curriculum offered (discussed further in Chapters 5 and 6). For these reasons, it is not only impossible to establish some kind of parity in the standard and quality of training conducted so far by the private computer training

providers but also difficult to determine the quality of training conducted in the future under this scenario. In other words, ‘ a line of best fit’ cannot be established for the various training programs conducted by the private computer training organisations in PNG under the current situation.

From the above cases, there has been a situation in which;

- a) where the policy exists (for example, the IT Policy for the Public Service) little effort has been made to develop and implement computer education and training in the public sector in order to educate locally the computer professionals required in the public service; and
- b) where there is no policy (for example, in the private computer training organisations), computer education and training activities are conducted as a commercial activity and have both increased and prospered in a business sense but pose serious questions in terms of standards or quality of IT education and training.

Possible reasons for the current scenario in which private computer training prosper are that:

First; the *National Training Policy* was formulated well after the private training organisations were registered and operated as commercial entities under the authority of the *PNG Companies Act* and *Income Tax Act*. Only in the last two or three years, have private training organisations begun to formally register with NTC and complied with its requirements. By 1996, there were still some private computer training organisations which did not register with the National Training Council but were conducting computer courses under the *Companies Act* (as amended) which resulted in further perpetuating the many discrepancies highlighted in Chapters 5 and 6. There appeared to be many discrepancies in both the *National Training Policy* and the *Companies Act* which forced the private training organisations to register under the *Companies Act* and at last report, the known loopholes were being addressed by the various agencies responsible for implementing the relevant policies (*The Independent*, May 9, 1997).

Second, the national accreditation policy (*Accreditation and Higher Education in Papua New Guinea*) was formulated by the Commission for Higher Education (CHE, 1995a) for implementation by *all institutions in PNG* but has not been implemented by the private training organisations. Possible explanation for not implementing the accreditation policy are that:

- a) private training providers do not come under the aegis of the CHE;
- b) private computer training organisations are not conducting ‘higher education’ programs at graduate or postgraduate level; and

there is a lack of coordination between the relevant authorities charged with the task of implementing the various policies and coordinating them between the relevant agencies (*The National*, June 16, 1994<sup>20</sup>).

Third, the *Information Technology Policy for the Public Service* was developed for the Public Service to implement, and was not intended for the private sector. This policy is intended to continue introducing computer systems into the Public Service and enhance existing information systems, liaise and cooperate with training institutions. The objectives of the Public Service IT Policy are to:

- a) improve the productivity and efficiency of the public service;
- b) ensure that the technology used is appropriate to local conditions;
- c) establish and maintain a corporate information system; and
- d) develop human resources required (Department of Personnel Management, 1991).

However, no insight is provided as to how IT human resource requirements for the different positions of the Public Service would be trained, where the required staff would be trained, and to what extent the training for these positions will take place (Sinebare, 1993). The IT Board which initially operated under the Department of Personnel Management has been inactive since but in a recent report, the government

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<sup>20</sup> Mr Gabriel Dusava, Foreign Affairs and Trade Secretary was quoted by *The National* (1994). Why govt policies are held up, June 16, p. 2.



established the National Centre for Information Technology to implement information systems throughout the public sector (*The National*, May 2, 1997, p.11). The main function of the centre: '...will be the coordinating agency for implementation of government policies... (related) to the use of computers and information systems throughout the public sector.' (ibid).

The current situation in which government policies have not been properly coordinated and implemented as described above are due to the lack of:

- a) financial and human resources;
- b) responsiveness, articulation, cooperation and commitment by public servants whose job was to understand the bigger picture of the policies and ensure that they were implemented (*The National*, June 16, 1994<sup>21</sup>);
- c) coordination and cooperation between political decision-makers and the implementers (ibid<sup>22</sup>);
- d) guidelines and policies to ensure the contribution of both public and private training institutions in IT human resource development; and
- e) liaison and consultation between departments and statutory authorities and other agencies to facilitate effective coordination, implementation and monitoring of the various policies at all levels of government and private sector.<sup>23</sup>

The lack of resources and lack of a coordinating agency to facilitate, consult, liaise and coordinate between the different agencies were identified as some of the major impediments by Tauwaole (1996).<sup>24</sup> Further, formulation of a relevant policy, design of a computing curriculum, and implementation of such a policy and curriculum at present

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<sup>21</sup> Sir Alkan Tololo, Chairman of the National Broadcasting Commission was quoted by *The National* (1994). Why govt policies are held up, June 16, p. 2.

<sup>22</sup> Mr Gabriel Dusava, Foreign Affairs and Trade Secretary was quoted by *The National* (1994). Why govt policies are held up, June 16, p. 2.

<sup>23</sup> Chairman of the Policy Coordination Monitoring Committee (Not named) was quoted by *The National* (1994). Why govt policies are held up, June 16, p. 2.

<sup>24</sup> Personal Communication with Mr Wesley Tauwaole, Coordinator, Private Training Organisations, National Training Council Secretariat, Port Moresby: PNG, (Diary of Interview notes; July 2, 1996)

are occurring on an ad hoc basis within the private computer training scene. It is therefore, highly unlikely that IT related human resource requirements of the country will improve for as long as the following characteristics hold:

- the different agencies have no new resources allocated;
- there is no coordinating agency to actively facilitate and coordinate the implementation of the various policies between the different agencies;
- the private training providers and their training programs remain unregulated; and
- no official guidelines or policies are established for IT human resource development.

#### **1.6.4 PNG Science and Technology Council Act 1992**

The *PNG Science and Technology Council Act 1992* (Independent State of PNG, 1992), was enacted in 1992 to establish a Science and Technology (S&T) Council, just like the *National Training Council Act 1991* was enacted to establish the National Training Council.

The composition of S&T Council is to be headed by a Chairman with appropriate science and technology qualification and background and will include ten other Councillors appointed by the Minister ‘responsible for science and technology matters’. The S&T Council will be serviced by a S&T Council Secretariat.

The Council has not yet been established, although the last government of PNG approved the creation of the Ministry for Energy and Science which will be responsible for PNG S&T Council Act 1992 (*The National*, May 2, 1997). The new government when announcing its policies upon coming into office after the June 1997 election made no mention of S&T (*The National*, July 30, 1997, p. i-iv). Further, the new government vested the ‘Energy’ and ‘Science’ functions with two separate ministries; Petroleum and Energy, and Education, Culture & Science respectively (*The National*, July 30, 1997, p. xii). It remains to be seen what the developments on the S&T front will be like during the life of this Parliament.

While the list of functions of the S&T Council are comprehensive, it is circumstances such as the change of government and consequent change of priorities that does little to facilitate and initiate S&T developments in the country. Without establishing a formal S&T Council, the list of functions established for S&T (in paragraph 3 of the *PNG S&T Council Act 1992*) would remain where it is written, and IT education and training in the country which is a subset of science and technology is likely to remain undeveloped for the years to come. Further, the demands for key positions in the IT profession will remain to be high and thus become a major obstacle to progress at all levels of public and private sector in PNG.

### **1.7 Private Computer Training Programs**

Private computer related training organisations refer to those commercial training firms conducting or running any computer related courses on a commercial basis. The commercial training refers to a training program designed and provided by either institutions, corporations or individuals where: (a) training course fees are charged; (b) training is available to either a specific group or the general public; and (c) the training is conducted by individuals, corporations, or a training institution in cooperation with other parties and is acceptable to the National Training Council (National Training Council, 1993b, p.12). The courses range from beginner level, to intermediate and advanced levels with varying degrees of content and methodologies. The courses conducted are very rudimentary by developed country standards but this is an essential initial step in the right direction. (The details of Private Computer Training programs or curriculum are provided in Chapter 6).

The curriculum or the course content offered by the private training providers are solely designed and developed by the individual training organisations to suit their particular client base. The teaching methodologies and administrative framework also vary across the training providers. Course design including course materials, course outlines,

programs, teaching methodologies, and assessment procedures and evaluation system also differ immensely. There are several serious problems with this type of flexibility in the private computer training organisations:

- Firstly, the training conducted concentrates more on the low level data entry staff and less on higher levels such as Systems Analysts, Designers and Programmers;
- Secondly, training programs are profit-oriented and the human side of training such as career paths, further and higher educational opportunities, and value for money issues are given little or no consideration;
- Thirdly, there is no logical career path in which a training program in one institution is used as a stepping stone to completing a course offered in another institution (Accreditation issue); and
- Fourthly, there are serious discrepancies in the: individual courses conducted, training institutions, trainers and training providers, teaching resources available, and the curriculum designed which have been highlighted earlier (Whitty, 1992).

The training providers are required by PNG's Income Tax Act 1959 (Sections 196Y and 196Z)<sup>25</sup> as amended to register as a private company but prior to registration, training providers must also register with the National Training Council under the Act of the same name by depositing course materials and their Three Year Training Plans (Arua, n.d.; National Training Council, 1993a). Hence private training providers find this to be confusing as to which authority is responsible for which functions.<sup>26</sup>

There is no formal scrutiny in the form of national examination and neither is there supervision, inspection or evaluation conducted by an independent external body. This independent scrutiny if available or established could:

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<sup>25</sup> Personal Communication with Ms Bonnie Dobunaba (formerly) of Internal Revenue Commission, Port Moresby: Papua New Guinea. [Letter dated 30.5.94 ref: AS633/ASSG].

<sup>26</sup> Personal Communication with a Training Provider in Port Moresby, June 1994). The training organisation was not registered in PNG. (The individual requested not to be identified.)

- a) impose on the training provider to maintain and implement the established standards in their individual training programs;
- b) empower the government to ensure that only those training providers with the capacity to adapt their training programs according to the standards established to bid for education and training of computing professionals required in the workplace;
- c) give credence to the training program, the curriculum, the certificates awarded; and
- d) convince the employers, trainees and the general public to have confidence in the standard and quality of training program delivered.

At present the quality control measures are left entirely to the individual training organisations to incorporate and implement as they see fit within their individual set up. Such a scenario allows the individuals concerned to pursue conflicting and non-standard training practices. This scenario creates and promotes ‘irregularities’ or discrepancies in the individual training programs and hence the whole private computer training industry in PNG can be simply described as chaotic. (The concept of chaos is further elaborated in Chapter 10).

## **1.8 Rationale of the Research**

The rationale for this study was to investigate the present training practices, ie. training methods or schemes, course content and general curriculum, assessment methods, and certification and accreditation systems of the private computer training organisations in the light of existing policy and legal framework in PNG. It is envisaged that from this exploratory investigation, the research results based on the questionnaire, document analyses, interview notes, and personal insights gained about the training programs will form the basis for offering several suggestions and putting forward a set of recommendations to different authorities for their consideration and action.

The overall aims of this research are to:

- a) observe, examine and study existing private computing curriculum practices in PNG and elsewhere in other developing countries;
- b) determine what particular aspects of the existing private computing curriculum need to be revised, adopted, formalised, and incorporated into an appropriate IT policy and IT curriculum;
- c) make qualitative analysis of the various sources of qualitative data collected;
- d) analyse some aspects of existing policies with regard to IT education and training;
- e) offer suggestions and make recommendations based on the analyses of the data to the various agencies in PNG; and
- f) propose a course of action to strengthen existing positive aspects of the training practices, eliminate negative aspects of the training practices, and give private computer training the necessary attention it deserves.

## **1.9 The Research Questions**

In order to develop an appropriate computing (IT) policy and informatics curriculum framework in the context of private computer skills training and development in PNG, the following research questions are proposed:

- 1) What is the nature of computer skills training and development methods or schemes used by private training providers in PNG? Does it comply with the guidelines of the National Training Policy? [This question is aimed at identifying the similarities and differences between private training providers conducting computer related courses in the country.]

What are the views of the private training organisations involved in computer education and training in PNG on the *National Training Policy*? [In order to answer this question, a Questionnaire<sup>27</sup> was used to obtain information addressing various aspects of the Policy].

- 2) Are the existing policies (eg The National Training Policy, The PNG S&T Council Act 1992, and PNG IT Policy for the Public Service) effective for or conducive to facilitating IT education and training in PNG? [This question is intended to analyse existing policies related to IT education and training in the country].

What are the characteristics of an appropriate curriculum on computing skills training in PNG private computer training organisations? How can these characteristics be translated and incorporated into future government policies in the context of computing (or IT) education and training curriculum? [This question is intended to identify the pedagogy (Teaching styles and methods, Assessment procedures and evaluation systems), and the curriculum model used in the private computer training organisations.]

## **1.10 Summary**

Computer systems ranging from microcomputers to mainframes are becoming popular and pervasive in the workplace in PNG. The people who possess computer skills are rare and in short supply but the workplace demands for people with computer expertise and qualifications are growing exponentially.

Private training organisations are involved in conducting computer applications skills education and training. The private computer training organisations are legally bound by:

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<sup>27</sup> An 'Opinionnaire' is annexed at the end of Appendix A as: *Private Computing Skills Training Providers' Attitudes Towards the PNG National Training Policy*.

(a) the *National Training Policy* as the guide to ensure that: training standards are maintained, training organisations are registered, qualifications awarded are credible or recognised, trainers are sufficiently qualified, training programs developed by private providers are effectively managed or delivered;

(b) the *PNG Companies Act* and *PNG Income Tax Act* (as amended) to register and operate as a private company (for taxation purpose) and to conduct a commercial activity in the country; and

(c) the *Accreditation in Higher Education in Papua New Guinea*, provides a policy statement which states that any training conducted in PNG for an academic award must be of an acceptable quality and standard in order for it to be recognised within the country in accordance with the accreditation policy statement.

Further, the *PNG IT Policies for the Public Service* and *PNG Science and Technology Council Act 1992* are two other policy and legislative initiatives undertaken by the government but have limitations in scope, and therefore do not incorporate private sector involvement in computer education and training in the country.

This study seeks to provide the basis for putting the context of computer education and training into perspective in terms of the current legal and policy framework under which computer related education and training in PNG in both the private and public sector institutions is being conducted.

In the current scenario, the demand for people with computer skills is high and growing, and so is the demand for computer courses from people wanting to obtain IT related education and training. This has resulted in the growth of the number of private computer training providers in PNG. The private training providers operate as a commercial entity by the nature of their registration as a ‘company’ and not as an



‘educational institution’ per se. Their training program is unchecked, while the quality and the standard of training offered remain ambiguous, obscure and unregulated because of the inadequacies in the various policies and the lack of coordination within and between the various agencies responsible for implementing the different policies.

In such an environment, there is potential for abuse of the existing policy and curriculum framework by the different computer training providers. It is in this context that this research is being conducted to provide possible solutions to regulate or formalise IT education and training in PNG as well as to propose for the formulation of appropriate IT Policy and Informatics Curriculum guidelines or framework which will then guide PNG to take a national approach to IT development, implementation, and applications in the country in general so that private computer education and training is conducted with a view to achieving both national and corporate goals.

Government policies such as the *National Training Policy* and *Accreditation and Higher Education in Papua New Guinea* were developed and adopted to formalise the ad hoc commercially-run training organisations in PNG. Other initiatives such as *Training Levy, Screening and Accreditation, PNG IT Policy for the Public Service*, and *PNG Science and Technology Council Act 1992* have been presented and their inherent effectiveness and inadequacies highlighted.

The context of the problem of non-formalisation, unregulated training programs and the myriad of problems associated with such a training environment will be outlined and examined in this study. In the broader context there is a preference by Western Governments for market oriented economies, (where competition in business enterprises are encouraged and markets are allowed to determine their success or otherwise), Papua New Guinea has reluctantly followed this global trend. PNG does not have a competition policy or law due to very little private sector investment as a result of government monopolies in many statutory organisations (Orere, 1999, p. 11). This

competition policy would encourage facilitating effective competition to promote efficiency and economic growth. Despite the absence of competition policy, the PNG government is determined to corporatise or commercialise much of its commercial interest as evident in the last couple of years.

## Chapter 2

# Computer Literacy & Developing Countries

### 2.0 Introduction

There is a plethora of cases described in the literature in the form of journal articles, conference papers, reports and books on the topics of computer literacy, computer awareness or computer appreciation, and computer and information science courses. Of particular interest in this chapter are the terms ‘computer’ or ‘technology’ literacy, and Information Technology (IT) education and training in various modes employed in the developed countries and developing countries (DCs). This chapter will mainly focus on some of the attempts and experiences in the developing countries.

It will begin with establishing a definition of computer literacy before attempting to describe briefly computer education/literacy in developed countries. This will be followed by a description of computer education/literacy initiatives attempted in selected developing countries. This is then followed by a classification of DCs into ‘*advanced*’ and ‘*laissez faire*’ categories as respectively defined by Lau (1981) and Munasinghe (1989).

Governments in DCs which pursue a centrally determined and implemented computing or informatics policy and curriculum are classified here as *advanced* whilst those with market-oriented non-interventionist approach to computing or informatics policy and

curriculum are classified as *laissez-faire*. Many smaller developing countries fall somewhere between these two extreme classifications. A rationale for introducing computer literacy in developing countries and the unique features specific to *advanced* and *laissez-faire* DCs as well as those common to both are highlighted.

This review is selective in order to paint an overall picture of the present computer education and computer literacy activities and initiatives in the developing countries.<sup>1</sup> It is particularly hoped that any subsequent discussion on computer education in PNG will be seen in the light of this general overview of IT education activities conducted in the developing countries.

## **2.1 Definitions of Computer Literacy**

There is no one accepted definition of Computer Literacy because it means different things to different authors to suit their particular interest and context (Webster & Webster, 1985). This is further exacerbated by the fact that computers and related educational technologies are continuously evolving (Bostock & Seifert, 1986b). Therefore, computer literacy as a definition also varies as educational technologies change to include the changing demands imposed on the user at different educational levels. For this reason, Webster & Webster (1985, p.2) advanced the notion that:

...computer competence addresses the question of what knowledge and skills people should be able to demonstrate at varying level, and as such is a more useful construct than the term computer literacy.

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<sup>1</sup> Please note that some information in this chapter may be 'out of date' but all attempts have been made to obtain the latest information. However, it must be borne in mind that in many Developing Countries, it is not only difficult to obtain the most current literature on IT education and training but also in many other areas as well. Much of the latest literature (if any) are still difficult to access either because nothing has been written or that the sources consulted failed to locate any such 'up to date' information. The information that 'seem' to be dated in some instances are still valid and holds true for the purpose of this review in the absence of any 'current' information.

Therefore, the term ‘computer literacy’ refers to the competency level achieved by students or trainees at different stages of their education in order to demonstrate or perform an action confidently and competently either as part of their education or in preparation for a job.

The definition of the term computer literacy varies in the literature because what one considers as an acceptable definition may be disputed by another or even propose yet another definition. The following examples attest to this issue. For example, Bostock & Seifert stated that:

...computer literacy includes the psychomotor skills necessary to operate a microcomputer, knowledge of the principles of hardware and software functioning, of important applications of computers and their social implications, and certain attitudes to computer use. (Bostock & Seifert, 1986a, p.2).

While another definition stated that: *‘...computer literacy ... means facility at using the personal computer and more specifically at using software run on the computer.’* (Amador, 1986, p.79). Yet another definition according to Kearsley (1990, p.867), computer literacy: *‘...refers to teaching people how to use computers to do their jobs. Thus it refers to teaching people **about** computers rather than teaching **with** computers.’* Even as recently as 1996, Seamus (1996) argued that ‘computer literacy’ is a misnomer which makes it difficult to prescribe a definition and therefore proposed a new terminology ‘comperacy’ instead of computer literacy. The term ‘comperacy’ denote: *‘...just the skills required to use a computer...’* (Seamus, 1996, p. 166).

Gantt (1985, p.51) on the other hand is of the view that computer literacy goes far beyond the successful use of computers to include programming and understanding what happens mathematically, logically, and/or electronically, inside a computer. Others like Turner (1987), argued that computer literacy is a dead issue because many people are using computers like a pencil or calculator, or simply as a tool (Taylor, 1980), and therefore computer literacy does not require any special attention. However, this author supports the view held by Bruwelheide (1984, p.6) that: '*... computer literacy is a prerequisite to effective participation in an information society and as much a social necessity as verbal literacy.*'

There are already different and wide ranging views of what computer literacy means as revealed from the literature. Computer literacy is a phrase that will never have a precise definition (Gilbert & Wiley, 1985), because of the rapid changes in the development of computers and information technology areas and the corresponding demands imposed on curriculum and education.

Thus in this study, the term computer literacy is taken to mean competent usage and effective application of computer technology wherever it is present in the workplace, homes, industries and the society in general. Computer literacy is essential for one to achieve both short term and long term objectives. Here computer literacy requires training in logic for logical thinking, decision-making, care in planning, organisation, presentation, and communication skills to present the solutions arrived at or an outcome achieved. Computer literacy must develop critical, sceptical, and analytical skills to be able to criticise and analyse one's own solutions or actions. Computer literacy includes computer related skills on the one hand, and knowledge in and application of

information technology in education in general on the other which will be broadly referred to as IT education and training in the remaining chapters.

Computer literacy here can be likened to driving a car. Once one knows how to drive one brand of car, that skill can be transferred to driving another brand of car with minor adjustments and familiarity. If one knows how to drive a Japanese made car, there is every possibility that one can also drive an Italian car. The difference may be in the price. One needn't be a certified motor mechanic or an engineer in the different engine component systems of the car in order to drive. However, the driver should be able to identify and attend to some basic things such as determine what fuel type to refuel, when to refuel, how to replace a flat tyre, and be able to drive on the public roads. It is similar with computer literacy. A person is computer literate if s/he is able to use a computer to perform a specific function related to his/her jobs. The user is not necessarily trained to drive a specific type of a car but to drive all types of cars, even those that have not yet been manufactured (Nydahl, 1990). In that way the trainee or student is prepared to act intelligently in both familiar and unfamiliar situations when confronted with educational technologies.

As computer technology advances, computer literacy demands on the users also increase which would include knowledge and successful application of areas such as application software, hardware, multimedia, telecommunications and information technology in general. Information technology education and training while it incorporates an all-encompassing terminology, also includes the term computer literacy and its broader application in private computer training organisations in PNG whenever it is used throughout this thesis.

## **2.2 Computer Literacy in Developed Countries**

Much of the existing literature on computer literacy is dominated by the experiences, efforts, applications and developments occurring in the developed world or industrialised nations. The ever growing volume of print materials (eg journals, books, and pamphlets) and electronic media (CD-ROMs, WWW pages) from developed countries reflects the advance in information technology and the advanced stage at which computer education and training occur at different levels of the education systems. Hence, most of the citizens in the industrialised countries are generally aware and literate in computing and other technologies compared to the citizens in the developing countries.

Descriptions in the literature reveal that computer literacy is implemented at all levels of the education system beginning with pre-school level right through to university levels. At each successive level, computing is applied with varying degrees of complexities throughout the school curriculum and/or subjects at different levels to achieve wide ranging goals and objectives. Computers are used in various forms in education. For example;

- a) computer adventure games have been used to stimulate learning at pre-school level (Angwin, 1990);
- b) computers have been used to make language learning meaningful for students in primary schools (Pacey, 1990);
- c) computers were introduced into mathematics classroom to teach introductory calculus concepts (Butler, 1990),



- d) computer were used to introduce computer science elements into mathematics classes in secondary schools (Bottino & Furinghetti, 1990); and
- e) computers were used as tools in schools in which students adapt computers to suit their individual learning needs (Haney, 1990).

Computers have also been used in post-secondary and tertiary institutions such as colleges and universities in various forms which initially began at primary school and eventually at the tertiary level. For example, teaching advanced computer graphics and animation technics at an undergraduate level (Suffern & Murray, 1990), teaching students about information systems design at universities (Mantelaers & Creusen, 1990) and teaching university students to develop multimedia products (Fieldman, 1990). 'Computer education' at the university level is changing both in content, teaching delivery or strategies, as a result of the changing computer technologies as it applies to education (Lidtke, 1990). For example, it changes from a teacher as the source and disseminator of knowledge to a facilitator and initiator of learning.

Not only do we find computer literacy in the formal school system but also in adult and continuing education contexts as well. Computers and information technology skills and strategies have been applied to bring about awareness and literacy among the citizens. For example, information technology has been applied in continuing and further education courses in adult education setting for adults, senior citizens and non-expert general public (Austin, 1986; Bernard, 1986; Gerver, 1986; Mruk, 1987; Vincent & Vincent, 1985).

The need to be computer literate is evident in many commercial and statutory organisations as well as other areas of specialisation which embark on on-the-job-training and in-house corporate training in order to develop staff expertise relevant to the organisation-specific needs. There are many such computer literacy approaches undertaken by various organisations which are briefly presented below.

For example, an approach undertaken to achieve computer literacy for the faculty in an American university (Hertsgaard *et al* , 1985/6), included conducting summer workshops, peer group presentations, hands-on assignment, and project development. The workshops conducted include lectures and demonstrations. The computer literacy project initiated increased computer literacy among staff and showed that there are staff who are willing to make time available outside official time to learn.

In Britain for example, field staff such as technical managers and technicians have been brought in and training conducted through the use of CMI and CAI in a private organisation such as British Telecom (Lamb, 1988). This training approach has several advantages and disadvantages. The advantages include; individually phased, trainee centred, shortens training time, and reduces training cost, while the disadvantages include large initial outlay and increase in initial design staff. The trainees identified for such training come in whenever it is convenient for them and follow through the CMI program at their own pace and achieve the aim of the training.

Also in Britain specialist computer courses have been developed to teach business or general office managers about computer applications in office management procedures (Bostock & Seifert, 1986b). The computer literacy project in this case includes; full access to hands-on activities, incorporate problem solving in a business environment,

encourage good management practice and principle, and practical input encouraged from trainees based on their individual experiences in similar business contexts. The course content includes applications relevant to the commercial environment such as software, hardware, and wider implications such as health, safety and legal aspects of applying computer technology in the workplaces. This makes training meaningful to the trainees to survive in the real world after the training period.

In Sweden, computers were used in vocational training in order to provide the trainees the essential technological skills relevant to their future occupations in the workplace (Nydahl, 1990). For example, in technical drawing trainees were introduced to autoCAD software to enhance technical drawing done manually and complement that with the use of the software; and business studies principles to balance a ledger by traditional methods before using an accounting software to perform the similar functions as well as simulating other accounting scenarios. In another case, the use of simulation on different load carriers (eg lorries, boats, wagons) was done using a simulated environment to establish correct loading and avoid costly damage. Vocational computer training has been integrated into different subjects in ordinary classrooms rather than in specially designated computer rooms.

Many countries in the industrialised world allocated resources and were committed to the introduction and development of computer literacy or computer education and advancement of information technologies in their respective educational systems. Each context is different and every policy is designed to serve its own particular needs and aspirations. For example, Galvis (1989), reported that in USA at the elementary school levels 36% of computer time was devoted to computer literacy while at the secondary

level 64% of time was dedicated to computer education. Computer education in secondary schools requires additional content and resources, and therefore, is more demanding than what was taught at elementary school and hence more time was allocated in secondary schools than in elementary schools (Becker, 1991).

As has been described in the foregoing paragraphs, the subjects covered are wide ranging and the potential for future application of computers in society and in education in particular is only limited by; the willingness and imagination of the educators to apply the technology in the various educational institutions and the limitations and potential imposed by the technology available. Computers in developed countries, particularly in education and training have been used in many different contexts to achieve both long term and short term educational, social, and cultural goals. In education and training, computers are being used as an important but powerful educational tool at different levels of the education system to achieve different goals and purposes.

In sum, it is necessary to restate here that computer literacy means acquiring and learning the necessary skills, values, attitudes, and knowledge or the content about the computer's potential and limitations, in order to apply them in one's workplace, home, society and wherever technology is available to achieve specific goals so that one can adapt, use or apply and coexist with the changing technologies successfully rather than being left out of the picture. Computer literacy refers to teaching people *about* computers, what it can and cannot do, and how they can be used by the individual within their immediate environment. In this context, computer literacy skills would enable one to apply computers as a *tool* to perform the functions which the computers can do well by complementing other available methods and approaches to free up the

individual from unnecessary time-consuming and error-prone tasks and use computers to improve the quality of one's work.

### **2.3 Computer Literacy and IT in Developing Countries**

The introduction and development of information technology in education in developing countries began haphazardly between 1960's and 1980's. The need for computer literate personnel arose from developments such as systems of government or bureaucracies including education. The models of development are either replicated or adapted from the developed countries. Since developing countries have had a tendency to adopt patterns of education of their former colonisers (Argila, 1975), the same is also true for the introduction of computers in schools. Odedra (1992, p.51) and Quarshie (1990, p.120), have both confirmed that the computing curriculum used for instance in African universities or polytechnics has either adapted or replicated the ones developed by similar institutions in developed countries.

Developing countries are new players in the IT field and are actively making headway into introducing computer technology into their respective countries although the rate and magnitude of such introduction varies from country to country (eg Bhatnagar & Odedra, 1992). China, Singapore, Sri Lanka, Thailand, Philippines, India, and Pakistan have actively placed priority for introducing computers into their countries and to establish formal structures at the highest political level to promote and coordinate the adoption and introduction of computers (Hawkrigde *et al*, 1990). These countries have limited natural resources but have high growth within the IT industry. Given the large size of the domestic market (eg, population base) countries like India, China and Pakistan have endeavoured to plan the IT infrastructure development and applications in

their respective economy (Bhatnagar, 1992a). On the other hand, many other developing countries have limited domestic market and are hamstrung by the lack of indigenous IT industry, scarcity of foreign exchange earnings, and the small size of their respective economies left them to take a less formal and less aggressive approach to implementing and adapting IT.

## **2.4 Overview of Computers in Education in Developing Countries<sup>2</sup>**

Developing countries differ in diverse and unique ways from one another and their respective colonisers. However, countries like China, Egypt and Jordan have never been colonised. Whether a country is classified as a developing country or not depends on the following general characteristics such as:

- a) recipient of a foreign aid program from developed countries;
- b) reliance on exports of primary products rather than manufactured ones;
- c) little research and development activities with a corresponding low high-technology and scientific development base; and
- d) a less industrialised economy (Bhatnagar, 1992b).

Other significant indicators have also been used by world bodies such as the United Nations as a standard measure by which to categorise countries in order to compare and establish the different living standards and level of socio-economic, scientific and technological development. These indicators identify where government priorities (socio-economic, scientific and technological) are to be placed, and necessary resources

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<sup>2</sup> It should be noted here that IT Education in both Developing Countries (DCs) and Newly Industrialised Countries (NICs) are described and highlighted. The purpose here is to show that NICs were once a DC but have come a long way to make technological advancement.

from internal and external sources are channelled to fund special projects in order to improve areas which need urgent attention. By focussing on such areas, *inter alia* (eg., high people per telephone density; high population growth; high infant mortality rates, high illiteracy rates; and high people per doctor ratios (*Asiaweek*, 1993; The World Bank, 1996; Todaro, 1989; United Nations, 1992), the developing or least developing countries take necessary steps to improve their standard of living as well as help them develop economically. Placing priorities in information technology education in most developing countries is given little or no attention at the expense of other more pressing socio-economic development agenda. Priorities are placed where the limited resources can benefit the greatest number of people, such as health services, basic education and maintaining these services.

In many developing countries IT has been promoted in the higher education through mechanisms such as establishing departments or institutes (Okot-uma, 1992). The Institute of Informatics Technology in India, and Department of Computer Science in Nigeria and Zimbabwe are examples where IT has been initially introduced. Okot-uma (1990) claimed that IT education and training in developing countries can be categorised into four generic forms:

- (a) as part of the traditional mathematics subjects in undergraduate and graduate courses at universities;
- (b) as a subject built into the non-mathematical subjects such as management informatics and administrative informatics;
- (c) as a subject or discipline in its own right such as computer studies and computer science; and;

(d) as an awareness, literacy or popularisation courses conducted at various levels such as schools, and in-house training for public servants and management personnel.

In PNG, a fifth may be added to the above list where the private computer training organisations aim to bring applications-oriented, computer knowledge and skills to those who have had no access to IT education and training through the formal education sector. This point is different from (d) above because IT education and training are conducted by commercial operators as a commercial enterprise in an ad hoc fashion which is of interest in this study. The presence of private training providers in other developing countries (eg. India, Malaysia, Singapore, and Botswana) and their current and potential future contributions towards human resources development in IT related fields have been acknowledged (Bhatnagar, 1992a; Mothatlhedi, 1990; Nordin, 1992; Okot-uma, 1992; Pawar, 1992). Private computer training in PNG forms the impetus which motivated the author to conduct the research for this thesis. It is further addressed in Chapter 6: Private Computer Training in PNG.

The following sections provide an overview of the current computer literacy approaches (or computer competence education and training) in developing countries. Computer literacy is a subset of IT education and therefore encompasses computer competence training. However, IT education is more theoretical and technically oriented. The discussion will describe IT education efforts in different countries under regional categories in which most of the developing countries are located: African, Asian, Caribbean and South American, Middle Eastern, and the Pacific Islands regions, and will be based on the availability of most recent literature on IT education and IT policy



in DCs (Hawkrige *et al*, 1990; Commonwealth Secretariat, 1990; Okot-uma, 1990; The World Bank, 1996; United Nations, 1992). It is supplemented by personal communications from professional contacts with learned individuals in some countries who have shared information with the author.

## **2.4.1 African Region**

### **2.4.1.1 Botswana**

Computers were first introduced in 1969 by the government in its Accountant General's Department but it has recognised computing as a strategic activity although its application is still reactive rather than proactive (Mothatlhedi, 1990). There is no professional computer organisation such as a computer society in the country. The user groups of the ICL mainframe computer which constitute the majority of computer users in both the government and private sector have been actively involved liaising with the government and made significant contributions in forwarding its collective views towards the government's initiative in creating a Government Computer Steering Committee. The University of Botswana was to have started a Diploma programme in 1991 which was to be followed later by the introduction of a degree course. The Botswana Institute of Administration and Commerce, somewhat similar to a polytechnic provided basic computer application skills training useful for the civil service. Other institutions have variously offered computing courses at certificate and diploma levels. Individual sectors are responsible for developing their own human resource requirements.

The government of Botswana took the initiative to formulate IT Policies encompassing areas such as procurement of hardware systems, development of telecommunications

strategy, human resources, IT strategies, and the prioritisation of IT projects (Okot-uma, 1990). The Government Computer Bureau liaised with the Education Department to provide funding for trainees to travel abroad to study computer-related courses which are unavailable in the country. The use of computers is increasing in all sectors but due to pressure from schools, the Ministry set up a computer committee to draft a policy. The vocational need of computer education seemed likely to be given approval (HawkrIDGE *et al*, 1990). There are various brands of computer hardware available. In 1990, the Ministry was intending to introduce computer studies courses in all senior secondary school to be examined nationally at 'O' Level, but in the interim period it started training teachers in conjunction with donor agencies from abroad (Mothatlhedhi, 1990).

While the government's intention to introduce computer studies in all senior secondary school is a positive effort, students in lower secondary and primary schools are without any kind of access to computing facilities because the infrastructure such as electricity is still not widely available to rural areas where the bulk of the people are. However, private computer schools with doubtful credentials are also entering the country to cash in on the opportunity to provide private commercial training, thus indicating a need for formalisation and standardisation (Mothatlhedhi, 1990).

#### **2.4.1.2 Kenya**

Computer studies and computer science are not yet recognised and have yet to appear in secondary schools in Kenya. However, the Ministry permitted a pilot computer education project (described below) to have been trialed in selected schools under a foreign aid package (HawkrIDGE *et al*, 1990). In 1988 a few Kenyan schools had some

computers mostly Apple II, Spectrum and BBC-B microcomputers which were donated in aid form. A pilot project began in 1983 at the Aga Khan Academy as part of the Computer Education Project which aims to: improve the quality of teaching using microcomputers as a catalyst; use computers as a resource for teachers in different subjects; provide the students with the general knowledge of information technology; help improve administrative efficiency using computers; and provide adequately trained staff to effectively use computers in the execution of their duties (Hawkrigde *et al*, 1990).

The Kenyan education system is meritocratic where some individuals can achieve wealth and status through education and therefore possessing education guarantees wealth and status. Kenyans placed high regard for successful performance in nationally administered examinations in order to secure better educational opportunities and hence better standard of living (Hawkrigde, 1990). Hawkrigde *et al*, (1990), reported that there was concern among teachers that computer studies was not examinable, and the novelty it presents may attract students to spend valuable time on computers instead of studying other nationally examinable subjects which may cost them university places.

Computers were first used in Kenya in the 1960s which were mainly introduced by large organisations such as East African Railways and East African Post and Telecommunications. Educational computing began at Nairobi university in 1969 and is currently taking a leading role in the country's computer education, the most recent effort being the training of information analysts (Moturi & Rodrigues, 1992). Very little by way of computer studies in schools including teacher training took place. Other privately operated adult education type courses were conducted in the evenings. Major

computer manufacturers offered in-house computer training course of a vocational nature to meet skills demand for their staff as early as 1975 (Cook, 1975).

#### **2.4.1.3 Mauritius**

Computers were introduced in the late 1960s when International Computers Limited and National Cash Register first established their operations in Mauritius. The earliest use of computers in schools took place in 1982-83 with enthusiastic teachers which Hawkrige *et al* (1990) call 'cosmopolitan' who would like to keep up with the changing times. The ministry of education took steps to introduce computers into schools in 1984 where vocationally-oriented curriculum were offered to students selected on merit while the pedagogical role of computers were not emphasised except that it may be realised when used in private by interested individuals. Some IT policy initiatives have been made in various ministries in planning and development .

The objectives of introducing computers in this manner were to: introduce computer literacy into the state secondary school programme to Form 3 students and computer studies to Form 4 students who would be examined for Higher School Certificate; encourage and support computer activities in private secondary schools. Although CAL was deemed desirable, it was placed on low priority. The priority however, was placed on vocationally-oriented aims hence the dominant rationale being the *Vocational Rationale* (Hawkrige *et al*, 1990). The government of Mauritius is serious in computer education in the country and has since established National Computer Board and State Informatics Centre. The University of Mauritius offers certificate courses in computer science and computer appreciation courses for public service officers in public financial management. The government had taken a courageous stand to abolish taxes on

computer hardware and software (Okot-uma, 1990), which made it one of the very few developing countries to do so. This helped to increase the volume of computers in the country and encouraged users to purchase hardware and software.

#### **2.4.1.4 Nigeria**

Introduction of computers in education was realised in 1984-85 through Compu-Camp conducted for primary school students using a mixture of hardware such as: Commodore, Apple, and Hewlett Packard for CAL application and Logo programming. In 1986 computers were introduced into the schools. The Ministry viewed computers to be non-elitist and encouraged computers to be made available to all students. Computer education and training opportunities exist at: primary and secondary schools; colleges of education; Polytechnic or Colleges of Technology, Universities; and private computer training institutions (Ojo & Odusote, 1992). There is no formal policy about or on computers in education and therefore the proliferation of private training institutions in the country are unregulated and no standards are enforced. Several government departments within the Nigerian Federal Government are implicitly influencing IT application and development (Okot-uma 1990). The Centre for Informatics Research and Training runs computer training programs.

However, the private institutions were seen to be serving a purpose by supplementing the public sector training institutions in creating general computer literacy and awareness in the country (Ojo, 1992a). In 1988, it established the National Committee on Computer Education with a task to plan computer education and literacy and to develop suitable curriculum for primary, secondary and tertiary institutions. Computers were placed in government-funded schools.

While there is no policy on computer education, problems such as lack of trained teachers, cost of hardware and software and use of computers mostly at universities made it unattractive for individual schools to pursue on their own. The various degrees and diplomas offered in Nigerian institutions are inadequate with regard to producing the right calibre of professionals with IT skills to satisfactorily meet the challenges and demands in the country (Ojo, 1992b). As a result of the increase in the demands for information technology professionals, the Yaba College of Technology created a Department of Computer Technology in 1989/90 to provide academic teaching in computing; conduct research in information technology; and maintain closer links with the country's computer and information technology industries (Odusote, 1992). The teaching component was to lead towards Ordinary National Diploma and Higher National Diploma in computer science (Odusote, 1992).

Universities offer first degree programmes in computer science, while polytechnics offer higher diplomas in computer studies. Approved private training is conducted by organisations especially large computer companies such as ICL and NCR. The Federal Government established a National Policy on Computer Education which empowers the Ministry of Education to equip secondary schools and begin computer training (Jaiyesimi, 1990).

#### **2.4.1.5 Zambia**

The first computers were installed in 1960s by the government to process government payroll, accounts and pension data (Okot-uma, 1990). The computer industry has been in existence since the early 1970s and as in many other developing countries, computers

have been introduced into Zambian industries by private sector organisations (Jere, 1992). Major users have been government departments, statutory organisations, and private commercial firms.

Very little formal computer education and training occurred in the school system especially at primary and secondary schools because of the paucity of funds universally experienced in developing countries (Corr, 1994). The question of lack of computer literate personnel in the country had still not been addressed in an adequate manner by the government. As a result, numerous private training institutions sprang up around the country to conduct short computer courses on an ad hoc basis to create awareness on the use of application software such as Lotus 1-2-3 and dBase III Plus, (Jere, 1992). No degrees or diploma courses are available in the private training organisations and none of these training programs were formalised.

Some private organisations were reported to be offering business and accounting courses from U.K. professional bodies such as Association of Certified Chartered Accountants (ACCA) for their staff at additional cost charged for the external examination and accreditation.

A generous bilateral aid program from the Irish government saw the establishment of the computer section at the Evelyn Hone College in 1986 which conducts a three-year Diploma Course in Computer Studies (Jere, 1992; Corr, 1994), which focussed more attention on the technical aspects of Information Technology rather than practical knowledge and understanding. This particular project while hailed as an indigenous course developed to meet Zambian needs, encountered several long term problems and

uncertainties such as: attracting and maintaining adequate staffing levels; and provision and supply of up-to-date teaching materials, deficiencies in the standard of qualification granted; and sustainability of the Diploma Program at the end of the aid project have been identified as major constraints (Corr, 1994). The ad hoc nature of computer use, procurement, application, and implementation has been exacerbated by the prolonged absence of an IT or computer policy as highlighted by Jere (1992) in an analysis of IT implementation in Zambia.

#### **2.4.1.6 Zimbabwe**

Computers were introduced in the 1960s into the government and commercial institutions but little opportunities existed for local Zimbabweans because of the dual curriculum in which local Zimbabweans followed an 'African syllabus' emphasising arts subjects while others (non Zimbabweans) followed an 'European syllabus' containing both arts and science subjects (Kadyamatimba, 1992).

The Ministry of Education in Zimbabwe encouraged developments where computers are privately funded. It established the Computerisation Planning Committee to put computers in selected secondary schools. Adoption of computer education came about as a result of pressure from many sectors of the country, mostly from: parents and principals who have combined to raise necessary funds to modernise schools; and teachers who wanted to be up-to-date professionally.

The government schools receive funds from sources like government grants; special levies imposed on parents; and raising money internally from fund raising activities. This means rural schools find it difficult to raise sufficient funds to purchase hardware



and software although some of the hardware were donated by foreign governments as part of their aid package. Schools in Zimbabwe offer computer studies at 'O' or 'A' level.

One research study into the introduction of educational computing in Zimbabwe claimed that benefits of educational computing would be realised if only the way computers were introduced in schools were determined by research evidence and implemented according to the needs of the students or trainees (Wilson *et al* , 1990). In most instances computers were introduced without proper planning based on identified needs and that such introductions resulted in failures which is also common in developing countries.

Formal computer courses were offered in the Business Studies Department at the Harare Polytechnic in 1983 as a result of the government's recognition of the fact that skilled personnel were scarce and those who obtained unstructured private training were of doubtful nature (Kadyamatimba, 1992). In 1986 Harare Polytechnic started offering computer studies at Diploma level and the university of Zimbabwe started offering a B.Sc degree in business studies and computer science. The graduates from this programme could not find jobs in industries because the course concentrated on programming in Pascal while the industries require personnel with expertise in either COBOL or BASIC. As a result this program has been modified by the combined effort of the government colleges and the Computer Society of Zimbabwe (Kadyamatimba, 1992).

Despite some efforts being undertaken at local universities, polytechnics, schools and colleges, and by an increasing number of private training centres, they were unable to produce in sufficient number adequately qualified personnel to be absorbed into the economy (Chiinze, 1990). Given this scenario and the constraints experienced in the educational institutions, the Central Computing Services (an agency which provides computer services to the government) strongly recommended the lifting and removal of import duty on all IT equipment and exemption of customs control on training materials.

The Government further established the National Computer Committee in 1988, comprised of senior public servants from other user ministries such as Post and Telecommunications, and universities, and reports directly to the Cabinet (Chiinze, 1990). The Government's computing requirements were serviced by the Central Computing Services (CCS) which operates under the auspices of the Ministry of Finance. One notable service included the processing and marking of Zimbabwe Junior Certificate examination using optical mark readers which finalised the results in record time and the public was reported to be pleased with the speed and accuracy resulting from the computerised marking of exams (Chiinze, 1990, p.368). The CCS set standards for hardware and software required in the public service.

## **2.4.2 Asian Region**

### **2.4.2.1 Bangladesh**

Computers were introduced into the Bangladeshi economy in the 1960s by public and private agencies and by the 1970s educational and research institutions started using computers (Rahman M, 1990). The advent of microcomputers in 1980s enabled further the introduction of computers in Bangladesh public service but while the application of

and demand for IT have increased in recent years, personnel with IT-related skills were in short supply. Like many developing countries Bangladesh experienced an acute shortage of qualified personnel in IT (Alam & Mondal, 1992). It took formal steps in establishing the Bangladesh Computer Council (BCC) through an Act of Parliament in 1990 to promote all aspects of IT in Bangladesh (Okot-uma, 1990), to address the issue of improving management efficiency and productivity, and to develop its human resources with necessary skills (Rahman M, 1990). The BCC was enacted with the aim to adopt, adapt and promote IT for socio-economic development in Bangladesh.

Until recently (circa 1990), no educational institution offered undergraduate or diploma programme in computer science. The Bangladesh University of Engineering and Technology began only recently to offer undergraduate programme in computer science for the award of B.Sc degree while the Bangladesh Public Administration Training Centre has been conducting in-service type training for public servants in introductory computer courses (Rahman M, 1990).

The undergraduate computer courses were mainly taught using Third Generation Technology, (referring to the generation of computers in which the integrated circuits replaced the individually wired transistors in the 1960's). Private firms or organisations were also engaged by the BCC on a contract basis to conduct training for the government. Among other positive efforts initiated, a detailed plan of action to implement IT in the country has been undertaken to drastically reduce the customs duty on imports of computers and their components from 100 to 10 percent to encourage further computerisation in the country.

#### **2.4.2.2 China**

In 1983, the Chinese government developed programs for computer education for young people as well as facilitating its growth in many ways. Government intervention in juvenile computer education, included the provision of 10-15 microcomputers for each centre involved in the program, provision of teacher training; computer related literature and textbooks, sponsoring annual national juvenile computer programming competitions, hosting conferences to share ideas and arrange for exchange of activities and visits with other countries like Hong Kong (Chen *et al*, 1987).

The government was actively involved in developing programs, providing necessary resources, committing most needed funds, encouraging different activities to popularise computer usage by way of competitions, conferences and visits, and preparing teacher training and other relevant educational materials.

Computers entered the schools in 1983-1984 and varied from provincial level to district level in the nature of use, resource allocation and curriculum planned and delivered. China is one of the few developing countries which has established a formal administrative organisations such as the State Science and Technology Commission (equivalent of a Ministry of Science and Technology).

In 1982, on the advice of Chinese computer scientists, the ministry required the existing universities to offer optional computer courses for senior high school students which initially affiliated to five universities (Qi, 1987). No funding was provided for the project by the government and therefore, the participating universities used their own resources such as facilities and teachers to provide optional computer courses in each of

their respective affiliated secondary schools (Qi, 1990). In 1987 the State Education Commission (equivalent of a Ministry of Education) established computer experiment centres and attached them to existing universities which helped to extend computer education outwards from universities to the schools. As a socialist utilitarian country its main rationale is the *Social Rationale* (Hawkridge *et al*, 1990), to provide the greatest benefit to the greatest number of students.

The national Computer Syllabus drawn up in 1986 and issued in 1987 was aimed at promoting and developing: fundamental knowledge of the parts of the computers and its uses in society; ability to design and write program in BASIC and Logo; knowledge of the operating systems of the microcomputers; and knowledge of and ability to use at least one application software such as a word processor or a spreadsheet. The syllabus recommended that students undertake computer studies for a minimum of 45-60 hours a year and that a third of this time should be spent on hands-on experience.

Computer Studies curriculum was nationally examined at secondary school level, but performance or the result in the subject was not taken into account in determining university entrance. Computer courses were optional in senior high school, while in junior high school it was taught as an extra-curricula activity. The purposes of the optional course were to: understand the fundamentals of computers, their structures and roles, mastery of BASIC language programming principles, and to develop or promote logical thinking, problem-solving ability and encouraging creativity. China has different models of hardware and software in its schools, mostly manufactured within China for use in China especially with their unique Chinese character sets.

Computer education in China is formalised with the establishment of government bodies responsible for the development and provision of curriculum materials, other relevant educational media, and teacher education programs in order to bring about computer literacy among the students. Lack of initial funds did not prevent it from introducing computer studies in secondary schools as seen in other developing countries but instead it assigned the responsibility of bringing about computer education to several of its existing institutions like universities to make use of their resources. Another important fact is that China indigenised computers into its own culture and system by developing and adapting computers and software to suit its own needs.

#### **2.4.2.3 India**

The policy to introduce computers in India was determined by the national government and the administration and implementation of this policy was left to the state governments to decide. Initially there was a government initiative in collaboration with another donor government through an aid package to bring about computer literacy. India has probably the most publicised Computer Literacy and Studies in Schools (CLASS) project which started in 1984, installed computer systems in the schools and established resource centres across the country with special purpose hardware designed for Indian conditions (Roy, 1992). It was intended for 14-17 year olds to develop computer literacy skills, and use computers as a tool in content-free across-the-curriculum mode. The objectives of the CLASS project were to provide broad understanding of computer hardware and software and their uses, familiarise students with different computer applications in human endeavour and its potential, demystify the computers, and develop students' creativity in utilising its application in their

environment. To achieve these goals, initial hardware (mostly BBC model B 32K microcomputers) and software were donated in the form of an aid package by the British government.

However, the situation in higher education is different as there are expertise and resources to provide education and training in information technology education. As Banerjeer (1990) pointed out, obtaining computer hardware was no longer a problem but non-availability of trained personnel and lack of relevant educational software were causing problems in information technology development and implementation strategies.

According to Wasan (1992), the government identified the potential for software export as one of the major industries given the availability of highly educated personnel in India and has instituted measures to enhance and promote this potential. Some of these measures include:

- liberalising its taxation policy, formalising its industrial policy;
- relaxing its licensing requirement for setting up mini-computer unit or peripheral;
- increasing foreign equity participation of up to 51%;
- relaxing the requirement for hiring foreign technicians; and
- allowing training institutions recognised by the Department of Electronics to import computers at a reasonable customs duty (25%) and without export obligations to the party concerned (Wasan, 1992).

In an effort to address the shortage of IT skilled personnel in the country, the government recognised the involvement and contribution of the non-government

sectors' in education and training. In 1986, the government modified its Computer Policy by approving courses and training programmes mounted by private sector training institutions which satisfy certain requirements. One of the quality control measures instituted was the examination conducted for the four levels of courses: 'O' Level (Foundation Course), 'A' Level (Advanced Diploma Course), 'B' Level (Graduate Level Course), and 'C' Level (Post-graduate Course). The examination is administered by India's professional societies such as the Institutions of Electronics and Telecommunication Engineers and the Computer Society of India. These professional societies have professional links with international organisations. Like Singapore, India has a well-established system of developing its human resources in information technology starting at the school level right up to the highest professional level as evidenced by the number of Indian professionals 'exported' to work in other countries.

The education and training service have been designed to:

- meet human resource needs;
- create awareness and understanding among users;
- update the knowledge of technical and managerial staff to keep up-to-date with changes in the field;
- promote the development of indigenous software and its applications;
- set standards through aptitude and achievement tests in information technology;
- produce courseware and conduct professional development activities to strengthen training; and offer advisory services to those organisations conducting training activities (Roy, 1992).



#### **2.4.2.4 Indonesia**

Computers were introduced into schools ‘surreptitiously’ in Indonesia through enthusiasts and the government had no choice but to consider formulating a policy in 1984 on computer studies, either to be taken as part of the traditional Mathematics syllabus or as a vocational skills subject. With the growth of computerisation in both the public and private sector, Indonesian Computer Society was set up in 1984 to formulate a national policy for computers and informatics (Surjadi & Luhukay, 1987). In 1987, the Directorate General of Higher Education appointed a special task force to develop a five-year plan for implementing computerisation in Indonesian schools (Rahim & Pennings, 1987).

Teaching of computer science is preferred and is given priority over CAL in schools for vocational reasons. In 1981, teachers college students studied BASIC programming in English and in 1983 they studied programming in Bahasa Indonesia (called KILANG). Other application software such as: word processing, spreadsheets, database, desktop publishing and programming were also taught. Computer hardware in schools was bought by parents and teachers associations and the government encourages such grassroots assistance. The teachers were mainly maths/science trained and self-taught in computer studies. The main barriers experienced were lack of funds and shortage of trained personnel. To overcome these impediments, some Indonesian schools contract with private firms that provide computer equipment and trainers for specified time after hours to have access to computers and the services of qualified instructors (Rahim & Pennings, 1987).

There has been an increase in the number of training programs available in Indonesia which claimed to be conducting graduate-level computer training activities and the growth of these training activities is a reflection of the people's enthusiasm for the technology (Surjadi & Luhukay, 1987). Hence, in 1997 a story broadcast from Reuters (available from Yahoo) announced that the Indonesian government is hoping to begin achieving its ambitious goal of making telecommunications facilities accessible to more than 3,800 sub-districts within five years making it possible for villagers across the country's 13,000 islands to use multimedia services, including the Internet for education, leisure, medical and other things.<sup>3</sup>

#### **2.4.2.5 Malaysia**

Computers were first introduced in Malaysia in the 1960s notably by the National Electricity Board and since then there has been a rapid proliferation in both the public and private sector mostly in acquisition and procurement of mainframe and mini computers (Rahman A, 1990). Various high powered committees were established such as National Committee on Data Processing (NCDP) which is responsible for issues such as: acquisition and usage, standards. Human resource development in IT, and development of local IT industry. Advisory committees such as Administration and Implementation Committee which appraise and recommend approval for purchases of computer equipment, Technical Operations Committee which prepares guidelines and sets standards for government computer installation, and the Education and Training Committee which plans and coordinates training in both public and private sector (Rahman A, 1990).

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<sup>3</sup> Roche, E. (1997, January 1). [Forwarded the Reuters story to all the IFIP WG9.4 Electronic Discussion, [e-mail to M.Sinebare], [Online]. Available e-mail: [eroche@stern.nyu.edu](mailto:eroche@stern.nyu.edu)

Privately operated schools introduced computers in Malaysia in 1980. In 1983 the Ministry of Education declared that computers be installed in selected schools by 1985. In 1986, the Education Ministry established the Computer Literacy Pilot Project (CLPP) in 20 selected secondary schools and also encouraged the establishment of computer clubs in schools to supplement and complement the formal programmes (Rahim & Pennings, 1992; Kam & Ahmad-Kabir, 1986). The Computer Literacy program placed strong emphasis on basic understanding of computers such as the uses, its capabilities and limitations, and how they can be used in their society. Many schools not selected to pilot the Computer Literacy programmes went ahead on their own, acquired computer software and hardware and offered computing in extra-curricula mode. The formal syllabus recommended that 40 minutes per week for 40 weeks in a year be the minimum requirement in those schools implementing the project. The rationale for introducing computer literacy in the schools lent more towards the social rationale initially but with the tendency to serving vocational rationale at the higher levels of education system (HawkrIDGE *et al*, 1990).

As a result of the CLPP, teachers and school principals were enthusiastic about the project but were cautious because of inadequate provision of computer equipment and funds. The teachers college staff felt that they lacked necessary qualifications and experience in order to implement the project while the students have shown great enthusiasm (HawkrIDGE *et al*, 1990). The rest of the schools were encouraged by the Ministry of Education to start up computer clubs. The government's encouragement was welcomed by urban schools because they had necessary resources such as community support in the form of parents and teachers associations to raise the required

funds to purchase hardware and software as well as donations from computer vendors in towns, while the rural schools miss out because it is difficult to raise sufficient funds to purchase computer hardware to start computer clubs.

The formal computer literacy curriculum included cognitive (ie. knowledge about computers), affective (ie. attitudes towards the computers and its effects on society and individual), and psychomotor (skills in using and developing programs) (Lau, 1987). This may seem simplistic but that is how Malaysia began introducing computer literacy into its schools initially. Many developing countries which introduce computer literacy curriculum into their schools began initially with a 'simple' computing curriculum. The Computer Literacy Pilot Project selected 20 pilot schools and each school was supplied with 5 microcomputers and the relevant peripherals to introduce computer literacy curriculum in the pilot schools. The hardware selected for trial included Apple, IBM, BBC and NEC. In most cases, computer hardware was donated by the respective vendors to schools to promote their usage. The computer project trialed a computer literacy syllabus in Form 4 (16 year olds), the terminal school year before entry into university. The course was optional and no public examination was required as computer studies was not part of the national curriculum. Teachers, principals and students were all enthusiastic but lack of adequate equipment, shortage of adequately trained IT staff personnel, and paucity of funds impeded effective implementation of computers in education.

Formal education in computer science in Malaysia has always been the function of tertiary institutions since the late 1960's and the early 1970's. Notably, the *Institut Teknologi Mara* began offering a three-year diploma in computer science, the University

of Malaya began offering a one-year post-graduate diploma in computer science, the University of Science offered a bachelors degree in computer science and by 1992 a four-year degree program in computer science was offered (Nordin, 1992). The rationale for computer science programs at tertiary institutions is vocationally oriented in order for Malaysians to be trained up to a certain competency level to meet the country's demands for and vacancies in information technology related fields.

Education and training of computer professionals in Malaysia were performed by: government-funded higher education institutions (eg. universities), private colleges and computer schools, in-house training of personnel in large user-organisations, and vendor-based IT training for its customers which was narrowly focused on product-specific training (Nordin, 1992). The content covered in the computing classes conducted varied from learning to use application software to those preparing students for internationally recognised exams like that conducted by National Computing Centre of U.K. A few of the private colleges collaborate with universities in Australia, USA and U.K. These efforts were insufficient to meet the demands for IT manpower within the country (*ibid.* p. 95).

New initiatives were undertaken in 1991-1996. First, Malaysia was to establish a Systems Education Centre between 1991-1992 to be a one-stop centre for IT training and consultancy. The experts in information technology were to be brought in from overseas to conduct different training programs such as advanced technology training, professional IT training, end-user PC training, and end-user Macintosh training for the different needs of the Malaysian economy (*ibid.* p.95). Second, the Malaysian government has allocated US\$2.5 million to establish the Asia Pacific Institute of

Information Technology to train the necessary IT human resource required. It has also made huge investments in information infrastructure to prepare for the ‘global information society’ in the 21st century (Moggie, 1996; Mahathir, 1996).

#### **2.4.2.6 Pakistan**

Computer hardware systems were first introduced in the 1960s by private firms such as the banks but this did not take-off in the first place because of lack of local expertise in computer knowledge and skills, high cost of hardware, scarcity of resources, and fear of mass unemployment as a result of computerisation (Sabri, 1990). Initially a private initiative was undertaken by Bank of Credit and Commerce International to install computer networks to: introduce and support use of computers in secondary schools, ensure sufficient number of people acquire qualifications to gain access to higher education or jobs, raise teachers’ and pupils’ awareness about computers, and its roles and limitations in their lives. Under this project initiated by the bank a British team trained 37 Pakistani teachers in 16 schools. The bank installed 2 computers in each school. The software supplied to each school under this project include: BASIC, Logo, application software like word processing and database. The software supplied was part of the package to introduce computer literacy curriculum into the schools.

Introduction of computers across the curriculum has not yet materialised. Like Singapore and India, Pakistan established the Pakistan Computer Bureau (PCB) in 1975 to conduct training programs in electronic data processing for both the government and semi-government organisations (Munir, 1992). The PCB was also responsible for: IT promotion in the public service, development of human resources in the public service,

development of IT application in the Government, and establishment professional computer users group.

Increase in demand for computer professionals like systems analysts, programmers, data entry operators, and data processing managers is not uncommon in Pakistan as elsewhere. Training facilities to service this demand have been established within the country, for example, the M.Sc degree programme at various universities (Sabri, 1990). But these institutions suffer from shortage of qualified teachers to teach in these disciplines. The private training institutions are mushrooming all over the country and they also lack qualified and experienced professionals.

The Pakistani government through its forward looking information technology policy established high profile committees such as National Informatics Committee (NIC) and PCB. The former was responsible for formulating policy, provide directions and guidelines in the promotion and application of IT. The latter was responsible for: computerisation in the country, training of human resources in the public sector, and the development of computer applications in the government (Sabri, 1990). The policy also focused on procurement mechanisms such as liberalisation of import duty on IT hardware, creation of incentives for IT personnel, and removal of import duty on IT equipment (Okot-uma, 1990).

The impact of such policy initiatives and the active role played by the various high powered bodies is beginning to pay dividends. Public and private sector organisations started to launch training programs for their staff to meet their internal needs. The supply of qualified IT personnel has not caught up with the demand from the increasing number of computer installations by both private organisations and government bodies which is often beset by the endless cycle of recruitment and departures both within the country and abroad (Munir, 1992). However, the Pakistani Computer Board (PCB)

offers short term courses in computer applications, systems analysis, database management, programming and office automation. The training program of the PCB helped to train the government's computer personnel requirements but is a long way off from becoming a reality because of the fluid nature of labour movements which are also common in other developing countries. The PCB also organises computer user groups in the country to hold conferences which provide a useful forum for discussion of issues related to information technology both to the government and other interested parties.

#### **2.4.2.7 Singapore**

The computer curriculum in Singapore was centrally controlled and computer clubs conducting computer literacy programs have thrived in secondary schools since 1986. The computer clubs emphasised programming in BASIC and Logo initially and later as interest developed emphasised application software. Singapore's Curriculum Development Institute drew up computer literacy courses in 1986 and the software used in computer literacy course include: BASIC, Logo and application software like word processing, spreadsheet, database, and graphics.

Computers were being used aggressively at various stages of the school system. Computer education in secondary schools was aimed at stimulating and developing pupils interest in computers and their applications and impart knowledge of computer programming. In the junior colleges, a two-year computer science programme was offered as part of a formal curriculum since 1980 (Kon & Wai, 1987). Singapore's success in making information technology as one of its major 'industries' was fuelled by its Economic Development Plan which was aimed at pushing its economy to become more knowledge and skill intensive, higher value added or what Hawkrige (1996),



called 'commodification' where everything is turned into something for sale, and technology-based through computerisation of its industries (Cheong, 1992a).

Singapore's National IT policy also clearly defined strategies such as: government support defining the roles and functions of training centres, the trainers, and course materials such as syllabus or teachers guides. In the Education sector, the Ministry of Education was to prepare students for the computer age beginning in 1980 and 1981 respectively for junior colleges and secondary schools (Kon & Wai, 1986). The following are some of the strategies initiated and actively pursued by Singapore:

a) At the sixth form level in the Junior Colleges, the students took computer science.

This curriculum was pitched at A Level computer science from Cambridge for General Certificate of Education. This is a 2-year course in computer science as part of a formal curriculum initiated in 1980's.

b) Secondary Schools to take computer education as an extra-curricula activity. All secondary schools set up computer clubs, and teachers given necessary training to effect computer education goals. The aims were to stimulate and develop pupils interest in computers and their applications, and impart computer programming principles and practices.

c) No firm plans to introduce computer in the primary school in the 1980's but this will have changed by late 1990's as there was plans to install micro and mini computers in various school (Iau, 1981).

d) Universities such as the National University of Singapore offer computer science program leading to the award of a degree in Bachelor of Science (Computing).

e) Initiate and develop international cooperation which resulted in establishing institutions like Japan/Singapore Institute of Software Technology to train

computing professionals in programming, systems Analyst, Engineering, and Software Engineering.

- f) Liaise with Singapore Computer Society to cooperate with Ministry of Education and British Computer Society to set examinations standards codes and ethics for computer professionals, and impose disciplinary actions against the defaulters.

It also established the National Computer Board in 1981 to oversee IT implementation and pursue towards achieving information technology expertise (Goh, 1990). It was further enhanced by total commitment and support from the government at the highest level and the selective cross-membership of committees to ensure effective and meaningful dialogue between the groups at all stages of planning and implementation of their policy (Gay, 1990).

Singapore recognised the strategic significance of IT and instituted many high powered government bodies such as the Committee on National Computerisation (CNC) and National Computer Board (NCB) as well as initiating IT investment and infrastructure development to achieve the full benefits of computerisation. The CNC is headed by a government minister something uncommon in developing countries. On the recommendation of the CNC, the government took immediate steps to:

- a) subsidise training and retraining of its people in IT related fields,
- b) promote computer literacy programmes for both school children and adults,
- c) upgrade the curriculum and the physical training facilities at educational institutions to conduct IT-related teaching and research;
- d) modernise the telecommunications infrastructure; and

- e) Establish the National Computer Board (Raman, 1990).

The establishment of NCB as a statutory body in 1981 under the Finance Ministry was aimed at moving Singapore towards an 'information society'. A working committee from NCB formulated the National IT Plan. The objectives of the plan were to:

- a) promote IT exploitation in order to improve productivity and competitiveness in all sectors of the economy (which in turn would help);
- b) to create a strong export oriented IT industry base (Raman, 1990).

In order to achieve the above objectives, Singapore identified several conditions necessary before IT can be fully assimilated into the society. These conditions are:

- a) high level of IT literacy and education;
- b) a modern IT infrastructure,
- c) availability of highly skilled IT personnel;
- d) an education system which had IT as an integral component of its curriculum at all levels of the education system;
- e) support and provide educational institutions with relevant and modern training facilities to train and retrain IT human resources; and
- f) provide cooperative and collaborative support base for both the industry and government (Raman, 1990; Wong, 1997).

The National IT Plan recognised the significance of its goals by identifying IT human resources development as the number one of the seven economic development building blocks. The above goals formed the framework of the National IT Plan. The other six (6) includes; IT culture, information and communication infrastructure, IT applications,

conducive climate for creativity and entrepreneurship, IT industry and coordination and collaboration (Wong, 1997, p.28).

IT professionals were educated at both overseas and Singaporean educational institutions at both undergraduate and postgraduate levels in computer science and information science. Singapore built an enviable career path for IT professionals in its educational institutions, even to the extent of entering into joint professional examinations agreement with international professional bodies such as the British Computer Society. Both privately-run and public training institutions prepared students for such examinations. Singapore gives priority to improving the people's IT literacy by offering secondary school computer literacy courses and adults computer literacy program was also implemented for those who needed it and were conducted in community clubs and halls. A basic computer appreciation and application curriculum was integrated into all levels and all disciplines of the school curriculum (Raman, 1990).

The education system in Singapore is characterised by a strong orientation towards science and technology as opposed to the arts which supports the utilitarian nature of educational planning common in Asian countries (Varaprasad, 1997). It was also reported that for the 1990s and beyond, emphasis in education was for every child to have basic information technology knowledge and skills to become independent learners and this will become a reality when every school will be equipped with computers (Varaprasad, 1997). One estimate of the availability of computers in schools within the Asia-Pacific region in 1990 for Singapore was put at 100% (Nishiniso, 1990). The rationale for introducing computers into the Singapore schools are both vocationally driven as well as catalytic (Hawkridge *et al*, 1990). Vocationally driven because the

human resource development in IT is aimed at serving in various sector of the economy and catalytic because students at all levels were to use technology as a learning tool to move away from a rigid curriculum and move towards giving more control to students to decide their own learning. Catalytic rationale lends itself to the use of Internet or World Wide Web and multimedia which is the direction in which Singapore is heading (Varaprasad, 1997).

#### **2.4.2.8 Sri Lanka**

Sri Lanka is one of the few developing countries which has undertaken formal initiatives at the highest political level to oversee the implementation of information technology in education progressively from secondary schools to higher education institutions such as universities. Computers were mainly used at the tertiary level in the engineering faculties in Sri Lankan universities. Sri Lanka's policy on computers and information technology was to:

- a) provide the government with advice on IT policy matters;
- b) encourage and facilitate information technology developments;
- c) promote the use of IT in both the public and private sector organisations;
- d) encourage education and training in IT in both private and public institutions; and
- e) establish professional norms, ethics and standards on the use of information technology (Basnayake, 1992).

In 1983, the Sri Lankan Computer Education Programme Unit was established which comes under the auspices of the National Institute of Education. Sri Lanka's Computer in Education Project (CEP) funded by the government installed 187 Sinclair Spectrum computers, hardware and peripherals in 108 schools initially. Without waiting for the

government to equip their schools with computer hardware systems and software packages for the CEP, other schools have also followed suite using their own initiatives and resources. Five of the larger schools were identified and set up by the government as teacher training base for those teachers implementing computer education in the project schools (Hawkrige *et al*, 1990). Teacher training was a cooperative venture between the computer vendors, the universities, and the government. The universities and computer vendors respectively provided computer related training programs and computer hardware systems, while the government financially supported the teachers on short term training programs. The curriculum offered under CEP include teaching of BASIC programming and flowcharting, while tutorial, problem-solving, graphics, and animation capabilities were demonstrated.

The initial computer systems installed in the schools were cheap (eg, Commodore 64, VIC-20, Spectrums, BBC Model B) and adequate for purposes such as: programming in BASIC and flowcharting. However, difficulties arose in the use of the national languages, *Shinhala* and *Tamil* as the language of instructions in the schools, while the educational software packages used English. Other problems experienced include: exam-oriented subjects were valued more favourably than computing (which was as an optional subject), non-availability of relevant educational software, irregular in-service training of teachers, hardware provided did not survive the test of time and volume of extended use, using a particular brand of computer hardware had limited application, and inability to provide attractive inducements to retain qualified teachers given the tasks to implement the goals of computer education in Sri Lanka (Hawkrige *et al*, 1990, p.191). Specific suggestions have been made to the government which were well within the capacity of the hardware, software and teachers to ensure that the identified

difficulties were attended to. Some of the points suggested include introducing computers to the lower classes in schools to give initial exposure to students earlier on in their education, extend applications of computers across-the-curriculum.

The main aim for introducing IT and educational technology in particular in Sri Lanka was seen as a positive step towards achieving the country's goals for modernisation (Chandra, 1985). The Sri Lankan government recognised Information Technology as a strategic and important development tool which would bring about socio-economic development. To make this recognition practical, the government established the Computer and Information Technology Council (CINTEC) and enacted a CINTEC Act in 1984. The objectives of CINTEC were to coordinate the use of IT in strategic areas such as:

- a) advice the Minister on the formulation and implementation of IT policy in general;
- b) develop human resource development in the country;
- c) oversee the development related to poverty alleviation programmes;
- d) apply IT usage in Government sector;
- e) monitor development and usage of IT;
- f) set and maintain IT standards in use in Government; and
- g) provide catalytic role in promoting the development of IT industries (Samaranayake, 1992).

In order to achieve CINTEC's objectives for example, in the human resource development area, CINTEC initially coordinated inter-university computing committees in Sri Lanka to pool all available resources such as teaching staff, classroom space, and funds. CINTEC collaborated with educational and training institutions, and professional

organisations in both public and private sectors to maximise the return from pooling available resources (Munasinghe, 1989). CINTEC initiated the establishment of The Institute of Computer Technology (ICT) at the University of Colombo, a collaborative effort between the governments of Sri Lanka and Japan with the Japanese government assistance. The ICT provides a one year conversion course to train Analysts/programmers. CINTEC also initiated the establishment of CAD/CAM Centre at the University of Moratuwa and the M.Sc degree program in Computer Science at university of Colombo. Another initiative undertaken by CINTEC is the development of a glossary of technical terms and concepts into the two national languages as part of its IT popularisation effort. There are several centres of excellence established which are committed to the development of its human resources not just in IT but in other disciplines (Samaranayake, 1992). Such initiatives helped to build up the country's own capacity to develop the necessary human resource required in the economy.

CINTEC's role was to assist the government to formulate, promote, encourage, coordinate and implement computer policy, and to create a framework in which to enable both the public educational institutions (eg, Ministry of Higher Education) and private sector training institutions (eg, Post and Telecommunications, Industries, Scientific Affairs, Computer Society of Sri Lanka) to cooperate and collaborate in the development of IT skills and training in Sri Lanka (Samaranayake, 1992). The Sri Lankan Government liberalised its trading policies in 1977 which allowed commercial organisations to enter into computer training fields to supplement the training of IT expertise which was traditionally the function of the universities (Hawkrige *et al*, 1990). It also reduced the import duties of computer products to a nominal 5% which



saw an unprecedented increase in the number of computer systems installed in the educational institutions, government departments and private sector organisations.

Sri Lanka has not achieved all of its objectives in human resources development in IT, but the necessary policy framework, administrative structure, and national information and communications infrastructure have been established, groundwork have been started, and the implementation and consolidation of these initiatives have been undertaken by the government (Samaranayake, 1992). There is no shortage of motivation and talents in the country. However, the available talents need to be identified, guided, developed and coordinated in order to achieve its national goals of modernisation and industrialisation (Chandra, 1985; Munasinghe, 1989).

#### **2.4.2.9 Thailand**

The Thai government announced a computer education syllabus for upper secondary schools in 1985. The Ministry of Education developed a computer curriculum to be taught in upper secondary schools in 1987. Computer studies was taught at various stages of the public education institutions such as: upper secondary school, vocational and technical colleges, higher vocational education with majors in Business education or Business administration, and teacher education programs in both pre-service and in-service mode (Thangsuphanich & Boonme, 1987). The government approved a 150 minutes per week optional course. The condition for schools to deliver optional computer course depends on:

- a) availability of a trained or qualified teacher;
- b) evidence of sufficient computer hardware (minimum 48K RAM) and necessary peripherals;

- c) a minimum of 10 students must subscribe to this course; and
- d) at least 1 microcomputer per three students is available (Hawkridge *et al*, 1990, p.212).

The aim of the computer curriculum for secondary schools were to provide basic knowledge in computer literacy and to ensure their learning is suited to the local environment and student needs (Thangsuphanich & Boonme, 1987). The Ministry of Education does not provide funds, however, it had approved a national plan to introduce a Computer Major subject in all junior colleges (Rahim & Pennings, 1987). Even if the schools raised the funds for computer and software purchases from internal sources, the Ministry must also approve the purchase of computers. Schools have been using computers as an administrative tool since 1983. Urban schools were keen on offering computer education courses because they saw the need to prepare their students for the workplace. Private computer schools were also a thriving business there. BASIC programming was taught for those wishing to pursue computer science later in their education and career. Very few schools used CAL software mainly because of the language difficulty experienced as the medium of instructions was in Thai and not in English.

### **2.4.3 Caribbean and South American Region**

#### **2.4.3.1 Barbados**

Barbados Development Plan 1983-88 mentioned use of computers in secondary schools (Hawkridge *et al* , 1990). An Advisory Committee on Computer Education recommended on software, hardware and courses necessary to offer computer literacy. In 1984 the Rotary Club of Barbados donated one Commodore microcomputer each to

36 secondary schools while the Canadian government donated TV sets for use as monitors. The government launched short courses for teachers in these schools to be familiar with the hardware and software. Major problems encountered include: use of US software is incongruent with the British-type curriculum of the island nation, teachers taught programming as the only application rather than applying computers across the curriculum, senior officials lack technical knowledge to effectively implement policy decisions, and teachers received little training. No formal structure or policy was established.

#### **2.4.3.2 Brazil**

Newly Industrialised Countries (NICs) like Brazil, China, India, Malaysia, Singapore and Thailand could be categorised as ‘advanced’ developing countries because of the level of developments in and application of information technology systems and infrastructure. Brazil has taken a national approach to computer education which was a multilevel educational programme in which computer concepts and courses were introduced at all levels beginning with elementary school level right through to secondary school, post-secondary institutions, undergraduate and graduate programs (Lucena, 1975). Universities have fostered computer education with graduate and undergraduate computer science curriculum while the college of technologies produced intermediate technicians to service the industries in Brazil’s economy.

Due to its aggressive and independent approach to formulating IT policy, and establishing links with overseas universities, Brazil has been acknowledged as the most advanced country in its region in informatics (Murray-Lasso, 1992). The IT policies facilitated the development of a local informatics industry within the country. This

implies that importation of equipment from abroad is prohibited when the same is locally produced (Correa, 1990).

The private sector- mostly the computer manufacturers or resellers conduct in-house training programs ranging from basic courses in computer operations and programming to advanced courses for specialists, technicians and executives. Since the computer facilities in the universities were funded by the federal government, private training organisations have been given access at a minimal charge to use the idle time in large computer installations for the purpose of training in Brazil (Lucena, 1975). Joint ministerial committees were encouraged to coordinate education planning in areas such as:

- a) planning of computer education in educational institutions;
- b) creating and funding colleges of technology;
- c) training of teachers; and
- d) promoting seminars to disseminate relevant information in order to achieve their goals (ibid).

The government also cooperated with the private sector, such as IBM, in the training of systems analysts in Brazil. Brazil had been involved in programs of international cooperation with countries like France, Canada, USA, and Germany which gave Brazilians diversity of experiences ranging from most basic knowledge about computers to post graduate education level. This cooperation was extended to twinning relationships between universities in Brazil and USA. The twinning arrangements enabled faculties to share and exchange information in the area of computer architecture and software engineering (Lucena, 1975). The graduate program was aimed at

preparing professionals with capabilities in information systems with application in business and industry while the undergraduate program sought to develop efficient ways to gather knowledge from outside of the government circles to develop and implement local projects (Silva *et al*, 1975).

#### 2.4.3.3 Jamaica

Jamaica gave low priority to computers in schools (primary and secondary) because of a failed experiment (Hawkrige *et al*, 1990). Included among the lessons learnt from the failure are: computer hardware equipment was expensive to maintain, no local teacher training; and the use of software from USA does not match the British-type curriculum used in Jamaican schools. Schools acquired computers through internal fund raising activities to purchase hardware and software. There was no plan to bring computers into schools officially either as a special course or within existing subjects.

Policy Making Committee which traditionally came under the Prime Minister's Department had gone defunct in 1984 and the need for government instigated IT policy remained valid as well as a need for a national body and/or enabling legislation to promote IT strategies prevailed (Okot-uma, 1990). Jamaica Computer Society was the only national professional organisation responsible for development and promotion of IT-related initiatives and strategies in the country.

In a recent communication with Gierke (1996)<sup>4</sup>, who is an American Peace Corps Volunteer in Jamaica was '*... working to get computers in to the schools...*' Gierke

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<sup>4</sup> Gierke, C.J.L (1996, Nov 28). Status of Computer Education and IT Education in DCs (fwd) [Email to M.Sinebare], [Online]. Available e-mail: macin-ja@InfoChan.COM (Cathy Jo Lee Gierke)

coordinated a Peace Corps project to assist Jamaican schools with receipt, repair, distribution, installation and training in the use of computers which are mostly donated from USA sources. All these were done by volunteers and the schools school who receive the computer must show evidence of four things: a) a secure are for the computers that can be locked whenever not in use; b) dust free environment with air conditioned room, c) Surge protector for all computers and d) Access to someone who can train other trainers such as teachers. No further details about how the computers were used for example, the curriculum were made available to the author.

#### **2.4.3.4 Trinidad and Tobago**

The Education Plan 1985-90 made cautious reference to computers in education (Hawkridge *et al*, 1990). In 1983 the ministry started a computer literacy pilot project. Teachers were given short training courses in the use of computers. Experiences so far included: teachers focussed mainly on programming languages rather than general computer literacy, hardware standard and software from USA were found to be incompatible with the curriculum adopted from Britain, and little training of teachers who were to implement computer literacy project in schools.

In 1990 no IT policy has been developed yet but efforts were being made to implement a national IT plan for development and application of IT by studying other countries' IT strategies in order to develop its own (Okot-uma, 1990). In the meantime, R&D centres, consultancy specialists, and various educational institutions including the University of West Indies developed courses at all levels of computer proficiency by offering short and long term certificate and diploma courses respectively.

#### **2.4.4 Middle East Region**

##### **2.4.4.1 Egypt**

Introduction of computers in education in Egypt began with the donation of Sinclairs by Egyptian professors in 1984. The Egyptian Ministry of Education pushed for a national computer education project in 1987. The goals for computer education were to:

- a) create and promote technological awareness;
- b) support and develop its citizens intellectual ability and potential;
- c) develop information storage and retrieval skills;
- d) encourage collaborative work amongst students;
- e) encourage self-reliance and self-sufficiency in learning;
- f) use computer as a tool; and
- g) provide teachers with an effective mechanism in which to perform their duties efficiently in their changing roles (Hawkrige *et al*, 1990, p. 121).

The syllabus was a broadly based information technology approach with emphasis on programming in Logo. The syllabus also placed emphasis on the use of software applications and was geared towards practical job related courses (vocationally oriented) instead of purely theoretical ones. The syllabus was used in selected upper secondary schools as an elective course (40 hours) in 1988 with the intention of gradually introducing computers into schools with assistance provided by developed countries such as Britain and France (ibid).

##### **2.4.4.2 Jordan**

Jordan also had received an aid package and collaborated with the British government to introduce computers initially into two (2) selected pilot secondary schools in 1984-85

with the aim of eventually extending to other schools later. The aid package included training of teachers, programmers, senior policy makers, and administrators. The project was intended to: introduce a computer awareness course to first year pupils in 200 secondary schools, develop and distribute curriculum materials such as books and software, and support its implementation. Available in U.K. under this project for Jordanian teachers were: short courses for teachers and administrators, technical cooperation, consultation in support of curriculum development and in-service training, and 'Arabisation' of British educational computer software. The main rationale for initially introducing computer education in Jordan was *Vocational Rationale* but as it turned out later, there was a potential that this rationale would enable *Pedagogical* and *Catalytic* effects would be realised as well (Hawkrige *et al*, 1990).

## **2.4.5 Pacific Islands Region**

### **2.4.5.1 Fiji**

In 1984, the Ministry of Education decided to prioritise computer studies in Fijian schools. The Ministry established a committee of parents' representatives, teachers, principals, computer representatives and Ministry officials. This committee called for teacher training, computer information for primary as well as secondary schools, and proposed curriculum development for both levels. The Ministry set up a Computer Centre to: train teachers; provide support; develop software; and teach school leavers. The centre had a mixture of hardware such as: Commodore 64s; BBC-Bs; Apple IIe and IBM PC clones (Hawkrige *et al*, 1990).

In 1986, about 60 secondary schools had at least 3 Commodore 64s each. Computers were supplied to schools with a teacher who is knowledgeable in computer. The



schools used computers to teach computer literacy skills, which included BASIC programming languages. The Ministry preferred application software and programming in Logo. The problems experienced include high import tariff (200-300%), and shortage of qualified technical staff. The government had a long term plan to spend around 20% of the Education budget on computers and aimed to have computers used as a tool to teach other subjects in its schools (HawkrIDGE *et al*, 1990).

#### **2.4.5.2 Papua New Guinea**

Computer hardware and Information Technology (IT) systems were introduced into PNG by private firms as early as the 1960s and introduced into the schools as recently as the 1980's by teacher enthusiasts. Computers have been introduced gradually into the country over time both at government and private sector levels. Little literature was available on IT in general or computers in particular in PNG. The lack of sufficient literature could mean that: IT and computer usage and implementation in the workplace may have been ignored as a less significant innovation, academic motivation was lacking, or an Information Technology wave (HawkrIDGE, 1983), has hit PNG but was overlooked by people with a professional interest in this subject. Local social researchers in PNG such as Iamo (1993) estimated that the information sector in the country is growing at about 12 per cent annually. While computers were introduced into the schools for example on an ad hoc basis, no formal efforts has been made to teach computer studies (Sinebare, 1990; Hulijeli, 1991).

A computer studies curriculum had not been formally introduced into the schools in order for future human resource requirements to be adequately developed from the school level up. Computers have been introduced into the workplace at an ever increasing pace (*The National*, Aug 4, 1997), but this has been occurring in an uncoordinated and sporadic manner. For example, the purchase or acquisition of

computers in the schools were occurring with neither a formal staff development program nor development of a formal national computer studies curriculum in PNG.

The scarce literature available covers unrelated and wide ranging issues of IT and computers in education in PNG and reflects the different interests of the various authors. The chronological events in computer-related literature on PNG begins with the Salter-Duke and Salter-Duke (1984) work which reported on the computer installations and IT usage in the Government, Statutory bodies and private sectors in PNG. Kalewa's (1984) survey covered computer usage as word processors in schools by school administrators while only the International Education Agency (IEA) Schools were reportedly using computers to assist classroom instruction; ie., in teaching and learning *with* a computer. The public secondary schools have been using computers to support administrative tasks such as maintaining student records and word processing but the computers' number crunching capability was highlighted as having possible application in computing students assessments and grading (Sinebare, 1984 & 1986).

Sinebare's (1987) dissertation covers the use of computers in the pre-service Mathematics Education program at PNG's only secondary and post-secondary Teachers College (upgraded to the University of Goroka in 1997) and the potential applications of computers in the classroom in general. The subjects were final year pre-service Mathematics Education students who also took a one-hour Educational Computing course.

The major findings from the study fall into the following categories and are highlighted below:

#### **a) Preferences of Educational Computing Aspects**

Computer programming course was high on the respondents preference list. Preference for programming was followed (in that order) by application software such as word

processing, database, spreadsheet, drill and practise, and educational software. The preferences reflect the respondents own background knowledge and experience in the use of the different computer applications under the preservice teacher education program.

#### **b) Computer Course at Goroka**

The findings also revealed that the computer courses conducted at the then Goroka Teachers College: helped trainees to have a better understanding of the content materials covered in lectures, explained and reinforced the work done in class, broadened the individual's general knowledge of what computers were capable of and their applications in the classroom, and provided the trainees with additional tools to use in their teaching. The one hour computing lesson given was deemed insufficient to cover as much material as the students would have liked.

#### **c) Computer Studies Subject**

A subject such as Computer Studies was considered necessary as part of the initial teacher education program to provide teachers with sufficient background in computers so that in turn they can become a catalyst to bring about computer literacy among their own students. This is already being implemented now as a first year compulsory course at University of Goroka (UPNG Goroka Campus, 1997). The findings also revealed that a Computer Studies Curriculum should also be introduced in the secondary schools now that computers were available in many schools and teachers would have undertaken computer education courses during their initial teacher training.

#### **d) Computers in Secondary Schools**

Computers (Micros and PCs) were already available in some secondary schools in PNG but they have been used in a very limited way such as administrative uses because of the shortage of computer expertise among teachers. The respondents indicated that they were able to use available computers to complement their own teaching. Even where

computer studies was not officially taught, they would be able to use them as extra-curricula activity in the schools. Respondents also indicated their familiarity and confidence in computer usage in teaching and where possible apply them in school administration tasks.

#### **e) In-service Education for Teachers**

Since the majority of teachers in secondary schools who graduated from Goroka prior to 1987 had no computer literacy skills themselves, little use of computers was made in schools. The research findings identified inservice training for practising teachers in the use of computers in schools for that group of teachers as essential. Various forms of inservices such as; School-site College Courses, After School and Released Time Workshops, Teaming Together at School or Province, and Lahara (or Summer equivalent) Sessions were identified and recommended accordingly.

Lipscomb (1988) surveyed both the National High Schools and IEA schools known to have computers. That survey revealed that schools preferred to use computers to perform administrative tasks, and indicated that teachers were inhibited from using computers in their schools because they lacked initial computer education and training. Furthermore, poor facilities like electricity, limited computer expertise among local teachers and paucity of funds contributed towards the general lack of computer use in schools. For those that have computers, their inability to obtain spare parts or timely maintenance of the faulty computers and their components within the local area inhibited full use of available computers.

Sinebare (1990) conducted a survey throughout the country in all the secondary schools including National High Schools, Technical Colleges and permitted schools in PNG aimed at obtaining information about the purchase and uses of computer software packages and computer hardware systems. The results amongst others revealed that only 14 per cent of the schools in PNG had computers and this figure was growing slowly.

Even where schools had computers, national teachers had no prior computer education skills to use the computers effectively either for instructional purpose or for administrative uses because no such training was available to them in their initial teacher training program (Sinebare, 1991).

In a separate but related study on the uses of computers by students Hulijeli (1991) while studying and commenting on Sinebare (1990) findings, strongly called for computers to be used as a teaching and learning tool in PNG's secondary schools. But this call like many other calls made prior to that, remain ignored by the education authorities.

By 1987, the Department of Education had neither a computer education policy nor support for computer education curriculum in its secondary school system (Department of Education, 1987). By 1993, schools were being encouraged to create computer awareness amongst their students, but no practical support, financial or otherwise was provided by the Ministry to effect this change (Department of Education, 1993; Rapese, 1994). The decision to buy and use computers in schools was left entirely up to the individual schools with adequate financial resources (to purchase computers) and a pool of teachers with expertise in computers who are themselves keen to pass on their computer skills and knowledge to other teachers. Like many developing countries, procurement of IT equipment in the public sector is by public tendering process and not by overt decision and systems development are carried out off-shore with results in 'user-mismatch' (Okot-uma, 1990).

Sinebare (1991) called for the development of computer-literate teachers in preparation for the challenges of teaching in the nineties and beyond. Some computer competency skills necessary for computer-literate teachers in PNG were identified for inclusion in the teacher education program of the nineties and beyond. Some of the competences for teacher trainees identified include, inter alia:

- a) identify and use Input/Output devices, care of computer hardware and software;
- b) familiarity with the keyboard and the functions of the special keys;
- c) distinguish appropriate educational software from the inappropriate ones;
- d) competent with several application software;
- e) demonstrate and confidently explain educational software to their students;
- f) understand some of the computer jargon and terminologies;
- g) integrate computers into their teaching with appropriate examples;
- h) conversant with key computer concepts;
- i) manipulate the printer with confidence;
- j) be articulate and troubleshoot in the event of a computer failing to start up or keyboard input not registered;
- k) provide in-service to other teachers within the school;
- l) identify and locate sources of relevant educational software and reference materials; and keep up-to-date with relevant information and their sources (Sinebare, 1991).

It was obvious from the available literature that little has been written on computer education or computer related training of personnel needed in the country. There is a severe shortage of highly trained nationals with expertise in computing in PNG. For example, Ryan (1994b) pointed out that: "...*university graduates in technological disciplines were recruited into the role of high level technicians*", because of the acute shortage of suitably trained personnel. The shortage of skilled people with computer skills was the result of the prolonged absence of computer policy as well as lack of initiatives and guidance on the part of the successive Governments to bring about appropriate computer education and training initially at school level and eventually at university level.

The universities were supposed to meet the scientific and technical human resources requirements of the country. For example, in the Higher Education Plan, higher education which include universities: '*...will have as its chief objective to satisfy in as*

*economically efficient and educationally effective a manner as possible the skilled manpower demands being created by the economy.'* (Commission for Higher Education, 1986, p.6). As far as computer education and training with commercial applications within the country is concerned, it was the private training organisations which were the first to capitalise on the lack of suitably qualified computing personnel and took the initiative to provide short-term training in computer related courses.

Chapter 5 presents a more detailed description of computer education in Papua New Guinea public sector institutions while Chapter 6 describes Private Computer Training in the private training institutions in the country.

#### **2.4.5.3 Solomon Islands**

Like many developing countries, computer studies do not form any part of the formal school curriculum although the country was characterised by diverse IT or computer equipment as a result of aid donor projects or individual initiatives (Okot-uma, 1990). The Government's Computer Centre advises the Government, other PC users, semi-government organisations, and non-government bodies. IT upgrading was undertaken in various government departments by aid agencies such as AusAID with Solomon Islands counterpart at hand to express what Solomon Islands want out of the project. No formal IT or Computer policy was formulated to plan and implement IT strategies in the Solomon Islands (Okot-uma, 1990, p.80).

#### **2.4.5.4 Tonga**

The tiny Pacific Island of Tonga is featured here for its effort in introducing IT in the government's bureaucracy. Computers were acquired by individual government

departments through *ad hoc* means for the purpose of improving their individual performance in their respective departments. It became necessary to establish a Computer Training Centre within the Ministry of Defence training wing which provided training for government personnel (Ketu'u, 1990). The Computer Co-ordination Committee was established in 1987 to: discuss IT issues, make policy recommendations, oversee IT planning, and coordinate general computer matters. This Committee comprised of Secretaries of key government departments such as Finance, Foreign Affairs, Planning, and Statistics, and Health. While computers were being utilised in the government circles, there was no evidence of computers being used in schools and educational institutions (Okot-uma, 1990). However, people with IT or computer related skills are in demand and no effort other than using the Defence Service's training wing to conduct short courses about application software for public service. User groups meet informally to discuss and exchange their views and experiences.

No IT policy is in existence and therefore procurement of IT equipment for example has been *ad hoc* prior to the 1980s but due to the increasing use of PCs in the public sector organisations, the government established (initiated by the Ministry of Foreign Affairs) a Computer Coordination Committee to conduct computer studies classes in the evening (Okot-uma, 1990).

#### **2.4.5.5 Vanuatu**

Vanuatu is one of the very few Pacific Island countries to have a National IT Policy established to 'encourage' rather than 'enforce' IT implementation. The National Data Processing Department (NDPD) was formed to formulate training guidelines, establish



procurement procedures, set IT standards, and provide an advisory service (Okot-uma, 1990).

There was little formal computer education and training locally which is evident in the low level of education and training in all facets of IT. For example, (Okot-uma, 1990, p.81) pointed out that: *'....tourism related activities are generally manned by expatriate staff whilst indigenous ni Vanuatu (sic) concentrate on Agriculture for subsistence.'* Therefore, the policy needs to insist on maximum local participation in IT strategies so that Aid assistance should incorporate training of locals.

#### **2.4.5.6 Western Samoa**

Western Samoa has no formal IT policy but the Government Treasury was influenced to establish standards and procurement policy for computer hardware. The choice of technology was left to the individual government departments or agencies while documentation was poor and uncoordinated (Okot-uma, 1990). There was heavy dependence on overseas experts and volunteers which come under foreign aid programs with limited local participation. The University of South Pacific's extension centre in Western Samoa owned some of the hardware used to provide computer studies training while the National University of Western Samoa conducts programming and application software courses.

### **2.5 Computer Education scenarios in Developing Countries (DCs)**

The developing countries including those mentioned above could be classified into two groups: those with formal structures established in order to adopt, adapt, promote and implement IT, and those without such formal structures (Okot-uma, 1990). The former,

*advanced* DCs include: Brazil, China, India, Malaysia, Pakistan and Singapore; otherwise known as the Newly Industrialised Countries (NICs). The rest remained as the *laissez-faire* DCs. The *laissez-faire* group of DCs lag behind the NICs in IT (including computer education) as in many other areas. IT applications in these countries have been *ad hoc* because firstly, there was no formal IT or Industry policy to guide them and, secondly, no formal structure established to implement the necessary policy. Therefore, introduction of computer education or computer studies curriculum in education within the *laissez-faire* DCs have been unplanned and left to chance.

The success of many of the DCs depended on their receptiveness to formulating an IT policy and implementing it. The IT Policy initiatives undertaken or implemented by DCs may be classified into three generic categories: *Non-existent*, *Implicit*, and *Explicit* IT Policies (Okot-uma, 1990). Firstly, the countries whose governments decided to remain indifferent to the application and implementation of IT would be classified as having *Non-Existent IT Policy*. This category is rare as more and more DCs were beginning to realise the significance of IT because of increased international relations through communications and trading with other countries. Secondly, where the governments actively participate in IT but deliberately decide to operate informally under the auspices of an informal coordinating body on behalf of the government were classified as having an *Implicit IT Policy*. The majority of DCs categorised as *laissez-faire* have Implicit IT policies. Finally, where the governments play active roles to institute necessary mechanisms (eg, legal, policy guidelines, and establish administrative structures) to formulate an IT Policy, develop IT strategies, implement IT in various programmes, adapt and assimilate IT into the overall economy they are categorised as

having an *Explicit IT Policy*. Obviously, those countries categorised into the *advanced* DCs category may be classified as having an *Explicit IT Policy*.

The major points of interest which emerged from the literature review are given in **Tables 2.1** and **2.2**. The features common to both categories of developing countries are highlighted in **Table 2.1**. In **Table 2.2**, a comparative analysis of some of the key differences between *advanced* and *laissez-faire* DCs are shown. These characteristics are listed here in point-form to summarise the specific trends occurring in DCs.

**Table 2.1**                      **Features common to both ‘Advanced’ and ‘Laissez-faire’ Developing Countries**

	Common Features
a)	Increase in application and implementation of IT systems.
b)	Increase in the demand for IT application in both government and private sector organisations.
c)	Acute shortage of personnel with the right kind of knowledge and qualifications in IT.
d)	Computer and information science subjects were mainly offered at undergraduate and postgraduate levels studies at universities and polytechnics.
e)	Initial computer hardware in schools were donated by charity organisations (eg Rotary Club), individuals (eg former students), private firms (eg Shell Petroleum) and foreign aid (by developed countries).
f)	Contributions and potential contributions from the private sector organisations in conducting IT related education and training were recognised by the government as complementing the efforts of the public sector training organisations.
g)	Initial computer hardware in the country introduced by private sector organisations such as Banks; electricity boards; and railway authorities.
h)	High import tariff imposed because almost all of the computer hardware and software required for use in training and education purposes have to be imported from developed countries or abroad.
i)	Private training institutions offer computer courses either in direct opposition or in cooperation with the government-funded institutions.
j)	Computers are introduced by enthusiasts which thus spark off government interest and action.
k)	A mixture of hardware and software used for training and education purposes.

**Source:** Information summarised from the literature review and professional contacts.

**Table 2.2      Different Features between Advanced and Laissez-faire DCs.**

	Advanced Developing Countries	Laissez-faire Developing Countries
a)	Establish formal structures such as Ministry, Commission, Council to implement IT at all levels	No formal structures established.
b)	Formulate a formal (Explicit IT Policy) framework to enable successful implementation of IT	Formulate an Implicit IT Policy. No serious effort made to implement IT.
c)	Develop necessary infrastructure , eg Training programme, Training facilities, and telecommunications infrastructure.	Development of physical infrastructure such as telecommunication is slow. Training programs are just picking up.
d)	Develop and formulate a formal Computer Curriculum for use at all levels of the system.	Computer Science and Information Science are mainly taught at university levels.
e)	Formalise Examination in Computer Studies/Science with external professional Organisations to give international credibility and establish quality control in their systems.	Computer literacy is taught as extra-curricula activity. No formal computer curriculum in schools. Computer Studies is not a prerequisite for university placements.
f)	Involve the Private sector in IT policy formulation, curriculum development, training programme and certification of private sector training programmes.	Governments and private sector work in isolation. Little or no input expected from private providers. Certification varies from institution to institution.
g)	Establish a network for inter-departmental co-ordination between Ministries and Statutory organisations including private sector players. International cooperation encouraged in IT related fields in educational institutions and Industries	Little or no co-ordination between government departments, statutory bodies and private sector. International cooperation in IT related fields have yet to be investigated and established between DCs and the developed countries.
h)	Firm commitment towards developing human resources in IT within its means in an open and future-oriented curriculum and necessary inducements offered to retain their services.	No firm commitment to training and retaining the human resources within the country. Large exodus of trained personnel leave their country of origin in search of better deals elsewhere.
i)	Computer studies curriculum introduced in increasing level of complexities throughout its education system. Private providers are partners in education complementing the public providers to meet national IT skills needs.	Computer education and training is uncoordinated and ad hoc resulting in skills mismatch between training provided and the workplace needs. Private training programmes are less cohesive and highly dubious.
j)	Recognise IT as an essential tool for development in order to advance and compete against other countries.	Significance of IT has not been fully realised. Priorities placed in other socio-economic areas.
k)	Liberalise trading and industry policies to reduce tariffs on import of computer hardware, software, and literature.	Little liberalisation because of the need to raise internal revenue from importing computer hardware and software.
l)	Indigenisation of computers. eg. Translation of English-based software for the local use and develop local software and manufacture hardware under license for export. Eg India and Brazil.	No indigenisation in both hardware and software. Imported software are not conducive to local curriculum. Little manufacturing in IT hardware and no attempt to do so in the future.
m)	Proactive in development, application and implementation of IT for assimilation and popularisation throughout the country in the long term.	Reactive, knee-jerk reaction to solve short term problems as the need arises. Only small faction of the community have a notion of IT and its benefits.

**Source:** Information summarised from the literature review and professional contacts.

## 2.6 Rationale for introducing Computers in DCs

Hawkrige *et al* (1990) described two schools of thought: learning *about* computers where the course is vocationally-oriented and mostly taught by computer specialists in specialist laboratories as a specialist subject; and learning *with* computers which is integrated across the school curriculum hence promoting purely *vocational rationales*, taught in different subjects by all teachers involved hence promoting *social-vocational-pedagogical-catalytic* rationales (Hawkrige *et al*, 1990. See **Table 2.3** for other rationales under discussion.

The rationale for introducing computers in education in a country was driven by shortage of IT personnel within the country to effectively drive the country's economy. The main rationales are what Hawkrige *et al* (1990), termed as *Social Rationale* and *Vocational Rationale*. These rationales or their equivalents were further translated into the IT and industry policies of developing countries which recognised IT as a significant tool to boost as well as improve its economic activity. Subsequently, the policies trickled down to other systems such as education which is responsible for the development of human resources within the country.

Little of *Pedagogical Rationale* and *Catalytic Rationale* were seen to be applied in developing countries because of the immense cost involved in the acquisition of hardware and software, and provision of training facilities to achieve their goals. The other three rationales: the *IT Industry Rationale*, *Cost-effective Rationale* and *Special Needs Rationale* were not popular because they have a narrow application. First, in order to achieve the *IT Industry Rationale* there must be sufficient local computer hardware manufacturing industry and software publishing houses. Second, the fear of

computers physically replacing the teacher discouraged many countries with unemployment and other social problems to delay introducing computers. Finally, limited resources in DCs were more often than not, used for the benefit of the mainstream education system and whatever is left is then used for minorities such as people with special needs.

The underlying theoretical justification for pushing for the introduction of computers in education were many and wide ranging. One justification put forward was that traditional delivery of education and training were inadequate and therefore it was necessary to either replace or supplement it by implementing new approaches such as remediation, simulation, and distance education using computer technology (Chesmond & Tucker, 1990).

A second justification highlighted by Nydahl (1990) was that of preparing students to meet the computer requirements of their future career which Hawkrige *et al* (1990) call *Vocational Rationale*. Even though Hawkrige *et al* (1990) identified these rationales in the context of using computers in schools in developing countries, it is just as valid in developed countries whose major rationales for introducing computers in education are similar.

**Table 2.3 Policy Options Based on Four Popular Rationales for introducing Computers into Secondary Schools.**

Rationale	Policy Option	Software	Training	Hardware	Costs
Social	Introduce as many students as possible to computers	Little software needed	Little training is needed	Many cheap machines are needed	High but can be low at first, then built up
Vocational	Enable some students to use computers in the economy	Some software needed including application software	Some training is needed	Some medium-priced machines are needed	Moderate and can be built up
Pedagogical	Improve teaching and learning across the curriculum	Much software needed including some local programs	Much training is needed	Many medium-priced machines are needed	High even if restricted to a few schools
Catalytic	Change schools and curricula through bringing in computers	Much software needed including many local programs	A great deal of training is needed	Many medium-priced machines are needed	Very high even if restricted to a few schools

Source: Adapted from; Hawkrige, David *et al* (1990). *Computers in the Third-World Schools: Examples, Experience and Issues* (Page 250). Great Britain: Macmillan.

The third justification was related to the second reason but had to do with pressure applied from outside the education system by parents, economy, industrial interest, cultural, social and political pressure (Stancher, 1990; Bruwelheide, 1984), which Hawkrige *et al* (1990) call *Social Rationale* and it was committed to raising awareness, knowledge and competences in computer related technology for future jobs. For example, students learned to use computers to be computer-literate in case computer literacy skills were needed for job security or enhance promotional opportunities (Friedstein, 1986). Tenner (1984), further clarified this pressure as coming from ‘below’ such as students and younger faculty to begin an impetus for computer literacy movement in education.

The fourth justification for the use of computers in education in developing countries was that introduction of educational technologies such as computers was seen as an important move towards modernising their country's economy. In other words, it was included in a country's national goals towards modernisation and industrialisation (Chandra, 1985). In this context, both developed and developing countries saw their greatest resources in their people and that the use of technology was seen as enhancing the people's capabilities and contributions they would make towards the country's development (Chandra, 1985, p. 847).

The other two rationales identified by Hawkrige *et al* (1990), were *Pedagogical Rationale* and *Catalytic Rationale*. The former was aimed at using computers to enrich existing school curriculum while the latter enabled students to go beyond rote-learning and teacher-centred learning into controlling and investigating their own learning. The 'constructivist learning' would fit into this category (Schwier, 1995). They have also highlighted three additional rationales which are popular in recent times mainly in developed countries and rarely in developing countries. These rationales are: *Information Technology Industry Rationale*, *Cost-effectiveness Rationale*, and *Special Needs Rationale*.

The IT industry rationale is inwardly driven (say from within a country) by industries (eg software producers, hardware manufacturers or vendors) who want to see their product approved for use in schools. This rationale was often market-driven under the guise of serving national interests and promoting domestically manufactured products. The cost-effectiveness rationale was used by proponents who argued that computer hardware and software can replace teachers in the classroom most 'cost-effectively'



For example, they argued that computer hardware prices are falling and teachers salaries are rising. However, anti-social and de-humanising roles of the computer were either ignored or de-emphasised by the proponents of cost-effectiveness rationale. The proponents for special needs rationale argued that students with special needs (eg, physical or mentally handicapped) can be catered for by using computers. For example, the computer can motivate slow learners. However, the cost for serving such purposes due to the specialist nature of hardware and software would be extraordinarily high and prohibitive in many developing countries. Many DCs cannot afford expensive educational technologies required to serve the special needs rationale.

## **2.7 Summary**

The literature on computer literacy, computer studies, computer science, computer education and all the variants of IT in education and training described a range of initiatives in both industrialised countries and Developing Countries (DCs). What computer literacy means varies from one context to the next and does not necessarily have a precise meaning due to the ever evolving nature of computer technology and its studies.

Despite significant differences between industrialised countries and DCs on the basis of socio-economic indicators such as: GDP, income per capita, population growth, illiteracy or literacy rates, people per doctor or hospital bedspace ratios, there is a further divide between the DCs themselves - the rate at which IT strategies were adopted and implemented. The DCs in general have introduced computing curriculum into their schools in the last two decades which were mostly attempted through private sector initiatives. The DCs by their individual nature and level or rate of IT development and

implementation fall into two distinct categories- the '*advanced*' and the '*laissez-faire*' developing countries. The former as the name implies have '*advanced*' in IT adoption with necessary policies, administrative and physical infrastructures, and effective implementation strategies in their country while the '*laissez-faire*' developing countries lag behind through *ad hoc* or haphazard efforts. Within this context, the *advanced* DCs generally fall into the Newly Industrialised Country category while the *laissez-faire* countries could be categorised as 'developing countries'.

This categorisation was done on the basis of questions such as; whether or not IT strategies were recognised and adopted at the highest political level and whether all necessary mechanisms (ie, policies, formal computing curriculum, training facilities and resources, IT infrastructure) were developed to help drive their countries' economy into the 'information society'. The other finer characteristics of IT development and application in DCs have been identified, contrasted and highlighted for both the '*advanced*' and '*laissez-faire*' developing countries.

The rationales for introducing computers in schools in the DCs are predominantly driven by *vocational* and *social* rationales as they were probably seen as directly beneficial to both the students and the economy as a whole. It was also a cheaper alternative as opposed to the other rationales such as: *pedagogical*, *catalytic*, *IT industry*, *cost-effectiveness*, and *special needs* rationales.

There was a marked difference between the '*advanced*' and '*laissez-faire*' developing countries as documented in this chapter. Some common characteristics include:

- acute shortage of personnel with IT related skills and qualifications;
- importing costly computer hardware and software;
- software incompatible with the curriculum used;
- the inadequate infrastructure to address IT application; and
- the use of English language in most of the educational and application software further disadvantaged the use of such software by those whose language of instruction were in languages other than English.

In the '*laissez-faire*' developing countries, computer literacy and computer studies courses were treated as either 'extra-curricula activity' or 'optional subject' in which only selected group of students may study and were therefore not publicly examined. Emphasis was placed on programming and use of application software. Education and training of this nature was unregulated and were often run in a commercialised setting.

Asian countries like Singapore have an *explicit* IT policy in which the government played an active part in providing the mechanism necessary for IT strategies and implementations and therefore aimed at moving Singapore into the Information Age or Singapore IT2000 (Cheong, 1992b; Wong, 1997). Singapore's explicit IT policy together with its 3Ps philosophy of: success through **P**artnership with government agencies, business groups, IT industry, professional bodies, academic institutions, private companies and international organisations; excellence through **P**rofessionalism and fulfilment through **P**eople-orientation drastically helped to excel in IT (Cheong, 1992a).

Some developing countries had an *Implicit IT Policy* where the governments are active participants in IT and work under the auspices of special government department or organisation like the Department of Electronics in India (Okot-uma, 1992) and

Computers and Information Technology Council in Sri Lanka (Basnayake, 1992). Such departments and organisations were responsible for the implementation of IT strategies including human resource development in computer education and training in their respective countries. They liaised with private sector training organisations and public institutions to develop qualified people required in the IT field.

Information Technology policy initiatives in Developing Countries can be classified into three generic categories; *non-existent*, *implicit*, and *explicit* (Okot-uma, 1990). Non-existent IT policy was rare where the governments deliberately elect to remain unperturbed by the developments in IT in the world scene. Implicit IT policy was prevalent in many developing countries where the governments have played an active part in IT development but chose to operate under an umbrella body such as a ministry. Explicit IT policy were found in a few developing countries (eg, Brazil, China, India, Malaysia, Pakistan, Sri Lanka, and Singapore) but the governments of these countries have been actively involved by developing policy mechanisms, establishing formal administrative structures to develop IT strategies, and implementing the policies according to their national goals and objectives.

One common trend in the developing countries observed from the literature was that the supply of qualified human resources has not satisfactorily met the demand from the increasing number of computer installations in both the government and private sector organisations. Therefore, government departments and private sector organisations were forever caught up in the endless cycle of recruitment and departures in the form of poaching and brain-drain between organisations (Munir, 1992). At worst, the personnel with relevant IT experience and qualifications exited from one country to another in search of better conditions where remuneration awarded was highly commensurate with their expertise and experience.

For the rest of the developing countries, there are either non-existent IT policies or they are beginning to draw up an IT Policy like that of PNG where computer-related training has been conducted on a commercial basis without formal coordination (Sinebare, 1993). However, since information technology is a fast changing and growing area, many countries may adopt appropriate IT policies for implementation over time. For the group of developing countries that don't have an IT Policy and human resource development plans and strategies to develop computer skilled personnel, people with relevant expertise in IT have to be recruited from abroad which was often costly. It was unfavourable for a country to continually and totally depend on foreign expertise in the long term and therefore such countries attempt to reduce the cost of employing foreigners by developing their own human resources. The need to reduce cost would be one of the driving forces to formulate an appropriate IT policy and human resource development strategies by developing countries.

Malaysia is one such country which recognised the significance of developing its own human resources within the country. For example, where there was a shortage of qualified staff to train local IT personnel, Malaysia brought in professionals from developed countries to conduct courses, and enable local universities to collaborate with overseas universities in Australia and United Kingdom (Nordin, 1992). It prepared students to sit for 'recognised' external examinations such as those courses conducted by the National Computing Centre of U.K. Many developing countries in Africa and Asia were injecting scarce funds and resources into the development of their human resources in IT.

Just recently, Malaysia announced that it was investing and planning for the 'Multimedia Super Corridor' and aimed to create a world-class physical information infrastructure by expanding IT education and training, enhancing IT awareness and enculturation, and reviewing the necessary laws to facilitate its Vision 2020 plan (Moggie, 1996; Mahathir, 1996).

Papua New Guinea realised the significance of human resource development and the many skills required in the workforce in the country. It has recently formulated and adapted several policy documents which are discussed in chapter 5.

## **Chapter 3**

# **Theoretical Framework**

### **3.0 Introduction**

This chapter describes the theoretical framework (section 3.1), discusses both quantitative and qualitative research methodologies (section 3.2), and highlights the research methodology adopted for this thesis (section 3.3). It also describes the theoretical policy approaches to what policy means, the different models of policy-making approaches, what policy analysis means, the different types of policy analyses, and how various policies of interest in PNG will be analysed (sections 3.4). Section 3.5 summarises this chapter.

### **3.1 Popular Theoretical Perspective**

This section highlights some features of the common theoretical perspectives in order to establish the viewpoints held by different schools of thought. It is not the intention to provide an exhaustive but rather a selective overview of the different theoretical perspectives. The intention, however, is to focus on the particular research paradigms or assumptions that lend themselves to the research being pursued. The paradigms being focussed on are positivist, interpretivist, critical, and grounded theory which are briefly described in the next four sections.

#### **3.1.1 Positivist Perspective**

A positivist views the world or the universe as observable and quantifiable. The positivists view research as objective where events are measured using an appropriate instrument and necessary data are collected for analysis and interpretation. Data or observations are used deductively for the purpose of testing theories. From this data and

observations interpretation, generalisations or conclusions are developed and prediction of future outcomes are proposed.

The positivist view is that in order to understand a phenomenon an objective quantitative measurement is necessary so that the results thus obtained from the empirical data are verifiable and replicable (Glesne & Peshkin, 1992). From such objective measurements, statistical computations, observations and analyses, generalisations or universal laws are developed. The positivist approach is to observe or measure quantifiable data to interpret the nature of the data and deduce what these relationships mean or explain and make predictions from this known vantage point.

The positivist researcher begins with a hypothesis with the expressed aim of testing the hypothesis, explaining an observed phenomenon (Blaikie, 1993) or predicting future outcomes under certain known or unknown conditions (Sarantakos, 1993).

### **3.1.2 Interpretivist Perspective**

An interpretivist researcher views research as making sense of a situation by being a participant in the activity or an event so as to fully understand the phenomenon (Glesne & Peshkin, 1992). The interpretivist researcher holds the view that: '*...social life is based on social interactions and socially constructed meaning systems.*' (Neuman, 1991, p.51). The interpretivist approach then is to internalise and personally experience the social interactions and socially constructed meanings of a system (ie as a participant-observer in a social setting) in order to understand the situation better (Sarantakos, 1993). By understanding the situation or the social world better one would be able to invent (make sense of meaning) or develop concepts (by conceptualising what is in play or observed) and formulate theories that describe, explain or interpret the specific details of the individual observations hence the term 'interpretivist' (Blaikie, 1993).



### 3.1.3 Critical Perspective

The critical research view, ‘...*aims at criticising social reality, emancipating people, empowering them to change social reality by suggesting possible solutions and thus liberating them from oppressive and exploitative social structures.*’ (Sarantakos, 1993, p.16). Critical research is based on the notion that the ability of human beings to give *reasons* for their particular activity is the greatest mental power that can be used to criticise and challenge what is occurring in a particular setting (Blaikie, 1993). Critical rationalism is interested in finding possible explanations for an event that causes yet another event. Critical rationalism is aimed at finding a causal explanation of a phenomenon. It attempts to answer logical, epistemological (based on knowledge) or semantical (based on meaning) questions.

**Table 3.1 Differences between the Three Theoretical Perspectives**

Features	Theoretical Underpinnings		
	Positivist Perspective	Interpretivist Perspective	Critical Perspective
Purpose of research	To discover general or natural law to predict and control future events.	To understand and describe meaningful social events.	To de-mystify any myths held and empower people to radically change for the better.
Nature of social reality	Stable pre-existing patterns or order that can be discovered.	Fluid definitions of a situation created by human interactions.	Conflict-filled and governed by hidden underlying structures.
Nature of human beings	Self-interested and rational individuals who are shaped by external forces.	Social beings who create meaning and who constantly make sense of their worlds.	Creative, adaptive people with unrealised potential, trapped by illusion and exploitation.
Role of common sense in the research	Clearly distinct from and less valid than science.	Powerful everyday theories used by ordinary people.	False beliefs that hide power and objective conditions.
Theory looks like (Nature of the Theory constructed)	A logical deductive system of interconnected definitions, axioms and laws.	A description of how a group’s meaning system is generated and sustained.	A critique that reveals true conditions and helps people see the way to a better world.
An explanation that is true	Is logically connected to universal laws and based on facts.	Resonates or feels right or acceptable to those who are being studied.	Supplies people with tools needed to change the world they live in.
Good evidence	Is based on precise observations which others can be replicated.	Is embedded in the context of fluid social interactions and documentations or artefacts.	Is informed by a theory that unveils illusions, empower the oppressed, and improve living conditions.
Place for values	Science is value-neutral, and values have no place except when choosing a topic.	Values are an integral part of social life; no group’s values are wrong, only different.	All science must begin with a value position; some positions are right, some are wrong.

Source: Adapted from: Neuman, L.W. (1991). **Social Research Methods**. Boston-USA: Allyn and Bacon, p.63.

### 3.1.4 Grounded Theory Perspective

Grounded theory research attempts to build a theory by using multiple data sources and research methodologies which contributes toward explaining a phenomenon. For example, a '*...grounded theory approach is a qualitative research **method** that uses a **systematic set of procedures to develop an inductively derived grounded theory about a phenomenon.***' (Strauss & Corbin, 1990, p.24).

The theory so developed is said to be grounded on the empirical data, because it is created through and emerges out of the rich data collected and 'analysed'. How these data are organised and how one makes sense of them through the evolving research process enables the grounded theory researcher to inductively construct a plausible theory or an explanation of a particular phenomenon (de Vaus, 1991).

The inductive method entails that initially at an empirical level a series of observations (verbal, textual, graphical, audio, interview, questionnaire, and document analysis just to name a few) are conducted out. From these observations, interpretations, patterns, holistic pictures or a general theory emerges out of the data. A theory is then constructed that attempts to explain the patterns that closely relates to the reality or the phenomenon under investigation. The main objective in constructing a theory is to present an overall picture which describes the nature or the phenomenon being studied.

### 3.2 Research Methodologies

Research methodologies translate the principles of a particular paradigm or a theoretical framework into a way of undertaking research which enables one to explain, handle, approach or study the phenomenon in question (Sarantakos, 1993). As Blaikie states:

Methodology...is the analysis of how research should or does proceed. It includes discussions of how theories are generated and tested. What kind of logic is used, what criteria they hope to satisfy, what theories look like and how particular theoretical perspective can be related to particular research problems (Blaikie, 1993, p.7).

Two such methodologies; quantitative and qualitative research methods are briefly discussed in the next two sections.

### **3.2.1 Quantitative Methodology**

Quantitative methodology is often termed; the traditional, experimental, empiricist paradigm, or scientific method and is based on testing a theory (Creswell, 1994). The theory often consists of variables which are conceptualised by the researcher and represented symbolically by the use of variables and measured with numbers. The data is manipulated and analysed using standard statistical procedures. Based on this analysis, the hypotheses are tested and generalisations or predictions formulated. Data is specifically collected from a representative sample of a population in which the researcher can confidently generalise. The study may be replicated under similar conditions by other researchers. The theory is then tested to determine whether it is confirmed or not from the quantitative data analysed and the results obtained from the analysis in the study.

Quantitative research follows the theory-testing approach which makes deductions. At the conceptual-abstract level, a theory either proposed by the researcher or emerging from the literature review is identified. In order to test the theory, the researcher designs different observations or tests specifically to verify or nullify the theory under investigation. In this case, the researcher is normally external to those being researched. The researcher allows the data to speak instead of speaking for them.

### **3.2.2 Qualitative Methodology**

Unlike the quantitative methodology, the qualitative one does not begin with a theory to test or verify. Theory is the end result of qualitative research which is inductively developed after data collection and analysis because theory emerges out of data collection and analysis processes (Creswell, 1994). Even if the theory is stated in the

beginning of the research process, it is then modified on the basis of specific revelations made by the research data and any interpretations deduced from it.

The qualitative design lends itself to a grounded theory research perspective where a theory is developed or modified as the research process progresses from observations of the phenomenon in question and collection of data, to making senses of the meanings inherent in the various forms of data gathered. Qualitative research follows a theory-construction approach which makes inductions initially at the empirical-concrete level, where observations are made. By making sense of the observations through understanding and meaning, generalisations are made at an conceptual-abstract level. Many different forms of data are collected in order to ‘understand’ and ‘make sense’ of the reality as they happen and to ‘interpret’ them accordingly.

Qualitative research is exploratory because the variables and theory are unknown to the researcher. The data (documents, visual and audio/aural materials) and informants are purposefully selected by the researcher to give the best answer to the research question under investigation (Creswell, 1994). Because each situation is unique it is not possible for a study to be replicated elsewhere, and therefore the theory formulated from one study cannot be disproved in the strictest ‘quantitative’ sense. However, it can only be stated that it is different from other studies (ibid). **Table 3.2** gives a summary of the differences between quantitative and qualitative research methodologies.

**Table 3.2      Differences between Qualitative and Quantitative Research**

	Quantitative	Qualitative
Research Goals	To test hypothesis or theory and establish facts to show relationships or make predictions.	To capture and discover meaning, develop understanding, sensitising and describing the reality.
Theoretical Affiliation	Positivistic, experimental, logical empiricism, or the scientific perspective	Critical theory (subjectivity), naturalistic, constructivist, ethnomethodology, phenomenology, and grounded theory .
Key Research Concepts	Concepts are in the form of distinct dependent and independent variables. Reliability, hypothesis, variable, validity, statistical significance, replication and prediction.	Concepts are in the forms of themes, motifs, generalisations, and taxonomies. Common sense, meaning, understanding, definition of situation and social construction.
Research Design	Measures are systematically created before data collection and are standardised. Detailed plan of operation. It is structured and predetermined and specifically focused.	Measures are created in an ad hoc manner and are often specific to the individual setting or researcher. It is flexible, evolving and generalised.
Nature of Research data	Data are in the form of numbers obtained from precise measurement. Quantifiable coding, operationalised variables, statistically manipulated and used.	Data are contained in the form of words from documents, observation schedule, artefacts, diaries, minutes, memo, newspaper articles and transcripts. Data are descriptive.
How theory is derived	Theory is largely causal and deductive.	Theory can be causal or non-causal and is often inductive.
Research Procedures	Procedures used are standard and replication is assumed.	Research procedures are particular and replication is rare.
Research Analysis	Analysis proceeds from using statistics, tables or charts and discussing how what they show relates to the hypotheses postulated. Data is deductive and occurs after data collection.	Analysis proceeds by extracting themes of generalisations from evidence and organising data to represent a coherent, and consistent picture of the whole. Data is inductive and is an ongoing process.

Sources: Adapted from:  
(a) Neuman, L.W. (1991). **Social Research Methods** (p.323). USA: Allyn and Bacon;  
(b) Bogdan , R.C. & Biklen, S.K. (1992). **Qualitative Research for Education: An Introduction to Theory and Methods** (pp. 50-52). Boston-USA: Allyn and Bacon; and  
(c) Creswell, J.W. (1994). **Research Design: Qualitative and Quantitative Approaches**. California-USA: Sage Publications.

**3.3                      Research Model**

This section proposes the research design including the theoretical perspective and the research methodology applicable to the research undertaken in this study. It argues for the use of a combination of theoretical paradigms and methodologies which are not only applicable but also lend themselves to the research being conducted.

### 3.3.1 Theoretical Perspective

The literature, for example Strauss & Corbin (1990), indicates that no single theoretical framework or paradigm lends itself easily to the research of the type undertaken in this study. Some theoretical points of view lend themselves well to a particular research methodology. For example, the positivist view is that in order to understand a phenomenon an objective measurement is necessary and therefore quantitative method is applicable. The interpretivist view is that one should be able to make sense of the situation by physically participating in the activity or an event to fully understand the phenomenon and therefore qualitative method is appropriate. The latter of the two theoretical perspectives lends itself to the research undertaken in this study and is therefore applied in the research process.

This author has adopted a multi-methodological perspective for this thesis. In the multi-methodological perspective a combination of the following methods were employed: a) a theory-construction model (Lewins, 1992), b) an *empirico-inductive* approach (Majchrzak, 1984) using empirical data (from both PNG and other developing countries), and c) *grounded theory perspective* (Strauss & Corbin, 1990) by inductively making sense of the materials obtained from various sources. Throughout the different stages of the research process, many sources of primary data were gathered, examined, compared, synthesised and analysed in order to understand the meaning contained in the various data, make sense of the qualitative data gathered, formulate generalisation and eventually make recommendations on the basis of the initial research questions investigated. The *positivist perspective* involving the collection and measurement of quantifiable data was used to a lesser extent in this study. A quantitative analysis was used in the analysis of the attitudinal questionnaire in attempting to answer Research Question Two. (The full report on the attitudinal questionnaire is appended in Appendix A).

### 3.3.2 Research Methodology

The proposed research uses a combination of methodologies such as case study (Yin, 1984), quantitative (to a lesser degree as mentioned above) and qualitative methods (as a dominant methodology) in this study. This research is both an exploratory and a pioneering one because no such studies have been done in PNG that the researcher is aware of. There is the possibility for the characteristics of each of the positivist, constructivist, interpretivist and critical perspective in this research. It is suggested by Sarantakos (1993, p.3) that it is not unusual to have such variations in methodology and perspective because every research is unique and different. This view is also strongly supported by Peshkin (1993) that there is no 'prototype' where qualitative researcher must follow. Creswell (1994, p.177) proposes three models which use combinations of methodologies to better understand the concepts explored, tested, and suggested by integrating several paradigms within a research design. The three models suggested are: *two-phase design*, *dominant-less dominant design*, and *mixed-methodology design*.

On the question of whether paradigms should be linked with particular methods, Creswell (1994) identified three schools of thought: *purist*, *situationalist* and *pragmatist*. The *purist* argue that paradigms and methods should not be mixed. The *situationalist* argue that certain paradigms and methods are suited to certain situations and conditions and should be used sparingly in a research design. The *pragmatist* is of the view that paradigms and methods should be integrated into a single study however best it is suited in order to obtain the best possible results given the particular nature of the research being undertaken.

A broad theoretical framework is envisaged in this thesis where a combination of theory-driven and theory-building approaches or the *mixed-methodology design* and *pragmatic* approach is employed in this study. It is further envisaged that the dominant

approach of the mixed-methodology design will be *grounded theory* and an *interpretivist paradigm* using *qualitative* research methods.

Multi-data collection methods or ‘triangulation’ method (Glesne & Peshkin, 1992) in the form of; an open-ended and closed questionnaire, face to face interview (with the representatives of the private training organisations), and collection of primary and secondary data from various sources will also be used. Other views and data inputs from professional contacts, colleagues, testimonials from the various sources (ie staff, trainees and potential employers) will also be consulted. The primary data will be supplemented by appropriate literature from elsewhere especially from developing countries.

### **3.4 Theoretical Policy Approaches**

#### **3.4.1 Broad Definition**

A policy is a statement of intent formulated by the state (or its agents) which expresses the broad purposes of government activity in a particular area or field. According to Hogwood and Gunn (1984, p.19):

A policy involves a series of more specific decisions, sometimes in a rational sequence (eg deciding there is a problem; deciding to do something about it; deciding the best way of proceeding; deciding to legislate; etc.)

The individual decisions and actions suggested by Hogwood and Gunn (above) may be best represented by the following illustration and explanation. The government’s expressed intentions for formulating a policy are to act on the area or the field identified (call it X) in order to create a change (call it Y) which results from acting on the field over a period of time in years. In other words, if there is an identified problem in existence (X) then the goals of the policy are to effect necessary actions in the form of decisions, legislation, sanctions, decrees, incentives, and guidelines on the field X at



various points in time represented by  $x_t$  (where  $t$  represents the time and  $x$  represents the necessary action) with the overall goal of achieving the purpose of the policy (Y). Each corresponding action is represented by  $y_t$  (where  $t$  represents the time and  $y$  represents the corresponding result).

If  $X$ , then  $Y$ .  
 Or If  $X \rightarrow Y$     The arrow represents actions or implementation of the policy.

If  $x_1 \xrightarrow{t_1} y_1$     Action one taken in time one resulting in change one.  
 $x_2 \xrightarrow{t_2} y_2$   
 $x_3 \xrightarrow{t_3} y_3$   
 $x_n \xrightarrow{t_n} y_n$     Action taken over a period of time with a given result.

Therefore, if there were specific actions over time (  $x_n$  ) taken on X, then the corresponding effect (  $y_n$  ) will result for the overall consequence (Y). However, the successful implementation of the policy depends on many and wide ranging factors. For example; where the focus of the policy is placed, how the policy is implemented, how many agencies are responsible for implementing the policy, are these agencies adequately staffed and resources provided, are the staff adequately qualified, are the different agencies duties and roles clearly specified, who implements the policy, whether the policy actors comply with the requirements of the policy, whether the intentions of the policy-makers have been translated into the policy document, whether the policy addresses the specific areas of concerns for which the policy was originally intended to influence or impact on, and whether the bureaucrats interpret the policy document as intended by the policy-makers?<sup>1</sup>

### 3.4.2            Models of Policy Approaches

Models are fundamental in many fields of study. Models may exist in the minds of the human beings or exist in tangible form for manipulation. Models are also fundamental

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<sup>1</sup>    For more details see Ham and Hill (1993), and Hogwood and Gunn (1984).

in policy formulation and policy analysis. Models help visualise what theoretical and conceptual possibilities are based on various underlying assumptions, variables, factors and issues. Many such models include; Analytic models, Simulation models, Gaming models, and Judgemental models (Quade, 1989). Different models may lend themselves to different policy environments. There is no prototype model for all policy environments and therefore, planners and policy-makers may have to adapt more than one model by ‘muddling through’ to represent the policy framework for its purpose (*ibid*).

Hogwood and Gunn (1984) identified two models; Descriptive and Prescriptive models of policy-making while Ham & Hill (1993) identified two other policy approaches, namely; Optimum methods and Mixed Scanning methods. These four models or approaches are relevant to the specific policies in PNG (and are discussed further in chapter 5).

#### **3.4.2.1 Descriptive Models of Policy-Making**

The work of Herbert Simon in the 1950’s ‘rational approach’ and Charles Lindblom’s in the 1970’s ‘incremental approach’ were highlighted under Descriptive models of policy-making (Hogwood & Gunn, 1984; Ham & Hill, 1993).

a) In the rational policy-making model (rational-comprehensive methods), the policy-maker looks for the available options and collects as much information as necessary before setting about formulating a policy that will maximise the outcome by linking it to the best available options within the area of concern.

Hogwood and Gunn (1984), identified (from the work of Simon and Lindblom) the following main points in which the policy-maker has to go through in the policy-making process:

- Intelligent gathering - Collect as much information as possible prior to taking any formal action to formulate a policy;
- Identify all the options - Identify all the available options and consider each of them carefully;
- Assess the consequences of these options - Assess each of the available options and their consequences resulting from adapting it;
- Relate consequences to values - After collecting data, identifying options, and assessing consequences, the information gathered must be prioritised according to the preferred values or goals of the policy;
- Choose the preferred option - Choose the option that best links to the preferred values. (Hogwood & Gunn, 1984, p.45-46).

b) The alternative rational approach to policy-making looks for and identifies the objectives of the policy. It sets the objectives first and then looks for possible options to achieve the goals.

An alternative rational policy-maker would:

- Define and rank in order of significance the values considered important;
- Specify particular objectives which are derived from the values defined or established;
- Identify all the possible options or ways in which the objectives specified can be achieved.
- Consider all the consequences of the various options available, costs, pros and cons; and
- Select the best possible option or combination of options which would maximise the values identified earlier as important. (Hogwood & Gunn, 1984, p.46-47).

The major criticism for both cases of rational approach to policy-making is that it is difficult to determine the values. For example, whose values should be given attention; the values of the policy-maker, the organisation, the people, or the government? Further, there are several limitations to policy-making under a rational approach. These limitations include:

- Psychological limitations - the policy-maker has limited knowledge, skills and values;
- Limitations arising from multiple values - there is no-one 'rational' way to represent different interest groups;
- Organisational limitations - the individual policy-maker has personal limitations and the organisational culture, structure, and politics will all pose obstacles;

- Cost limitations - cost considerations are often limiting regardless of how 'rational' a policy might be;
- Situational limitations - there are other influences to policy-making such as past precedents and special interest group pressures (Hogwood & Gunn, 1984, p.50-52).

The rational approach is sometimes labelled top-down approach because the policy formulators have nothing to do with the policy implementation. They just formulate the policy from the top level (Parliament, Bureaucracy) and the policy is implemented downwards in the hierarchy or organisations by the bureaucrats and the target groups (Ham & Hill, 1993).

#### **3.4.2.2 Prescriptive Models of Policy-Making**

While rationalism (Descriptive models) seek to obtain detailed and comprehensive information about the whole scene, incrementalism (Prescriptive models) on the other hand focuses on the individual parts or particular aspects of a policy in order to iron out the troublesome patterns that have developed in the past and incrementally improve upon it as one progresses in policy-making (Hogwood & Gunn, 1984). It is argued that incrementalism allows serious mistakes in the policy process to be avoided because the policy-maker assesses the different moves he or she makes at each increment (step) and determine if further steps are necessary or a different direction must be taken (Ham & Hill, 1993).

#### **3.4.2.3 Mixed Models of Policy-Making**

The third model incorporates mixed methods of policy-making approaches, namely Normative Optimum Model and Mixed Scanning. Their individual differences are highlighted below.

##### **a) Normative Optimum Model**

The Normative optimum model attempts to increase the use of both rational and extra-rational elements such as the use of judgments, creative inventions, brainstorming, and

other approaches instead of just using rational elements such as the examination of available alternatives (Ham & Hill, 1993). This model uses a selective review of the available options and examination of the goals and of the policy. It seeks for an optimal method in order to strengthen and improve policy-making. The normative optimum model falls between the rational-comprehensive and incremental methods continuum.

## **b) Mixed Scanning**

As the term mixed scanning implies, it enables the policy-maker to scan as much information from as many sources as possible with a wide range of alternatives and draw conclusions from a broad review of past decisions or policies. It enables a policy-maker to review other sources of information relevant to the issue at hand and gradually build the bigger picture from the individual, isolated, and unrelated parts (Hogwood & Gunn, 1984, p.60). This may be likened to a complicated zig-saw puzzle where each component is important in contributing towards 'completing' the whole picture. Similarly, each aspect of a policy, however minute and insignificant must therefore play its part to help policy-makers to piece together the individual but related parts to formulate a sound policy.

### **3.4.3 Policy Analysis**

#### **3.4.3.1 What is Policy Analysis**

Policy analysis is the study of the policy-making process and it is often conducted by political scientists interested in the process in which policies are made as well as the effects of those policies after they are adopted or implemented (Majchrzak, 1984). However, the definition of policy analysis adopted by this author for the purpose of this study is given by Quade who states that policy analysis is:

... a form of applied research carried out to acquire a deeper understanding of sociotechnical issues and to bring about better solutions... (It) searches for feasible courses of action, **generating information** and **marshalling evidence** of the benefits and other consequences that would follow their implementation, in order to help

the policy-maker choose the most advantageous action (Quade, 1989, pp. 4-5). (emphasis added)<sup>2</sup>

### **3.4.3.2 What Policy Analysis is Not**

It is also useful to be aware of the antonyms of policy analysis, or what policy analysis is not in order for us to have a complete picture of the concept. For example Quade (1989), identified three such antonyms;

- First, policy analysis is not ‘an exact science’ because science is concerned with the truth and it seeks to understand the phenomenon and make predictions while policy analysis seeks to provide the decision-maker with evidence and alternatives in order to make better choice of the available evidence and alternatives.
- Second, policy analysis does not provide all the solutions to all the problems and defects in policy-making and policy-making processes. Policy analysis is not a panacea for all the ills in policy and policy-making processes.
- Third, policy analysis is not a tool to be used by the analyst to advocate his/her point of views. It does not help perpetuate the advocate’s standards and expectations but those of the target groups as conveyed by the research data and findings.

In other words, policy analysis is simply a tool to aid policy-making by providing the policy-maker with a wide range of information and perspectives to the problems at hand. The policy-maker uses the information (eg, alternative choices, experiences, consequences) made available by research and policy analyses in order for policy-makers to formulate policies which are rational (ie, cost-effective, socially acceptable by the target groups, effectively implemented by the bureaucracy) and achieve its purposes.

### **3.4.3.3 Types of Policy Analyses**

Policy analyses may be conducted in several ways. Highlighted below are three types of policy analyses:

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<sup>2</sup> Emphasis is added to highlight what is relevant and applicable to the Policy Analysis conducted for this Thesis in Chapter 6.

- a) **Intuition** - The intuitive process entails that the analyst tries to learn as much about the problems confronting the policy, live with the problems and let the subconscious analyse the information and then provide the policy-maker with alternative choices which may be necessary for an acceptable solution. However, the intuitive process is analytically insufficient to establish cause-and-effect relationships as in scientific analyses.
- b) Use of expertise from an **Expert or a Group of Experts** - Here an expert in the area of concern is engaged to give an opinion. Sometimes a group of experts are engaged to put their expertise together in order to provide an independent view of the situation after closer examination of the facts and information available to them to synthesise or absorb. This approach is more analytical because many sources of facts and information are consulted by the experts to form an opinion and make suggestions or recommendations of the best option to the policy-maker.
- c) **Muddling Through** - In this type of analysis, a trial-and-error process is adopted by the analyst. The analyst examines the naturally occurring feedback from what is actually happening in the policy scene and supplements that by a limited analysis (through intuition and judgment) to form generalisations (Quade, 1989).

Often in such analyses, many analysis tools are applied to aid the policy analysis process. The commonly used analysis tools include operations research, systems analysis, cost-benefit analysis and cost-effectiveness analysis. The analysis would require a formal or scientific approach to conducting a thorough analysis of the policy under consideration.

The scientific approach entails the analysis of the following features:

- a) **The Objectives** - What the policy-maker seeks to achieve by the decision made or policy adopted.

- b) **The Alternatives** - What options or means are available to the policy-maker which will help achieve the objectives adopted. Investigate all the possible alternatives available before selecting the ones that provide the best option.
- c) **The Impacts** - What are the consequences associated with the alternatives identified? Consequences can be both negative or positive. Identify the impacts before determining the right alternative to choose from.
- d) **The Criteria** - A rule or a standard established to rank the alternatives according to the different objectives, alternatives and potential impacts in order to decide what alternative would best help to achieve the objectives.
- e) **The Model (or Models)** - A scheme or process to help visualise the action adopted in order that the impacts are generated to form generalisation. It is a simplification of real world to test the logic of the policy-maker's assumptions (Quade, 1989).

#### **3.4.3.4 How the different Policies related to IT Education and Training in PNG**

##### **3.4.3.4.1 Brief Background**

There are three policies of interest which this author perceived as related to IT Education and Training in PNG. These policies are highlighted in Chapter 5 (Computer Education Scenario in PNG), namely:

- The National Training Policy (The National Training Council Act 1991);
- The PNG IT Policy for the Public Service; and
- The PNG Science and Technology Council Act 1992.

There is no policy specifically formulated to address IT Education and Training in PNG. However, there were implicit references made to some aspects of IT education and training in each of the above-mentioned policy or Act, thereby prompting an analysis. Consequently, several discrepancies have been found to be in existence in both the public and private training organisations. These discrepancies together with the inherent difficulties of each of the policy initiatives identified (in Chapter 5) were considered by this author to be unsatisfactory and warranted some analysis.



The need for conducting such an analysis came from this author's many years of involvement (teaching and research) in IT education in PNG and observation of the IT education and training scenario in PNG under the present policy environment. This reasoning is supported by Quade who suggested that:

For a policy analysis to be carried out, **someone who finds the present or projected state of affairs unsatisfactory** must either commission a study or **undertake an investigation himself**, with a view to improving the situation (Quade, 1989, p. 69). (Emphasis added)

The policy analysis conducted in this thesis is neither commissioned by an individual nor an organisation but is undertaken by an individual who has been observing IT education and training in PNG over many years and convinced that the current state of affairs in which IT education and training was unplanned, uncoordinated, and heavily commercialised without appropriate formal policy guidelines is grossly unsatisfactory. The analysis conducted as well as the overall findings from the research undertaken for this thesis will provide additional information to help the policy-makers improve the current situation.

#### **3.4.3.4.2 Description of Policy Analysis Employed**

As noted in section 3.4.3.3, there are three possible ways of conducting a policy analysis - Intuition, engaging Expert or group of Experts, and Muddling Through. Often either an expert or a group of experts with expertise and knowledge in that subject area is commissioned to conduct an independent analysis for the sponsor. In such cases, specific terms of references are defined and necessary resources provided by the sponsor for the expert(s) to conduct policy analysis. A scientific approach to policy analysis is employed in such cases and therefore, a more detailed scrutiny is applied throughout the analysis process.

The formal or scientific approaches to policy analysis does not lend itself to the analysis of the three policies in PNG which are to be analysed, because it is not just one policy being analysed but three different policies with different goals and objectives. To conduct such an analysis thoroughly by using the scientific approach for all three policies is beyond the scope of this thesis.

The policy analysis is undertaken by an individual who saw the current state of affairs in IT education and training in PNG to be unsatisfactory. Therefore, the methods of analysis employed are slightly different because they help the analyst (author) to use personal experiences in IT education accumulated over many years. Additionally, the various sources of data obtained from the research (ie, Questionnaire, Interviews, Professional contacts, and Primary documents such as course materials and policy documents) are 'intuitively' used by 'muddling through' these sources of data to arrive at sensible or rational generalisations. The 'Intuitive' and 'Muddling Through' processes of analysis helps to bring together relevant information from the wider spectrum of data sources in order to assist the policy-maker to consider and use the best possible alternative in future policies or revisions to the existing ones. This type of analysis will be:

... providing information through research and analysis, isolating and clarifying issues, revealing inconsistencies in aims and efforts, generating new alternatives, and suggesting way of translating ideas into feasible and realizeable policies (Quade, 1989, pp. 11-12).

In this thesis, both 'Intuitive' and 'Muddling Through' approaches are employed to examine and highlight the different but appropriate aspects of the three policies. The different aspects of the policies include; background information, general goals and objectives, functions of the policies, and the administrative structures of the policies. The intuitive and muddling through processes will be applied to analyse and determine:

- where the general weaknesses and strengths of the policies lie;

- what the target group's (private computer training organisations) current practices are;
- where the direction of the current policies are heading;
- where the future policies should be directed;
- how the current inadequacies in IT education and training in PNG could provide clues and insights into future policies; and
- what the implementing agencies (individuals and organisations) should do to improve their individual inadequacies and limitations.

### 3.5 Summary

The positivist, interpretivist, critical, and grounded theory perspectives have been described and their differences highlighted. Qualitative and quantitative research methodologies and their key differences were also highlighted. From the different points of view described, this author is of the view that the best one can do is to adopt an approach that makes use of the most relevant theoretical perspectives and most appropriate research methodologies (Creswell, 1994).

This is an exploratory study of a topic which has yet to be addressed in an academic exercise of this nature. The research undertaken for this thesis uses a combination of positivist, interpretivist, critical and grounded theory perspective and follows the qualitative research methodology. A *mixed methodology design* and a *pragmatic* approach are used in this research with the dominant research perspective being *grounded theory* and *interpretivist* paradigm and the dominant research methods being *qualitative*. This approach is necessary because it is intended to develop a theory from the meaning synthesised and established from the collection of primary data from various sources. Grounded theory entails observing and interpreting data or information gathered so as to formulate a theory of a particular phenomenon under study - in this case, Private Computer Training in Papua New Guinea.

The theory thus formulated and put forward would help policy makers to better understand the environment under which IT education and training is conducted in the country. The policy maker would be guided by this theory to formulate an appropriate IT policy which would then help to implement IT education and training in the private computer training organisations in PNG. This theory is developed in Chapter 10 Theorising - The Ripple-Effect Theory.

With regard to the theoretical approaches to policy-making relevant to the context of this thesis, several theoretical models are described; descriptive, prescriptive, optimum methods, and mixed scanning models. The rational-comprehensive model either looks for the available options first or identifies the goals and objectives of the proposed policy before formulating it. Each policy-making model has specific strengths which can be adapted by policy-makers to formulate appropriate policies. For example, the findings from research such as this will provide: information, insight, evidence, the pros and cons of the present policies in order for the policy-maker to assess, evaluate, rank, brainstorm, judge and apply in the most appropriate manner in future policy-making processes.

Different variations of incremental approaches to policy-making only make small increments to critical aspects of the policy and gradually make improvements in corresponding increments. Finally, the normative optimum methods looks for the optimum method to formulate a policy while the mixed scanning methods combines both detailed examination of the whole and a cursory view of the individual parts to understand the wider issues in the policy making process.

The policies under close scrutiny in PNG are analysed with the intention of providing the policy-maker with the most critical information about IT education and training in the country. In order to achieve this goal, two types of policy analyses namely: Intuition and Muddling Through are employed. It is not possible to conduct a scientific approach

to policy analysis because this thesis is concerned with three different policies with different goals and objectives. Therefore, it is necessary to ensure that personal experiences accumulated over the years and the large volume of research data collected during the research period are analysed, synthesised and made sense of. Together with the personal experience and research data in mind, the different aspects of the policies concerned with IT education and training will be analysed by using the 'intuition' and 'muddling through' policy analysis processes. Such analysis is conducted in order to identify the relevant parts of the policy that either require improvement or where the strengths are identified to further consolidate them according to the current state of practices as revealed from the research data gathered.

# Chapter 4

## Research Methods

### 4.0 Introduction

This chapter describes the Methods of Research employed to gather relevant materials needed in investigating the research questions stated in Chapter 1 (section 1.8). It describes the various research instruments used and data collection procedures applied. It also identifies and highlights the limitations of the research process adapted.

### 4.1 Research Instruments

There is little evidence in the literature on human resources development especially in the education and training of Information Technology (IT) or computing personnel in PNG private training organisations. However, there is sufficient primary data available in various forms in PNG and elsewhere. The research methodology (qualitative) and the theoretical framework (theory construction) followed for this research lends itself to obtaining as much information as possible from as many and varied sources as possible. Therefore, any information needed for an academic exercise of this nature, may be collected by:

- a) physically interviewing the people concerned such as training providers, educators, trainees, employers and other individuals;
- b) personally collecting relevant primary data such as policy and legal (or official) documents, individual course or curriculum materials, testimonials; and
- c) conducting thorough literature searches from PNG information sources such as the newspapers and libraries.<sup>1</sup>

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<sup>1</sup> The nation's two daily newspapers (*The National* and *PNG Post Courier*) are on the world wide web while the academic libraries in PNG are not accessible electronically from outside of the country at the time of writing this chapter.

Following are some of the research instruments employed in order to enhance the quality of data gathered for the research. The research instruments are objective enough to gather the relevant materials in order to answer the research questions posed in chapter 1.

#### 4.1.1 Questionnaire and Interview (Background)

A combination of questionnaire and focused interview methods were used to collect primary data from PNG. Two separate questionnaires were used and administered at two different times.

The first Questionnaire or an Opinionnaire (called *Private Computing Skills Training Providers' Attitudes Towards PNG National Training Policy*)<sup>2</sup> was designed to find out about the views held by the private computer training organisations, (eg. their attitudes or inclinations) towards the National Training Policy and the various aspects of it. This Questionnaire was specifically designed to answer **Research Question 2** posed in Chapter 1 (section 1.8).

This particular Questionnaire was administered in 1994 and the full report of that study is appended as Appendix A, entitled *Private Computing Skills Training Provider's Attitudes Towards the Papua New Guinea National Training Policy*<sup>3</sup>.

The major component of this thesis was based on primary research data from PNG obtained by using an open ended research questionnaire called *Private Computer Training in PNG: Current Practices and Future Policy Directions* and the data gathered in this questionnaire was supplemented with data from interviews conducted with key individuals in the private training organisations, public institutions, statutory

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<sup>2</sup> The copy of the Opinionnaire is annexed to Appendix A.

organisations, and other professional contacts within the country as described in the following paragraphs.

This particular questionnaire was administered in 1996 in order to answer **Research Questions 1 and 4**. This questionnaire is appended as Appendix B. The brief policy analysis discussed in Chapter 5 (section 5.4) together with information obtained from the literature (Chapter 2) and other sources in PNG will be used to answer **Research Question 3**. The results from Research Questions 1, 2, 3, and 4 will be the basis from which to present the main concepts resulting from the findings of the research in Chapter 8 Findings and Recommendations.

#### **4.1.1.1 Subjects or Participants in the 1994 Research**

The participants were those involved in private computer training activities and were exempted from paying the Training Levy fee as stipulated under the Income Tax Act 1959 as amended Section 196Y(j) (National Training Council, 1995). The participating Training Providers have been involved in conducting computer applications training courses. (See **Tables 4.1 and 4.2**). They were initially identified from the following sources:

- (a) the official list of 'training organisations' obtained from the National Training Council Secretariat (NTCS) in 1994;
- (b) individual advertisements placed in the country's newspapers by computer training organisations;
- (c) the Yellow Pages of the 1994 PNG Telephone Directory; and
- (d) professional contacts with those involved in computing skills training and development activities.



**Table 4.1 Individual Training Providers who participated in the 1994 and 1996 Fieldwork**

<b>Name</b>	<b>Position</b>	<b>Training Organisation</b>
'Pablo'	Branch Manger	Niugini Computers and Business Training Centre
Jefferson J. Albis*	Branch manager	Niugini Computers and Business Training Centre
Patricia Bull	Managing Director	Haus Computer Pty Ltd
Anne-Marrie Broughton*	Training Manager	Daltron Electronics Pty Ltd
Patricia Corotan*	Principal	NCRT & Vocational Training College
Geoff Gloway*	Principal Director	Commercial Training College
Greg B. Haworth*	Managing Director	Workhouse Computer Training Centre
Carmelo Imperial	Manager	POM Business Training Institute
Clifford Inimgba	Managing Director	Peak Management Training & Consultants
Oigen Konia*	Project Manager	UNISEARCH Pty Ltd
S. Kulasingam	Lecturer (Business Com)	Institute of Business Studies
Hicks H. Lawsie	Managing Director	Professional Staff Training Centre
Ian Lewis*	Training Manager	Datec (PNG) Pty Ltd
Gabriel Logo*	Manager	Logo Consultants Pty Ltd
Joyce Mayum	Trainer/Teacher	Computers & Communications Pty Ltd
Rita M'laseula	Training Co-ordinator	Daltron Electronics Pty Ltd
Helen J Morlin	System Support Analyst	AT&T Global Information Solutions
Dick Morehari	Registrar	Professional Staff Training Centre
Mick Nades	Director	Institute of Business Studies
Andrew Orobi	Computer Instructor	Professional Staff Training Centre
Annie D. Pervera	Manageress	Computrain Computer Centre Pty Ltd
Sue Robb	Training Manager	Computers & Communications Pty Ltd
Lothar Schwarz*	Managing Director	City Electronic Pty Ltd
T. Shantharajah	Lecturer (Computing)	Institute of Business Studies
Teddy Tipora	Coordinator	Commercial Training College
Ben Warner	Managing Director	Project Solutions Pty Ltd
Bernice Yeweh	Chief Trainer	Computers & Communication Pty Ltd

\* Denotes those individuals consulted in the 1994 fieldwork.

Since it was difficult to identify those specifically involved in computer training programs from the list obtained from the NTCS in 1994, every Training Provider held on the register was contacted by mail from Australia to determine if they were involved in any computer related training. However, Training Providers who advertised their training organisations and training programs were easily identified and cross-checked. For other training providers, a process of elimination was used to eliminate all until only those private training organisations conducting computer related courses were left (See **Table 4.2**).

The process involved eliminating all those training organisations:

- a) governed by their own Acts of Parliament (shown in column EL1) which include those statutory bodies such as universities and colleges, and private firms conducting in-house training for their staff in job-specific or hardware-specific programs (eg the Bankers College, OK Tedi, ELCOM, Air Niugini);
- b) conducting in-house computer courses which responded "No" to an earlier questionnaire sent by the researcher asking them if they offered any computer related courses as a commercial activity in their organisation (shown in column EL2);
- c) conducting courses other than computer related courses in their organisation (shown in column EL3) identified either by their advertisements placed in the newspapers in PNG or based on information provided by professional contacts; and
- d) failing to return the *Private Computer Skills Training Providers' Attitudes Towards PNG National Training Policy* questionnaire (shown in column EL4).

**Table 4.2** contains the number of private Training Providers in PNG. Those involved in computer skills training are shown in the second-last column. It must be noted that the number of private computer related training organisations is constantly changing with new ones starting or through other changes such as mergers or closures.

**Table 4.2      Number of Private Training Providers in PNG**

Center	No on NTC <sup>4</sup> Register 13.01.94	EL1	EL2	EL3	EL4	No of Computer Training Providers	No of Questionnai res Returned
Alotau	2	-	1	1	-	-	-
Goroka	1	-	-	-	-	1	1
Lae	9	2	3	2	-	2	2
Madang	1	-	-	-	1	1	-
Mendi	1	-	-	-	1	1	1
Mt. Hagen	4	-	1	1	1	1	1
Port Moresby	75	12	23	22	11	18 <sup>5</sup>	8 <sup>6</sup>
Rabaul	1	-	-	-	-	1	1
Tabubil	1	1	-	-	-	-	-
Total	95	15	28	26	14	25	13

As can be seen from **Table 4.2**, the percentage return is 52% of the total national sample of the private Training Providers in PNG engaged in computer skills training which is encouraging for the purpose of the 1994 fieldwork. It is encouraging given that:

- (a) there was a small number of Training Providers involved in computer skills training in the whole country;
- (b) the proportion of those Computer Training Providers participating in this study is high; and
- (c) only those involved in computer training as a commercial activity participated in this study because they had the freedom under the *Companies Act* to operate as a business venture without detail scrutiny on their individual curriculum offerings.

The Training Providers involved in computer training courses as a business venture are small compared to other categories of Training Providers in PNG including private sector and statutory organisations conducting in-house training. However, four of the Training Providers which returned the questionnaire had training sites located in other centers of PNG. They were also the largest and more reputable Training Providers in

<sup>4</sup> Some Training Providers (at least 12) in Port Moresby were not on the original register of the National Training Council Secretariat in 1994. Such training organisations have been identified from: (i) advertisements placed in the newspapers between 1993 to 1994 and the Yellow Pages, and (ii) professional contacts with other Training Providers.

<sup>5</sup> It is possible that not all of these Training Providers conduct computer skills training because they failed to respond to the first inquiry which asked all Training Providers if they conducted any such training. Some of these Training Providers were known to the author as conducting computing skills training courses but neither returned the questionnaire nor responded to the subsequent reminders.

<sup>6</sup> Four of these organisations had branches in other centers of PNG. They were also the largest of such Training Providers in PNG. Only their main office in Port Moresby and Lae participated in the survey.

the country. Therefore, their views were most valuable not only to the research but also in terms of their net contribution to the training needs of the country and the short-term training requirements of the trainees at their respective training organisations.

#### **4.1.1.2 Administration of the 1994 Questionnaire<sup>7</sup> and Interviews**

The private computing Training Providers identified from the various sources of information were personally visited where possible and were given the Questionnaire to be self-administered by the most senior staff member of the training organisations in 1994. The Training Providers which were difficult to access or to meet personally were either sent the Questionnaire or delivered to their premises for the persons concerned to complete and return the questionnaire to the researcher.

The researcher personally visited; Mt. Hagen, Goroka, Lae, Rabaul and Port Moresby during the 1994 fieldwork to talk with those involved in computing skills training activity. Prior to the visit, the Training Providers were either contacted by mail, fax or telephone (from Goroka where the researcher was based for the duration of the research) to make arrangements for the meeting. Training Providers' reception of the researcher ranged from cooperative to uncooperative attitudes towards the research as well as the researcher. The visit took nearly six weeks for face-to-face interviews and self-administration of the Questionnaire. The cooperative ones gave their consent for the interviews to be conducted at their premises while others promised to complete the Questionnaire when they could find time. Some Training Providers who supported the research completed the Questionnaire and returned them much later than the deadline set while the others failed to honour their promises by the time the report was written up.

#### **4.1.1.3 Subjects or Participants in the 1996 Research**

The second Questionnaire (called *Private Computer Training in PNG: Current Practices and Future Policy Directions* ) was designed to address **Research Questions 1 and 4** (stated in Chapter 1) and was administered during the 1996 fieldwork. The

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<sup>7</sup> This questionnaire is called *Private Computer Skills Training Providers' Attitudes Towards PNG National Training Policy*

result from this Questionnaire is discussed and presented in Chapter 7 Results and Discussions. Both the *Private Computer Skills Training Providers' Attitudes Towards PNG National Training Policy* questionnaire and the *Private Computer Training in PNG: Current Practices and Future Policy Directions* questionnaire were developed in close consultation with academic supervisors prior to the administration of the Questionnaire in 1994 and 1996. No formal trialing of the Questionnaires was done because of the small sample size of the computer training organisations and the qualitative nature of the research methodology used.

Before the *Private Computer Training in PNG: Current Practices and Future Policy Directions* questionnaire was finalised, all known Private Training Organisations in PNG (from 1994 fieldwork) as well as the 1996 list of Interim Registered Training Organisations from the National Training Council Secretariat) were requested by the researcher to provide materials such as: course handbooks, course outlines or course descriptions and any other materials produced for the public about their individual computer related courses. A reminder letter from the supervisors was sent after 3 months of the initial letter requesting the course materials. As responses trickled in, the Questionnaire was revised and finalised in view of the course materials supplied by a handful of training providers. For example, deleting questions made redundant by information contained in the course materials supplied and devised new questions for those requiring answers to support the initial research questions were included.

#### **4.1.1.4 Administration of the 1996 Questionnaire<sup>8</sup> and Interviews**

The researcher's past data collection experience with the use of a questionnaire was sufficient to adopt a slightly different approach, ie to conduct face to face interviews using the questionnaire as a guide. The interviews were conducted at the premises of the different private computer training organisations which were mainly located in Port Moresby. Other computer training organisations were located in Lae, Madang, Mt.

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<sup>8</sup> This questionnaire is called *Private Computer Training in PNG: Current Practices and Future Policy Directions*.

Hagen and Goroka. As a representative sample and partially due to cost reasons, only those training organisations in Port Moresby and Lae were visited and interviewed during 1996 fieldwork (See **Tables 4.1, 4.3 and 6.1**).

**Table 4.3      Number of Training Organisations Involved in Computer related Training in 1996**

Number of Training Institutions Interviewed in 1996	Registration Status with National Training Council (NTC) as at June, 1996.	Remarks
10	Granted Interim Registration by NTC on 21.03.95	<ul style="list-style-type: none"> <li>• 11 out of 23 private training organisations were given interim registration by NTC.</li> <li>• 10 of them were interviewed while the 11th one refused to cooperate with the research.</li> <li>• Private computer training organisation.</li> <li>• Collected individual course materials and other primary documents.</li> </ul>
3	Not Registered with the NTC as at June , 1996.	<ul style="list-style-type: none"> <li>• Private computer training organisations.</li> <li>• Registered with the Internal Revenue Commission (IRC) under Companies Act.</li> <li>• Collected individual course materials</li> </ul>
3	Public Institutions	<ul style="list-style-type: none"> <li>• Need not register with NTC or IRC.</li> <li>• Conduct computer courses for the general public by competing with private providers.</li> </ul>

Note: There are other Training Organisations located in centres outside of Port Moresby which are not included in this study due to cost reasons. The researcher is aware of this because of the many advertisements in the newspapers in PNG announcing the different computer courses. Some of these organisations are also not registered with the National Training Council because they are not on the List released by the Council at the time of research (June/July 1996).

The sample from the two centres was used because<sup>9</sup>:

- a) there was a concentration of private training organisations operating there;

<sup>9</sup> There are other Training Organisations located in centres outside of Port Moresby and Lae which are not included in this study due to cost implications. The researcher is aware of this because of the many advertisements placed in the newspapers in PNG announcing the different computer courses. Some of these organisations are also not registered with the National Training Council (NTC) because they are not on the List of registered training organisations released by the NTC at the time of the research in June/July 1996.

- b) the majority of the private computer training organisations were located in these centres;
- c) the larger private computer training organisations have their headquarters located either in Port Moresby or Lae where there has been greater demand for computer skills training;
- d) other centres have just one or two training organisations which were either branches of those located in Port Moresby or Lae offering similar courses to those conducted at the headquarters; and
- e) the small number of private computer training organisations within the country were well-represented. The representation was based on the following criteria:
  - the size of training institutions (small, medium, large),
  - ownership of the organisations (nationally-owned, owned by non-citizens, joint-venture partnership between PNG nationals and non-citizens),
  - affiliations (no affiliation, affiliation with national and/or international institutions), and
  - registration with authorities (National Training Council or Internal Revenue Commission).

The targeted respondents were generally the senior staff personnel (with such title as Director, Managing Director, Registrar or Principal) of the private computer training organisations. Other training personnel were also delegated and authorised by the respective management to complete the questionnaire or attend the interview with the researcher. Since some private training organisations cancelled the proposed interviews with the researcher at the very last minute due to other unforeseen company commitments, the Questionnaire was delivered to them with a specific request to complete it at their convenience and return to the researcher. Those training organisations which were difficult to reach had the Questionnaire mailed to them with a

self-addressed and stamped envelope in order for them to complete the questionnaire and return it to the researcher.

Where face to face interviews were not possible, training organisations completed the Questionnaire for the researcher to pick up several days later. The researcher also had the benefit of both formal and informal opportunities of chatting with key personnel about their training programs and held general discussions of interest to the research which were found to be valuable, enlightening and supportive of their written responses. The respondents do not hesitate to speak their honest mind during such informal conversations. The verbal remarks came out naturally in informal conversations and these were noted or written down in the researcher's fieldwork diary immediately after leaving their premises. Important comments and statements expressed by the training providers or their representatives during the interview, formal and informal gathering between the researcher and the training providers were also noted in the diary.

#### **4.1.2 Primary Data from Papua New Guinea**

In order to understand the computer application skills curriculum and teaching methods or schemes used by private training organisation in PNG and in order to answer **Research Questions 1 and 4**, primary data from the individual training organisations such as course materials were requested and obtained while some organisations treated them as confidential and withheld them from the researcher. Various official documents and information were also requested from the relevant authorities in PNG in order to answer **Research Question 3**. While some authorities cooperated with the research and made available the documents requested, others were uncooperative. However, the relevant documents were obtained from unofficial sources.<sup>10</sup>

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<sup>10</sup> The unofficial sources here refers to: a) the third party contacts of the researcher's professional colleagues, and b) the Wantoks (or friends) in the legal fraternity who have in their possession the relevant policy documents and Acts of Parliament.



This research is an exploratory one because there is very little published material available on the topic of the research being pursued. However, there was sufficient primary data being produced by training providers which had to be collected by the researcher. Therefore, much primary data (mostly policy documents and general literature related to the research) were collected from:

- a) private computer training providers (eg including courses materials, handbooks, content outlines);
- b) relevant government departments and statutory bodies (eg legal and policy documents, press statements, Departmental instructions, minutes); and
- c) newspaper articles (eg advertisements, news clips, letters to the editor) both print and electronic versions to supplement the limited literature available on this subject in PNG.

Most primary data relate to course descriptions, course handbooks and course outlines of the participating training providers and policy documents from the National Training Council Secretariat. The Secretariat is responsible for private training providers in PNG. Other relevant documents and information from the Ministry of Education, Commission for Higher Education, the National Training Council Secretariat, Internal Revenue Commission, and other sources have also been consulted or acquired.

#### **4.1.3 Data from other Developing Commonwealth Countries**

Similar course materials (course descriptions, course outlines/program) were also obtained from some private training providers, researchers and academics from other developing countries. These materials were obtained through the researcher's association with the International Federation for Information Processing (IFIP) Working Group 9.4 which is committed to research and action in the social issues of informatics in Third World countries. Professional colleagues who have direct or indirect knowledge of training providers and relevant literature (course descriptions, course outline/program) in developing countries provided either in electronic or hard copy

versions in response to the researcher's request for such documents placed in the organisation's electronic journal with an anonymous ftp site at <ftp.ifip.or.at> and a world wide web site with URL address at, <http://www/ifip.or.at>. These materials were supplemented with email communication with professional contacts in many countries.

#### **4.1.4 Fieldnotes or Diary**

As well as using the Questionnaire to gauge the views and responses from Training Providers, the researcher also maintained a brief fieldnote or a diary by keeping an account of relevant descriptions, discussions, events, and statements that the researcher heard, saw, thought, observed, and experienced during the fieldwork - such as interviews with training providers, government departments, Statutory bodies and institutions whose views the researcher sought. Some trainees were also interviewed briefly about their training programs during training sessions as well as outside of formal training environment such as between classes. These notes were written soon after the face to face interviews or chats whilst they were fresh in mind.

#### **4.1.5 Individuals from Key Organisations**

Primary data were collected from the following sources: (a) training providers, (b) administering the questionnaires, (c) keeping a fieldwork diary, and (d) obtaining information sources in other developing countries. As well as collecting data from these sources, individuals from key organisations in PNG were also interviewed and consulted. These individuals included trainers, senior management staff, the representatives of the National Training Council Secretariat, Internal Revenue Commission, Commission for Higher Education, and other professionals in both the public and private sector. Their individual views have been sought and noted and these have proven to be valuable in the writing of the thesis.

Views and informal comments made by other individuals involved in the industry (eg parents, sponsors and trainees) during the course of the research period were also noted

by the researcher in order to gather a broad range of current views about the private computer training in PNG and what they would like to see in the future in the training industry in the current changing technology environment.

#### **4.2 Limitations of the Research Instruments Employed**

The success of the research depends on many factors such as the research methodology used and the research instruments employed. Some of the limitations inherent in the research instruments and methodologies employed are:

- a) First and foremost is the cooperation of Training Providers in PNG. Whilst many of the training organisations cooperated with the researcher by completing the questionnaire, making available their computer course materials, including brochures, pamphlets, course descriptions, course handbooks, and course booklets, others have deliberately kept their operations secretive by not cooperating with the researcher either by withholding vital information requested or not completing the questionnaire.
- b) No matter where questionnaires are sent, there is always this element of difficulty in poor response rate. As well as withholding relevant primary documents (ie, unwilling to make available course materials to the researcher, refusing to cooperate), several training organisations have deliberately not returned the Questionnaire either in fear of being exposed of their activities or simply uncooperative to an ‘unknown outsider’ who might have other motives to discredit their operations. This is despite both written and follow up verbal assurances from the researcher to ensure their anonymity as well as confidentiality of any information provided to the researcher which might put their organisations at risk.
- c) The research entails obtaining various documents and information from many government departments and statutory bodies. The cooperation and support of the various government departments and Statutory bodies responsible for the computer

related training in making available to the researcher relevant information such as policy documents are paramount. Various policy documents have been obtained from the respective statutory bodies and government departments. Some information requested from statutory bodies such as the Internal Revenue Commission and National Training Council have been either outrightly denied because of a 'confidentiality' clause in their policy or deliberately withheld and the many correspondence to this effect remain unanswered.<sup>11</sup>

d) Limitations imposed by the use of the types and quality of questions asked on the questionnaire, for example, the bulkiness and the large number of questions may wear out the respondents interest and hence, questions asked may be half-heartedly answered.

e) Other limiting factors include; accuracy of information supplied by the respondents, their honesty in completing the questionnaire correctly and promptly, consciously or unconsciously withholding any information considered private by the respondents, their willingness to make admissions of some kind in the response, and failing to interpret questions as intended by the researcher.

f) Lastly but not least, a very small number of respondents or training organisations cooperated and participated in the completion of the Questionnaires. However, at the time of administering the *Private Computer Training in PNG: Current Practices and Future Policy Directions* questionnaire, only those training organisations granted 'interim registration' status which constituted a small sample of subjects completed that Questionnaire with the exception of one or two others which were registered by the Internal Revenue Commission. This small sample of subjects, were the only few training organisations registered to conduct such training in PNG.

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<sup>11</sup> For example, a letter dated September 12, 1997 sent to the Director of the National Training Council Secretariat in Port Moresby requesting for the *National Training Council Review Report 1997* has not been answered.

### 4.3 Description of Data Collection Methods

The *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire and the list of contacts with the Private Computer related Training Organisations interviewed are appended as Appendix B and Appendix C respectively. The participating organisations were identified from the list of "Private Training Institutions" supplied by the National Training Council Secretariat with whom training organisations in PNG must register under the *National Training Council Act 1991*. The names of training organisations listed in 'Private Training Institutions' conduct a wide variety of training activities in the country.

Private sector training organisations which conduct computer related courses were identified and confirmed from the advertisements carried in the *Times of Papua New Guinea* (now *The Independent*), *The National* and the *PNG Post Courier*. The former is the country's only English weekly paper while the latter two are daily newspapers. These papers carry the private training organisations' advertisements informing the public of their training activities. It must be stated here that some training organisations do not advertise in the papers.

### 4.4 Data Collection Procedures Employed

The following steps were followed in collecting data for this research:

- a) As soon as the research proposal and the research questionnaire were approved and finalised, the objectives and the intentions of the research were communicated in writing to those who were involved in computer related training as per the list obtained from the National Training Council (See Appendix C) as well as those training organisations which advertise their courses in *The Independent*, the *PNG Post Courier*, and *The National*.
- b) The research tool or instrument (the Questionnaire) was refined while awaiting the responses from the initial letter requesting course materials from Training Providers

in PNG. The *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire for example, was refined on the basis of: (i) whether the type of questions asked in the Questionnaire would help in answering initial Research Questions posed in chapter 1, (ii) whether the primary data (ie, course materials, handbook) supplied by training providers contains information which could answer the Research Questions, and (iii) whether there were further questions in order to obtain the relevant information. The revision of the Questionnaire was done in consultation with one of the supervisors who has extensive knowledge and experience of the PNG education system.

- c) Immediately after the correspondence with Training Providers requesting for course descriptions, course outline/program, a notice requesting similar materials and views were sought from professional colleagues in developing countries through its electronic mail system.
- d) About this time, the Questionnaire was revised and finalised by incorporating questions relevant to answering the research questions investigated.
- e) Immediately after the Questionnaire was finalised and despatched, travel arrangements were made to visit the private computer related training organisations in PNG which conduct computer related training courses.
- f) Arrangements were made and interviews (or administration of the Questionnaire) were conducted in the private computer related training organisations in PNG; (especially those in Port Moresby, Lae, Goroka and Mt. Hagen in 1994 and Port Moresby and Lae in 1996). Fifteen such organisations were known by the researcher as conducting computer related courses in PNG. Some of these training organisations did not cooperate in the research even though they were sent the

research questionnaires and personally visited by the researcher on both occasions in 1994 and 1996.

- g) Other relevant information was gathered from the University of PNG's Michael Somare Library, the National Library, National Research Institute and key bodies such as the National Training Council Secretariat, the Commission for Higher Education, Internal Revenue Commission, National Statistical Office, Investment Promotion Authority, and the Ministry of Education which were consulted for additional materials and information relevant to the research.
- h) On completion of the interviews and data collection, which included completion and return of the Questionnaire from the private sector training organisation; the analysis of research data and write up began in earnest.

#### **4.5 Summary**

The research methodology and the theoretical framework employed in this research requires the collection of a huge volume of primary data from as many and varied sources as possible. The research instruments employed in gathering the relevant data in order to answer Research Questions One, Two and Four have been described. (In order to answer Research Question Three, various policy documents with a potential to effect IT education and training in the country will be examined and analysed). The research instruments used included: the use of Questionnaires, face to face interviews with training providers and/or other individuals, gathering primary documents from the training providers, obtaining official policy and legal documents from statutory bodies, and interview data from individuals from key organisations including the private training organisations, the National Training Council, and the Internal Revenue Commission. Additionally, materials from Commonwealth developing countries have also been consulted, either through appropriate literature or from professional contacts maintained by the researcher. Other data sources relevant to this research have also

been consulted and relied upon. These include Fieldnotes and a diary maintained by the researcher throughout the fieldwork period on both occasions.

The limitations pertinent to the research instruments used, ie. Questionnaire and interview methods have been highlighted. The shortcomings identified in the use of the Research Questionnaires are further strengthened with the use of fieldnote or diary, course materials from PNG, and interviews with individuals from both the training organisations and the key organisations. A brief description of data collection method employed and the procedures followed in collection of the basic research data is also highlighted.



# **Chapter 5**

## **Computer Education Scenario in Papua New Guinea**

### **5.0 Introduction**

This chapter provides an overview of the current computer education and training scenario in PNG. It covers computer education and training in both private and public sector educational institutions under the existing policy and legal framework.

Section 5.1 introduces the state of computer education and training in PNG's public sector educational institutions. Computer education and training at various levels of the public sector educational institutions are highlighted, the rationale for introducing computer studies in schools pointed out, the current practices within the various public sector educational institutions described, educational reforms attempted, and the shortcomings experienced by various public sector educational institutions.

Section 5.2 discusses the state of computer education and training in PNG's private training organisations. Other significant areas covered in this section include; the definition of private computer training organisations in the PNG context, the different private institutions such as International Education Agency schools, private technical colleges, private tertiary institutions, and private commercial training organisations.

Section 5.3 provides the background to which private computer training organisations grow and develop. The specific points of interest discussed are: computer skills demand

and supply in the country, the national priority placed on computing professionals, the neglect of computer skills demand and the government's incapacity to produce the personnel required. Also highlighted are: introduction of computers into PNG and the need for re-training and re-skilling in computing skills, and the reasons behind the growth and development of private computer training organisations which operate under various policy and legislative framework that pays little attention to standards and quality of training are highlighted. The various discrepancies found in the different training programs as a consequence of commercialising computer training are described.

Before summarising the chapter in section 5.5, section 5.4 describes the various policy initiatives and legislative measures undertaken by the government. The policies and legislation covered here includes those that have a potential to promote IT education and training in both the private and public sector because no specific policies were adopted for IT education. These policy initiatives and legislation include: The Training Levy, *The National Training Council Act 1991*, *The National Training Policy*, *PNG IT Policy for the Public Service*, and *PNG Science and Technology Council Act 1992*. These initiatives are briefly described as to how IT education and training in both the private and public sectors are either promoted or impeded by the individual initiative.

## **5.1 Public Sector Computer Education and Training in PNG**

### **5.1.1 The National Education Objectives**

In the public sector educational institutions, four broad objectives have been set by the National Executive Council for implementation by the Department of Education and the Commission for Higher Education. The general objectives are:

1. To develop a schooling system to meet the needs of Papua New Guinea and its people which provides appropriately for the return of children to the village community, for formal employment, or for continuation to further education and training.

2. To provide basic schooling for all children who are ready for it as this becomes financially feasible.
3. To help people to understand the changes that are occurring [sic] in contemporary society by the provision of non-formal education and literacy programmes.
4. To identify the manpower development needs in the public and private sector and to provide appropriate higher education, development and training programmes (Baki, 1994, p.1).

These general objectives are implemented at different levels within the public sector educational institutions, commencing at primary school level right through to the universities and colleges in PNG. Several programs were developed to achieve the stated objectives, these programs include; Literacy and Awareness, Relevant Education for All, Access and Expansion, and Programs. Each division (eg, Primary, Secondary, Technical, Tertiary) of the public sector education system has its own sector-specific objectives to strive for in the provision of educational services and human resources development for the country.

### **5.1.2 Primary and Secondary Schools**

The public sector educational institutions are government-funded and run institutions in PNG's education system. The focus in primary school is to provide basic formal education to help students to adjust to the changes in their society and country. There is no formal computer education curriculum offered at either the Community School (primary education for grades 1 to 6) level or at the Provincial High School level (lower secondary schools for grades 7 to 10). The Secretary for Education reiterated the Department's view on computers that: *'...the (Education) Department does not wish to introduce computers as part of the curriculum [sic] in the near future because of the financial and technical constraints.'* (Tetaga, 1994a).<sup>1</sup>

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<sup>1</sup> Personal communication with Mr Jerry E. Tetaga OBE, Secretary for Education, Department of Education, Port Moresby, PNG: Letter dated 21/01/94, Ref: CM2-4-2.

In the Provincial High School, the focus is on providing a basic general education so that only selected students can continue on to the National High Schools (NHS) to obtain upper secondary education for grades 11 and 12. One of the original reasons for establishing the NHS was to enable students to socialise and unite with those from different regional and provincial groups in preparation for political independence. The NHS played a unifying role in the early years of nation-building in PNG as well as educating a cadre of nationals to the highest standards possible in human resource development in PNG (IASER, 1980). The NHSs numbered only 4 in 1992 but were to progressively increase annually in selected provinces from 1993 onwards in order to have at least one NHS in each province (Baki, 1994). The NHSs were and are still responsible for bringing in the best year 10 students from the Provincial High School system throughout the country in order to prepare them for the third level of studies at the nation's two universities - the University of Papua New Guinea (UPNG) and the PNG University of Technology (Unitech). By the end of 1996 other existing institutions (eg UPNG Goroka Campus, Divine Word Institute, Pacific Adventist College, and Vudal Campus of Unitech) were upgraded to university status commencing their operation as universities at the start of 1997 academic year.

A few secondary schools such as Lae and Kabiufa high schools, and Sogeri National High School have individually ventured into providing computer education to their students with establishment of modern laboratories equipped with computer hardware systems and software packages necessary to mount their programs (Jayawickrama, 1994; Goodwin, 1994; Fova, 1994; Nalu, 1994). Some Provincial High Schools used computers mainly for administrative purposes, while some National High Schools have begun introducing computer studies curriculum to students but only as an optional subject which also varied from school to school (Sinebare, 1990).

The computer studies programs at Lae High School for example are taught by part-time teachers specifically recruited for this purpose so as not to over-burden the full time teachers who are solely committed to delivering the official school curriculum. The goals behind computing at Lae High School are more towards serving *vocational* and *pedagogical* rationales (Hawkrigde *et al*, 1990)<sup>2</sup>. At Kabiufa High School, the aims of introducing computers are to equip students with an additional tool to enhance learning in all subjects, (ie *social* rationale) as well as *vocational* rationale (Goodwin, 1994; Hawkrigde *et al.*, 1990). The Bugandi Secondary School is also conducting computer studies for year 12 students and appears to focus on *social* and *vocational* rationales as well (Olmi, 1996)<sup>3</sup>.

The Sogeri National High School also aims to expose students to use computers as tools to enhance their learning in school and apply them in their working life as people who are knowledgeable in the use and application of information technology (Fova, 1994). The rationale for incorporating computing at Sogeri are; *pedagogical*, *social* and *vocational*. (Hawkrigde *et al.*, 1990)

To date only the Western Highlands Province intends to introduce computing in all its Provincial High Schools beginning at Hagen Park High School in 1996 and Notre Dame and Togoba High Schools in 1997 (*The Independent*, Feb 23, 1996; *The National*, Sept 5, 1996; *The National*, April 28, 1997<sup>4</sup>), but has not yet released any details on the computing curriculum to be used.

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<sup>2</sup> See Hawkrigde *et al.*, (1990) for details on the rationales for introducing computers in the third world schools. See also Table 2.3 for a summary of the rationales.

<sup>3</sup> Faxed copy of the 1996 Grade 12 Computer Science Studies Termly Teaching Schedules, from Mr Aiwa Olmi, Head of Computer Science Department, Bugandi Secondary School, Lae, PNG: Fax imprint 22.08.96.

<sup>4</sup> Tender advertisement placed in *The National*, April 28, 1997. p. 20, calling for expression of interest in Assembly & Installation, Maintenance & Service of Computers and Accessories in the selected high schools in the Western Highlands Province, PNG.

All these individual efforts to introduce computer studies curriculum into education at high school level are officially encouraged but no financial resources are allocated, no staff expertise provided, and no curriculum support given by the Ministry of Education (Rapepe, 1994). This trend is likely to continue in the foreseeable future because the ministry has neither any long term intention to provide any funds for the purchase of computers nor a computer studies curriculum (Department of Education, 1993 ; Tetaga, 1994a<sup>5</sup>).

Individual schools throughout the country are also moving gradually towards providing computer education by purchasing computer hardware and software from within their resources and with assistance from business houses (*The National*, June 8, 1994). There is some indication that a bottom-up approach to create computer awareness in PNG schools has at least been attempted (*PNG Post Courier*, August 29, 1994). The public sector educational institutions, particularly at Primary and Secondary School levels are not expected to offer computer courses (Department of Education, 1993). The school curriculum is centrally planned at the national level. With centralised curriculum planning no flexibility is allowed for additional subjects to be introduced into the school system. Only those subjects approved by the government are taught and examined nationally. Unfortunately computer education and training is not one of them.

### **5.1.3 Technical and Secretarial Colleges**

The Technical Colleges in PNG offer Industrial Arts and Technical subjects. The duration of the trade certificate courses ranges from 6 months to 3 years. They are post-secondary institutions. The completion of these subjects qualifies the trainee as having completed the Pre-Employment Technical Training course.

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<sup>5</sup> Personal communication with Mr Jerry E. Tetaga OBE, Secretary for Education, Department of Education, Port Moresby, PNG: Letter dated 21/01/94, Ref: CM2-4-2.

The basic functions of the Technical and Secretarial Colleges are to prepare and develop the country's human resources with appropriate technical skills training (Department of Education, 1992, p.33). This training is necessary to equip students to enter into the public and private sector workforce, especially in the trade subjects in order to take up technical occupations in various forms including professional technologist, higher technicians, industrial trade technician, tradesman or craftsman (Department of Education, Vol.2, 1991). Different Technical Colleges are supposed to be responsible for different subject area specialisations as part of the rationalisation process in the Technical Division (Rei, 1996b, p.21). Shortage of technical teaching staff in the different technology-based subjects has been identified as one of the major impediments by the Division (Kuhena, 1993, p. 9).

The Secretarial Colleges offer Secretarial courses like typing or wordprocessing, office management & procedures, business communications and clerical studies. Given the work nature in the workplace, the secretarial, office management, and business communication subjects involve some element of computer studies subjects such as word processing and database management.

The *Port Moresby Business College* is one of the very few colleges under the Technical Education Division of the Department of Education to have a state-of-the-art computer laboratory funded by the Korean Embassy (*The Saturday Independent*, Sept 30, 1995)<sup>6</sup> with qualified expertise to teach computer application courses like *MS Word*, *Word Perfect*, *MS Excel*, and *Lotus 1-2-3*<sup>7</sup>. The College is offering Word processing courses (using *WordPerfect 6.0* and *MS Word*) and computerised Bookkeeping courses (using

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<sup>6</sup> Newspaper photo-caption carried by *The Saturday Independent*, Issue No. 19, Sept 30, 1995, p. E8.

<sup>7</sup> Newspaper Advertisement placed by the Port Moresby Business College. *The Independent*, May 17, 1996, p.16.

*Lotus 1-2-3* and *MS Excel* ) not only for the full time students but also for those on day-release from work.<sup>8</sup>

#### **5.1.4 PNG Institute of Public Administration**

The PNG Institute of Public Administration (PNG IPA) formerly known as the Administrative College of Papua New Guinea (or Adcol for short) has been responsible for the training of public servants for positions in all echelons of the public service (Saffu, 1993).

It has played a significant role in accelerating the process of localisation in the civil service since 1963. Initially, the then Adcol was responsible for preparing public servants with skills appropriate to the efficient running of the public service system in both the pre- and post-independence era. There are a wide range of subjects and courses offered at PNG IPA. The Institute also has regional centres scattered throughout PNG at strategic provincial centres for short-term to long-term courses in all aspects of public administration.

The *National Training Policy* has given the PNG IPA additional responsibilities whereby every sector of the public service will go through PNG IPA for all its training requirements. The *National Training Policy* states that:

...From January 1990, no unit of the public service will engage private training bodies for courses in management, administration, basic computing, training of trainers, or in related general subjects: these will be delivered by or through Adcol which will make 'contracting-out' arrangements as necessary (Independent State of PNG, 1989, p.13).

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<sup>8</sup> Newspaper Advertisement placed by the Port Moresby Business College. *The National*, July 7, 1996, p. 38 and *The Independent*, May 3, 1997, p.17.



However, computer related courses offered in the Adcol era were being revised in 1996 in order to conform to the new status of the institution (as PNG IPA) (Albert & Ganavi, 1996).<sup>9</sup> According to the lecturers at PNG IPA: *‘The courses ... are basically aimed at providing trainees (public servants from the provinces) additional tools to assist them in their jobs.’* (Albert & Ganavi, 1996).<sup>10</sup>

The PNG IPA is now in a better position to conduct Information Technology education and training given the recently adopted *Information Technology Policy for the Public Service in PNG* (Department of Personnel Management, 1991). The institute will service the needs of the public service instead of forcing public servants to enrol in the existing private computer training organisations. Even if some computer related courses were contracted out to the private training organisations, the public service would still benefit from such computer training conducted by the private sector because the PNG IPA would have a say on the computing curricula and the quality of training being provided through such contractual agreement (Saffu, 1993). In this way computing curricula and training standards will not be compromised but instead PNG IPA will have a long term perspective on IT related education as well as plan to strive toward this goal.

### **5.1.5 Universities and Colleges**

The universities, namely; UPNG and Unitech being the highest learning institutions in the country have been responsible for developing high level human resource requirements by producing graduates in the traditional university disciplines, ranging from Arts and Humanities to Science and Technology. Kali (1992) has claimed that the

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<sup>9</sup> Personal communication with Mr Jack Albert and Mr. Urban Ganavi, both Lecturers, Computer Studies Department, PNG Institute of Public Administration, Port Moresby, PNG: July 3, 1996.

<sup>10</sup> Paraphrased from personal communication with Mr Jack Albert and Mr Urban Ganavi on July 3, PNG IPA, Port Moresby, PNG.

universities' output of graduates as computing and Information Technology (IT) professionals has been abysmal compared to the demand for such skills in PNG.

UPNG now has two Campuses. The Waigani Campus has faculties of Science, Law, Arts, Education and Creative Arts. The Taurama Campus houses the Medical Faculty. Both Taurama and Waigani Campuses are located in Port Moresby. Unitech has only the Lae (Taraka) Campus now that the Vudal Campus functions are transferred to Vudal as a separate entity just as Goroka Campus of UPNG has been separated by the passing of their respective Bills in Parliament (*The National*, Jan 24, 1997).

The Goroka Campus now known as the University of Goroka has been a centre for Teacher Education in the country since 1975 under the umbrella of UPNG. Future secondary school teachers would be exposed to using computers as a tool in the form of application software such as word processing, spreadsheet, databases and mathematical packages (ie. *Statworks* and *T.E. Maths* ) by the time they graduate from the University of Goroka (Krajcsik, 1994; Kravia *et al* , 1994). This will be achieved through a compulsory academic program in Information Technology subjects for all first year students which was introduced in 1995 (Olney, 1995; Olney, n.d).

The PNG University of Technology offers courses in high-technology disciplines such as; Engineering (civil and electrical), Architecture, Surveying, Forestry and Mining for example. The two universities (UPNG and Unitech) have been developing courses and offering them in accordance with the perceived human resource needs of the country from time to time. Old courses were revised and adapted and new ones added as the nation's need dictates. For example, at the height of the mineral boom in the country, the school of Mining Engineering was established in the early 1990s at Unitech.

The University of Papua New Guinea (UPNG) and the Papua New Guinea University of Technology (Unitech) have no academic departments responsible for computer science or information technology discipline (Sinebare, 1993). As mentioned above, with the increasing need to be computer-oriented, the Mathematics Department at Unitech renamed itself as the *Department of Mathematics & Computer Science*.<sup>11</sup> Computer courses at UPNG and Unitech, have been conducted under the Mathematics Department (UPNG, 1994a).

The Computer Science degree or diploma at Unitech is offered by the Mathematics and Computer Science Department. There is no 'Information Technology' degree/diploma program at either Unitech or UPNG. However, there are computer related courses (eg. information systems and information processing) which are offered as part of a degree or diploma program in other disciplines such as; science, commerce, mathematics, economics, or business studies and accounting. The Accountancy and Business Studies Department at Unitech offers a Diploma in Microcomputer Information Processing (Dip. MIP) and Bachelor of Management Information Systems (B. MIS) which contain a smorgasbord of course modules as well as electives from various academic disciplines and departments to enrich the programs both qualitatively and quantitatively (Ryan, 1994a).<sup>12</sup> The two universities also offer computer courses especially in the application software area for non-degree part time students through their respective commercial arms.<sup>13</sup>

At the time of writing, UPNG was offering computer science courses such as; Analysis and Design of Information Systems, Elements of Information Systems, Introduction to

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<sup>11</sup> PNG *Journal of Mathematics, Computing & Education*., Vol.1, 1995.

<sup>12</sup> Accounting and Business Studies Department, Unitech. Structure of Dip. MIP and B. MIS., List obtained from Mr. Ged Ryan, Lecturer via Letter dated 2/2/94.

<sup>13</sup> UPNG through Unisearch (PNG) Pty Ltd., and Unitech through Unitech Development & Consultancy Pty Ltd.

Computing, Structured Programming, Introduction to Computing Science, Introduction to Linear Programming and Networks, Digital Logic Design and C Programming, Systems Analysis and Design, and Introduction to Information Technology (UPNG, 1994a). Unitech has undertaken extensive revision of its computer courses in 1988 (Ryan, 1994b), and consequently has a revised computing curriculum designed to produce computing specialists at both degree and diploma levels based on a report by Salt (1988).

The number of graduates in computing specialisation from Unitech (about 10 per year) has not increased despite increases in information systems in both the public and private sector since the mid 1980's (Commission for Higher Education, 1986; Kali, 1992). The demand for computing specialist is increasing annually<sup>14</sup> but the supply side has not produced sufficient graduates at the same rate to meet the workplace requirements, even though the computer related courses and computing specialist academic programs (eg, Diploma in Commercial Computing and Bachelor of Technology (Computer Studies)) were prioritised by the government a decade ago (Commission for Higher Education, 1986).<sup>15</sup>

It was pointed out that there is '*serious inefficiency in the area of technological education and training*' in the Commercial Computing Curriculum offered at Unitech (Ryan, 1994b, p.627; Salt, 1988). This inefficiency is the result of concentrating on technically oriented courses such as systems architecture, software development, mini and mainframe systems, and programming by Unitech on the one hand and the concentration of application user-level training conducted by the private training organisations on the other, hence overlooking the needs of the business sector or the

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<sup>14</sup> The number of advertisements carried in the Position Vacant column of PNG newspapers everyday. Nearly 25% of the Position Vacant advertisements are related to Computer or IT related positions.

<sup>15</sup> List of Higher Education Programmes classified in accordance with Priorities indicated by the Second National Manpower Assessment, Appendix 18, pp. 217-225.

possible employers which lies in between these two spatial continuum. The remark of one Managing Director supports this notion:

...It is important to recognise that the majority of graduates in computing finish up in a commercial environment - not scientific which is where a lot of emphasis seems to be. The main thrust [should be] to provide computer skills as a tool for the commercial world (Salt, 1988, p.78).<sup>16</sup>

That is just one of the reasons why the few graduates in computing from Unitech are automatically absorbed into the workplace as 'high level technicians' (Ryan, 1994b), rather than the purely theoretically oriented computer science graduates.

#### **5.1.6 Other Post-Secondary Colleges and Institutions**

There are many post-secondary colleges and institutions in the country which come under three categories. Those under Public Sector Training Institutions include: PNG Institute of Public Administration, Agriculture Colleges, Civil Aviation Training College, Nursing schools, PNG Forestry College, Timber Industries Training College, and Works & Supply Training College. Those under Other Government Training Institutions include: Corrective Institution Staff Training College, Electricity Commission Training College, Joint Services College, Police Training College and Nautical Training Institute. Institutions under Churches and Private institutions are numerous, but examples of such institutions are; Theological Colleges or Seminaries and the Bankers College (IASER, 1980; Commission for Higher Education, 1986). Teachers Colleges in the country are responsible for education and training of teachers, mostly for primary school teaching. They come under the direction of the Ministry of Education.

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<sup>16</sup> Written comments from a Managing Director when responding to the survey carried out by Salt (1988). *Tertiary Education for Computing Specialists in Papua New Guinea*, p.78. Department of Accounting and Business Studies, Lae, PNG: PNG University of Technology.

Each of these colleges and institutions is responsible for conducting specific training for a specific profession in the PNG workplace. The public institutions with overlapping functions are being rationalised in order to reduce duplication, while those that don't overlap would retain their separate entities (Commission of Higher Education, 1986, p.105; Apami, 1996).

Many post-secondary colleges and institutions under public sector educational institutions do not have any computer training courses. Where there is a computer or two available, they are mainly used by teachers or school administrators. For example, very few teachers (mostly non-citizen staff and just a handful of PNG nationals who are self-taught) know how to use computers to prepare teaching materials and other mundane administrative tasks. The administrators on the other hand use them for word processing and record keeping (Sinebare, 1990). Other than that computers are still not generally accessible to many students in most of the public sector educational establishments throughout PNG. For this reason, Hulijeli (1991, p.4) called for a 'new direction' in computer education in PNG to direct the use of computers by students as learning tools in the classroom but this call like all other calls remain ignored.

#### **5.1.7 Reforms and Innovations**

At present, six years of Primary Education is provided at Community Schools (grades 1 to 6). A further four years of lower secondary education at Provincial High Schools (grades 7 - 10), while a selected few from Provincial High Schools enter the upper secondary education at National High Schools for two years (grades 11 to 12). The critics of this system are of the view that the system promotes an elitist system that produces very few people at the apex of the system's pyramid to enter into the formal economic sector (Tetaga, 1994b). Conversely, the education system also produces 'misfits' who cannot even fit back into the diverse PNG society.

Numerous reforms and innovations have been introduced into the Education system since attaining political independence in order to help enable the school leavers to fit back into their society. One of the reforms which was given a lot of attention in late 1970s and early 1980s was the Secondary School Community Extension Project (SSCEP). The SSCEP concept did not succeed because the students consider vocational education inferior to that of purely academic subjects which are nationally examined. Successful performance at nationally administered School Certificate Examinations determines a place at the National High Schools and subsequently, continuing on to universities. At worst, only selected schools were implementing the SSCEP concept whose respective provincial authorities consider them as discriminatory. While the SSCEP concept was given a lot of attention as a significant curriculum innovation in a developing country, the concept itself did not succeed in PNG because the very people whom this curriculum innovation was designed to benefit rejected the scheme. Even the World Bank in one of its studies has been reported to have questioned 'vocationalising' the curriculum in PNG (McGavin, 1990, p.45). The goals behind vocationalising the curriculum in PNG was among others to ensure that children are given an education that is practically relevant to their social, cultural and economic conditions in their respective communities.

The more recent reforms being implemented in PNG include Basic Education which covers the first nine years of schooling. The first three years (including preparatory and elementary grades 1 and 2) covers elementary schools and emphasises on the mastery of TOK PLES (vernacular instruction) - mostly a dominant vernacular of a chosen geographical area, while Primary Education provides the next six years of education. Primary Education caters for grades 3 to 6 but in addition to that, grades 7 and 8 are added in the Basic Education which was previously the lower secondary grades. The Provincial High Schools are supposed to take in grades 9 to 10 and the National High

Schools to continue providing grade 11 and 12 education (PNG-Australia Development Cooperation Program, 1994).

In all these reforms, computer education and training either as a subject of study (learning *about* the computer) or as a *tool* (learning *with* the computer) in both the public and private institutions is not mentioned, probably because it was considered as less significant skill and knowledge. It also reflects the government's priority which aims at a basic literacy and numeracy level as being important as opposed to computer literacy and knowledge which will only serve the interest of the urban sector and a selective industry.

## **5.2 Computer Education and Training in Papua New Guinea**

### **5.2.1 Private Commercial Training Organisations**

Throughout this document, private computer training organisations refers to those commercially-run private training organisations which come under the aegis of the *National Training Council Act 1991* through the National Training Policy (NTP) and are conducting private training activities as a commercial activity under the *PNG Companies Act 1959* administered by the Internal Revenue Commission. In other words such organisations conduct computer training as a commercial activity under the Companies Act 1959 as amended and as a training organisation under The *National Training Council Act 1991*.

The discussion that follows is concerned mainly with private training organisations involved in conducting computer related courses which lead to the award of certificates but do not necessarily come under the jurisdiction of the *PNG Education Act 1983*. According to The Preamble and Objectives of National Training Policy, the NTP is concerned with 'training' rather than 'education' (National Training Council, 1993c).



Training is broadly defined as: “...*planned activity aimed at raising the productivity of workers through upgrading their motivation, practical skills and understanding.*” (National Training Council 1993c, p.2) Education on the other hand, is taken to mean those functions that are normally performed by the Education Department within the public sector educational institutions (*ibid*).

### **5.2.2 International Education Agency Schools (IEA)**

The IEA schools have been introducing computers to students (Kalewa, 1985), from as early as primary school and continue to provide teaching and learning activities, and access to computer systems and hardware facilities throughout the children’s education (primary to secondary education). It must be emphasised here that IEA schools are privately funded schools operated outside of the government’s publicly funded education system. The main difference is that parents or guardians pay the full cost of their children’s education. Because of the fee-paying nature, the IEA schools are financially advantaged to purchase computers and offer computer education or computer studies courses.

Unlike the schools in the public sector, the IEA schools have the independence and autonomy to design and develop their own curriculum and implement them independently. The curriculum is drawn along Australian, New Zealand, British or American education systems lines to reflect the ‘international’ focus of the school curriculum and the different nationalities of the students at the school. The IEA schools design and implement a curriculum as determined by the IEA Board. It has a well-defined and structured statement of outcomes and suggested the appropriate learning experiences required to achieve the stated outcomes. The statements on outcomes and suggested learning experiences range from level 1 (the most elementary) to level 8 (competent IT user in everyday situations) (IEA of PNG, 1996).<sup>17</sup>

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<sup>17</sup> The IEA of PNG’s Technology Curriculum Statement on (a) Technology Outcomes, and (b) Technology - Suggested Learning Experiences are respectively Available at URL: <http://www.ozemail.com.au/~ieapng/techout.html> and

The majority of the children attending IEA schools come from expatriate families and PNG elites such as; public servants, politicians and business executives. Therefore, the children are more likely to have the advantage of being exposed to computers at home where they may have used computers either for games or word processing before entering the IEA school. The children attending IEA schools come from an affluent sector of the community as opposed to their counterparts in the public school system. The affluent sector of the community consists of less than 5% of the work force in comparison to the majority of the people whose children attend publicly funded schools.

### **5.2.3 Private Technical Colleges**

Another category of private institution offering computer courses is the Caritas Technical Girls High School funded mostly by donations from charity organisations. At last report, Caritas took delivery of 40 brand new computers and software donated by the Japanese Government (Rei, 1997a, p.20). The Don Bosco Technical College (DBTC) is also a church run college equivalent to the Caritas which relies on charity to help provide technical education to boys who would not normally be accepted into the government run Technical Colleges (Rei, 1996a). The United States Agency for International Development initially helped constructed the buildings in 1985 and Chevron Niugini made additional cash donations recently to purchase computers in order for DBTC to provide essential technical training. Both DBTC and Caritas are categorised as Permitted Schools by the Education Department but are still under private control (Rei, 1996b).

### **5.2.4 Private Tertiary Institutions**

There are a few private universities or private colleges in PNG, run mostly by the churches, for example the Catholic Church-run Divine Word Institute in Madang and the Seventh Day Adventist Church-run Pacific Adventist College near Port Moresby.

These institutions were upgraded to degree-offering institutions or university status by the PNG government in 1996 (*The National*, July 23, 1997). Such institutions are governed by their respective Acts of Parliament (Commission for Higher Education, 1995a). The now Pacific Adventist University is offering some computer application courses (Truscott, 1996).<sup>18</sup> There are some special purpose private training organisations such as the Seminaries run by the churches which come under this category but they are not of interest in this study because they are not conducting ‘computer courses’ on a commercial basis.

Only the private computer training organisations are of interest to this thesis and the subject of discussion throughout because they conduct computer related courses on a commercial basis to either the general public or a specific client group in PNG by training providers either from PNG or abroad (National Training Council, 1993b).

## **5.3 Growth and Development of Private Computer Training Organisations**

### **5.3.1 Computer Skills Demand and Supply**

There is a lot of demand from the general public to acquire computer related skills and possess computing qualifications in the workplace (Commission for Higher Education, 1986; Salt, 1988; Karambi, 1992; and Ryan, 1994b)<sup>19</sup>. One only need to look at the number of people (mostly young people between the ages of 16 and 24) who queue up with their money to obtain computer skills. This interest is sparked off by the number of advertisements placed in the newspapers by the employers (from business and industry)

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<sup>18</sup> Personal communication with Mr. W.S. Truscott, Head of Business Studies Department, Pacific Adventist College, Port Moresby: PNG. Letter dated July 10, 1996 and subsequent telephone conversations.

<sup>19</sup> The demands from the Business sector and Industry regarding personnel with computer or IT related skills, expertise and qualifications is clearly demonstrated in the number of advertisements placed in the newspapers every day in PNG. While no official figure is available, the demand for IT related skills is obvious from the newspaper advertisements carried daily.

which call specifically for potential employees with computer related skills and qualifications. Such demands are so high that those people seeking jobs have no choice but to pay, often an exorbitant fee, to acquire the necessary computer skills and knowledge. Many employees are vigorously seeking training opportunities to acquire new skills and this demonstrates the 'updating behaviour' (Hesketh *et al*, 1994). Because of the lack of appropriate computer courses in PNG public sector institutions, those who wish to update their skills and knowledge have to obtain necessary computer training from private training institutions outside of the public sector educational institutions.

Another reason for undertaking such training is because it is an essential requisite for localisation, promotion, career development or simply for job satisfaction (McGavin, 1990). Increased use of new technology in the workplace means increased demand for computer skills. Therefore, increase in the demand for retraining and upgrading existing workers (IASER, 1980). The computer skills demand pyramid has to first fill the base level which consist of application users and technicians and gradually progress up the narrow and more theoretically oriented computer science-based professions at the top of the pyramid.

Those who already have a job but without any computer skills may not be able to fully perform their duties cost-effectively and efficiently especially where computers in the workplace are inevitably more common. The use of computers in the workplace is increasing and dependence on computing power is also growing. Therefore, a need arises for education and training in the use of computers for those who have no prior

computer knowledge and background, let alone formal education and training from the public sector educational institutions. This could also help stimulate self-employment for those who are innovative and enterprising enough to make the best of what they have.

The public sector educational institutions provide limited opportunities for computer related education and training in PNG (See sections 5.1.2 to 5.1.6). UPNG offers some computer courses as part of a degree program in disciplines other than computing or IT fields. Computer skills requirement for many computer-related jobs cannot be met satisfactorily by the public sector educational institutions alone. The demand for such education and training is on the increase in both the private and public sector in PNG. Hence, various forms of computer training organisations have sprung up in most of the major centres of the country. These private computer related training organisations have come to realise the entrepreneurial benefits from such opportunities. An opportunity where a computer skills 'demand' was created and needed to be 'supplied' by providing appropriate training in computer skills and knowledge. Such training and associated skills could not be obtained from the public sector educational institutions - hence, the increase in the number of commercially operated computer training organisations in PNG. To obtain such training overseas by an individual is beyond the economic means of the majority of the people.

The commercially operated computer training organisations are providing an important computer education and training opportunity which complements the public sector educational institutions such as universities. The universities have recently designed short computer courses relevant to the commercial world, with business or commercial applications in the workplace in both the public and private sector (*The PNG Times*, Oct 21, 1994; *The Independent*, Dec 23, 1995; Thirumoorthy, 1996<sup>20</sup>). Such training

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<sup>20</sup> Personal communication with Mr. M.N.T. Thirumoorthy, Lecturer, Commerce Department, UPNG, Port Moresby, PNG: Diary

organisations should be encouraged for their foresight and commitment because without their involvement in and commitment to the provision of the private computer education and training, those seeking jobs in the country's workplace in the lower rungs which require computer skills and knowledge would be unable to succeed in securing a job or gaining promotion.

Because there is no active and dynamic body established specifically to coordinate the training activities of the many computer related training organisations in the country, this has meant that training organisations were conducting computer courses in an ad hoc and often uncoordinated manner. In such circumstances almost anyone who had sufficient capital and computer knowledge and background could go ahead and secure office and teaching spaces, procure computer hardware and software, advertise their courses for students to enrol, conduct various computer application courses, issue certificates without any formal scrutiny on its training standards and program, and continue to operate as a 'business venture'.

Whether or not there is a 'qualified' trainer is less significant. Someone who has some background and knowledge (but not necessarily possess a formal academic qualification) in computing is sufficient a 'qualification' to engage in conducting computer training on a commercial basis. However, there are some who are highly qualified and experienced trainers-turned business persons involved in such training organisations.

Job vacancies advertised in the local newspapers ranging from data entry operators or even secretaries (with sufficient background) to computer programmers, systems analysts and Managers are common occurrences. Vacancies in such highly specialised

and skilled jobs have to be filled by recruiting suitable and qualified persons from overseas. There is little or no literature on private sector involvement in computer training in PNG. However, Salt’s (1988) report from surveying 140 private and public sector employers showed that there is definitely demand for computing specialists in PNG under various computing positions (See Table 5.1). If one projects these figures (given in Table 5.1) at the national level a decade later at an estimated growth rate of 12% (Iamo, 1993) there is no doubt that IT related positions in the work force is in great demand.

**Table 5.1 Human Resource Requirements (N=140)**

Computing Position	No of Positions in July 1988	No of positions in January 1991	Annual (%) Increase
Data Entry Staff	657	1085	22
Wordprocessing Specialists	193	404	34
Mini & Mainframe Computer Operators	152	232	18
Microcomputer Software Specialists	80	178	38
Systems Analysts & Designers	82	128	20
Application Programmers	75	126	23
Management Positions in Computing	79	122	19
Computer Training Specialists (Instructors)	42	79	29
Operating System Software Specialists	34	73	36
Computer Marketing and Sales Representatives	27	45	23

Source: Salt, N. (1988). *Tertiary Education for Computing Specialist in Papua New Guinea*, p.8, Lae - PNG: Department of Accounting and Business Studies, PNG University of Technology.

### 5.3.2 National Manpower Assessment Priority

The demand from Business and Industry for computing skills has been high over the last decade in PNG, mainly because the formal education sector in the country has provided little educational opportunities for Papua New Guineans who might need computer skills and knowledge. The existence of computer skills demand has been acknowledged by the National Manpower Assessment Committee and had prioritised all Higher

Education Programs in computing (eg Computer Fundamentals for Non-Computer Executives, Computer Appreciation for Managers/Users, Introduction to Programming in BASIC, Advanced Programming in BASIC, Cobol Programming, Advanced Cobol Programming for experienced Cobol programmers, Commercial Computing and Computer Studies) by the Commission for Higher Education (1986, p.218), as priority number 1 and 2 on a 1-7 scale. Priority number 1 represents the highest priority and priority number 7 represent the those on the verge of being phased out from the national manpower priority list. This shows that computing professionals and associated expertise in IT are still in very high demand in PNG (Priority 1= highest priority and priority 2= high priority) (Commission for Higher Education, 1986).<sup>21</sup>

The government has placed top priority, on paper, on the need for people with appropriate education, experience, and qualification for jobs in various computing professions. However, it has not taken any concrete measures to: (a) formulate appropriate IT policies, (b) provide necessary funding and resources, and (c) coordinate and implement the various government policies and agenda. Further, the government has no formal programme for cooperating with the private sector in order to achieve the goals and needs identified such as, the computer skills demands experienced in PNG. For a long time, the government and the private sector worked in isolation not only in computer education and training matters but also in other areas. A long time science educator at UPNG recently offered justification for cooperation between the government and private sector when he stated:

The private sector has now become the greatest user of science and technology in PNG. It is therefore necessary to actively involve this sector in any development process so that maximum benefits to use may be realised (Singh, 1997b, p.25).

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<sup>21</sup> Commission for Higher Education (1986). **Higher Education Plan: A Strategy for Rationalisation 1986-1990**. Port Moresby, PNG. pp. 217-225. Appendix 18.



### **5.3.3 Neglect of Computer Skills Demand and Incapacity to meet the Demand.**

Regardless of the shortage of personnel with computing skills and qualifications in PNG, the Education Sector Review Coordinating Committee recommended that:

...even where Papua New Guinea's manpower needs are well known, the education sector should still be geared to the broader requirements of integral human development and not tied down to the economy's requirements (Department of Education, Vol.1, 1991, p.10).

That is to say that IT human resource requirement and IT related education which have been identified as two areas with high demand at present in PNG (eg, Salt, 1988), should be ignored by the department and focus on providing just the basic education for the general school population.

For this reason as well as other reasons like financial and technical considerations, the Education Department's view is that computer skills training should be the function of special institutions such as Technical Colleges, Universities and private training schools or organisations (Department of Education, 1993). In other developing countries like Africa, India and Pakistan where the socio-economic needs are similar (eg clean water, infant mortality, social services, population control, and illiteracy), the respective governments view investment and development in science and technology as a means to achieving their different socio-economic goals (Munir, 1992; Odedra, 1992; Roy, 1992).

One of the aims of Technical Colleges in PNG is to provide technically skilled personnel for industries and commerce (Department of Education, 1993). However, it has been reported that: '*...existing technical teaching staff...have not been exposed to the impact of technology within their respective trade...they are now being asked to teach.*' (Kuhena, 1993, p.9). In other words the Technical Division has yet to fully prepare

trained personnel (including computing) in PNG to take up teaching in that subject. The existing institutions do not have the capacity and resources to meet this need. The limited resources are allocated to other essential areas such as textbooks and departmental maintenance, while the acquisition of computers by schools depends on the generosity of the commercial firms such as computer vendors (Dowa, 1993; Max, 1993).

The University of Papua New Guinea (UPNG) offers computer courses for which credits earned are accumulated towards degrees awarded in other disciplines rather than computing per se (UPNG, 1994a and 1994b). The University of Technology (Unitech) has not been able to produce graduates in sufficient numbers to meet the demands of the workforce (Kali, 1992). In the Bachelor of Commercial Computing program, Unitech graduated 5% and 4% (of the total number of graduates) respectively in 1990 and 1993 while it graduated 5% and 6% (of the total number of graduates) in the same period in Diploma in Information Processing (ILO Asian Regional Team for Employment Promotion, 1992, p.215). Students who take one-off computing courses or subjects in the universities to accumulate credits towards degrees in other disciplines are acknowledged.

It must be borne in mind that those who graduate from institutions like UPNG and Unitech with computing qualifications do not necessarily perform the functions for which they were trained because the circumstances in their jobs require them to perform other mundane and less demanding functions. For example, it was revealed that:

...some university graduates in technological disciplines were recruited into the role of high level technicians. Possible factors that might explain this were that graduates did not reach the expected level of professional competence or there was a shortages of suitably trained technicians (Ryan, 1994b, p.627).

Conversely, this author is personally aware of people with formal qualifications in non-computing fields placed in jobs that could be effectively performed by people suitably qualified and experienced with computing skills and knowledge including IT. This might sound a bit exaggerated but the fact is that this category of people are still in short supply. Lack of skilled personnel not only in computing but also in other technical areas are an impediment to development initiatives undertaken in many developing countries including PNG (*PNG Post Courier*, August 7, 1992).

The demand for computer skills retraining and upgrading is exacerbated by the following reasons. First, the lack of Government direction in the form of computer policy in education (Sinebare, 1987, p.96). Second, the absence of computer education and training opportunities and computer studies curricula in the public school system in PNG. Thirdly, the universities are producing too few graduates who cannot fulfil the requirements of the employers in the workplace. The computer education and training courses on offer by the private training organisations can only service the most rudimentary tasks in the workplace (at the very bottom layer of the computer skills pyramid). The computer professionals required for middle to top level management have to be recruited from elsewhere.

The Education Department has recognised the need for schools to make a start in developing computer awareness and computer skills (Department of Education, 1993). The Department *does not officially wish to introduce computers* as part of the official curriculum in the future because of financial and technical reasons (Tetaga, 1994a).

Therefore, there is neither an *official computing curriculum statement* approved for implementation by schools nor a *commitment of funds and other resources*. The Education Department however *encourages* schools to purchase computers if they have necessary financial resources as well as availability of teachers with computing background knowledge who would then design their individual curriculum for use as extra-curricula subject.

#### **5.3.4 Introduction of Computers**

Large private sector enterprises were the first to introduce computers within their organisations in order to help increase efficiency and productivity of staff in the country. It is difficult to ascertain exactly when computers were introduced into the private sector in PNG but indications are that organisations like the banks introduced their computer systems in the 1970's (Ta'eed, 1992). Similar trends were seen to be occurring in other developing countries (See Chapter 2 Computer Literacy and Developing Countries). The government on the other hand introduced computers, especially the computerised salary processing systems between the 1960's and 1970's (Sinebare, 1993). Each statutory body or government department has its own organisation-specific training programs conducted in-house to service its specific computer skills requirement. Introduction and acquisition of computers and information systems into the government departments took place in an unplanned manner in the 1980s.

The Education Department issued a statement on the role of computers in education in PNG in 1987 (Department of Education, 1987). It appears that computers have been introduced into the schools sporadically since the early 1980's because of the irregular manner in which computers appear in the schools. For example, (a) the official Education Department stance on computer purchase, acquisition and use in the school curriculum is voluntary (Department of Education, 1993; Rapese, 1994), and (b), the individual initiatives undertaken by schools to purchase and introduce computers into

schools (Fova, 1994; Goodwin, 1994) do not necessarily follow any planned introduction and implementation. Computer education and training in the secondary school sector remains an 'extra-curricula' activity for the few high schools with computers. The school curriculum is centrally planned and implemented. Therefore, there is no flexibility allowed for schools to introduce and conduct any learning and teaching activities outside of the defined core- and non-core curriculum. The core-subjects are Mathematics, Science, English and Social Science which are nationally examined. The non-core subjects are: Agriculture, Commerce, Expressive Arts, Home Economics, Design and Technology, Physical Education and Religious Education and are internally examined at each school.

Most of the private firms such as the banks conduct company-specific computer training in in-house mode for their staff. Large companies can afford to provide training for their key staff members in computer skills and knowledge in strategic business or information systems training overseas. The smaller organisations either have ignored computer training completely or have their staff attend computer training courses conducted in the premises of other training organisations such as the Bankers College. The more specialised and highly technical computer education and training for PNG nationals are often obtained from overseas educational establishments such as Universities, Institutes, Polytechnics and even at parent company premises for on-the-job practical experience.

Such training for PNG nationals is mostly funded by overseas development aid agencies such as Australian Agency for International Development (AusAID) or sponsorship from private enterprises. The absence of high level computer training locally and non-availability of local staff who are sufficiently qualified to take up employment at the managerial and technical levels (*PNG Business*, 1994), have been the determining factor behind the heavy dependence and reliance on overseas expertise. Overseas personnel

bring with them skills and expertise which are scarce in the country and their capabilities and performances are matched or compensated by higher rewards compared to PNG nationals (McGavin, 1990).

### **5.3.5 Re-training and Re-skilling**

The university graduates after completing their specialised academic programs come across situations in their respective workplaces that almost always require a mastery of and competency in computer skills. For example, it was reported:

There are a great many 'computing roles' within business that do not necessarily require the knowledge gained on a four year degree course....Many students join organisations straight from school without any formal computing qualifications (Ryan, 1994b, p.628).

The graduates therefore have to go through company-specific computer skills re-training either in-house or elsewhere in order to acquire appropriate computer skills and knowledge directly relevant to their jobs. This meant that the university graduates (which includes diplomates in other disciplines) have to undergo re-training even after completing academic studies in other non-computing disciplines, hence they begin a new learning phase upon being employed.

For the employers however, it means injection of additional funds into training their key employees initially. The productivity of the employees in this category is not immediately realised or at least for the duration of the re-training period. This is especially true where firm-specific skills are involved. Imposition of the Training Levy fee allows employers to provide training for its staff and claim tax exemptions accordingly. The Training Levy fee is a positive way to induce and encourage local staff training not just in computing but in all other disciplines.

The re-skilling and re-training is necessary because universities or the public sector training institutions provide general skills which reflects lack of communication between them and the potential employers. For example, it was revealed that:

Early in 1988, a few employers expressed concerns that computing graduates do not possess the essential skills needed to meet the requirements of the job. Some employers suggested that the university program is too theoretical and offers insufficient practical training to develop analytical business skills. Others expressed the view that graduates lack an understanding of the basic concepts required to utilize the popular microcomputer software packages effectively (eg., wordprocessors, spreadsheets, and databases) (Salt, 1988, p.1).

Salt (1988) recommended close dialogue and discussion between public sector institutions and private sector employers to collectively determine the type of computer skills needed and how best to achieve this so that it will be mutually beneficial to all the parties concerned. As a result of Salt's report, the Accounting and Business Studies Department at Unitech revised its courses (Ryan, 1994b).

In a nation with a large number of private training organisations and the need to obtain different skills training by individuals, a healthy environment for providing quality training between commercial training providers is created (Australian National Training Authority, 1994). Through competition, trainees stand to benefit immensely from the available training organisations by choosing the best available computer training organisation that provides the best training program at a cost that is affordable for those who need it. However, in PNG the private training organisations appear to be indifferent to the existing policies (eg National Training Policy) and are conducting their individual training programs without being stringently scrutinised by the authorities. There appears to be two reasons for this situation. Firstly, there are reportedly some

serious loopholes in the existing policies,<sup>22</sup> and until such loopholes (McKie, 1996; Tauwaole, 1996; Bayagau, 1997<sup>23</sup>), are attended to, the ad hoc training programs will continue to exist. Secondly, coupled with the fact that existing policies contains loopholes, there is also a lack of *'coordinated and integrated approach to policy formulation and implementation at the central government level'* (Kakas, 1993, p.20). This lack of coordination contributes towards the half-hearted implementation of many government policies in the public service in general and the sporadic or irregular training programs mentioned here is just one confirmation of this scenario.

Most small to medium level private sector organisations cannot afford to re-train their staff in-house and neither can they afford to sacrifice productivity in favour of re-training. In fact, very few organisations engaged in the provision of computer training for their staff until the necessary legislative changes like the Training Levy were made. This legislation was drawn up to encourage those who engage in training and discourage those who do not conduct any training. Furthermore, the proponents of quality training state that:

It is not good enough for an employer to provide just any training. It should be the right of every employee to receive training which is relevant to PNG conditions and culture, and which fully addresses his or her skill and knowledge requirements. Anything less is selling PNG short (Secomb, 1994, p.6).

The net beneficiaries from successful and quality training programs conducted in PNG are those ordinary people who require necessary skills training in different subject areas.

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<sup>22</sup> The loopholes in the legal, policy and organisational matters were confirmed by both Mr Wesley Tauwaole of National Training Council and Mr Ron McKie of Internal Revenue Commission during fieldwork in Port Moresby, PNG: Diary of interview notes, July 2 and July 4, 1996.

<sup>23</sup> Perceived loopholes were being addressed by the appropriate government departments and statutory bodies in May 1997. See Bayagau (1997).



The computing area is just one of such training programs conducted in the private sector in the country.

### **5.3.6 Growth of Private Computer Training Organisations**

School leavers entering the work force in PNG do not have the opportunity of obtaining any computer related skills and training from within the public sector educational institutions such as the secondary schools. On leaving the public sector system, the school leavers are armed with the School Certificate which shows the results of their performance in the examination of the core- and non-core subjects. Those who gain employment often have to undertake re-training in computer related courses. The advertisements placed in the newspapers for vacant positions often specified that the person they are seeking must possess some prior computer knowledge and relevant job experience in similar fields. While some employers encourage their workers to undertake such training at the many training centres, others use this requirement as a way of determining whether their staff member is prepared to make personal sacrifices in the form of fees and cope with the demands of training after-hours. Yet other employers assist financially and give time-off in order for their staff to undertake training if they consider such training essential for the survival of their organisations. The standard and quality of training conducted in the private sector has been questioned by critics (Secomb, 1994; Sinebare, 1992b; Thompson, 1994). The competence of the individual trainee after completion of a training program cannot be ascertained because of the disparities in the training programs, the curriculum used, content covered, teaching methodology and evaluation procedures applied.

There are now some 33% of the private sector training organisations registered (at the time of writing) with the National Training Council that are involved in computer related training in PNG. The private computer related training organisations are

probably the most popular with trainees who sign-up for the different computer courses conducted throughout the year in each of the training organisations.

The private computer training organisations are mainly ‘doing their own thing’ in the provision of computer skills training in the country. As pointed out by Sinebare (1989), such training organisations were only capitalising on the ‘lack-of-computer-skills’ situation without due consideration for a well-defined and approved computer curriculum, assessment and evaluation of the trainees in the courses, content of the courses, length of training period, physical hands-on experiences, fees charged, certificates or diplomas awarded and most importantly the accreditation of the awards and their relative equivalence between the different training organisations operating in the country.

The private computer training organisations began to grow in numbers between 1988 and 1992 becoming more popular annually. The private training organisations conduct training operations or activities under the *PNG Companies Act 1959* as a registered company engaged in a commercial activity for profit purpose. Most private training organisations claim exemption for Training Levy purposes under Division 14D of the *Income Tax Act*. As long as they obtain recognition from the government through the *PNG Companies Act* and the *Income Tax Act*, the private training providers are allowed to conduct training activities in PNG in any way that they are comfortable with as long as the paperwork requirements are met to the satisfaction of the Internal Revenue Commission (IRC).

The IRC is not in the business of education and training, it is merely there to grant Training Levy exemptions. The necessary functions are to be transferred to the National

Training Council once all the loopholes identified are fixed by the relevant authorities. For example, the IRC stance on private training is clearly stated that:

IRC has no interest in training organisations except for the taxation purpose - for this reason, what the training organisations are doing, what course content they are delivering, how they are delivering their course, how they assess and evaluate are seen as falling within the purview of NTC....The IRC function to grant Training Levy exemptions to private training organisations will be transferred to NTC once all the necessary loopholes in existing legislation are tightened and solved within the next 12 or so months (McKie, 1996).<sup>24</sup>

### **5.3.7 Commercialising Private Computer Training**

The present loopholes as highlighted by IRC and NTC, and the lack of coordination by NTC gave much freedom to 'commercialise' private training activities in the country. With too much freedom in the training industry comes many training organisations which give less attention to quality and standards of training. It can also be detrimental (not just to the trainees but the whole private training industry) in the sense that training organisations or training providers can misuse the freedom currently enjoyed by them. The misuse of such freedom is exemplified in the manner private training organisations are conducting a diverse range of computer related courses which differ from each other in many ways, both within an organisation and between training organisations. That includes the disparities and discrepancies in many aspects of the training activities highlighted in Chapter 6.

In order to emphasise the detrimental nature of such freedom being enjoyed by the private computer training in PNG, several characteristics pertaining to providing quality computer training are highlighted below. [The characteristics of a quality training are

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<sup>24</sup> Personal communication with Mr. Ron McKie, Assistant Commissioner, Revenue Assessment, Internal Revenue Commission, Port Moresby, PNG: Written statement obtained from Mr McKie dated July 4, 1996 and interview notes.

also highlighted in Chapter 6 Private Computer Training in PNG and Chapter 8 Findings and Recommendations]. These characteristics are supposed to be given serious considerations by private training organisations. It is necessary because the training organisations must satisfy the specific requirements of the Internal Revenue Commission and the National Training Council before respective registration is granted to operate as a ‘business venture’ and conduct a ‘training activity’. However, these expectations appeared to have been inadequately incorporated by many private training organisations and hence are detrimental to trainees in particular and the training industry in general as described under the different characteristics.

Briefly summarised here are some of the characteristics of quality training observed by the researcher<sup>25</sup> to be overlooked by many private computer training organisations:

- a) **Teaching Space:** Many private computer training organisations visited in PNG have large student numbers and small teaching spaces. As a consequence of this situation there was overcrowding because the teaching spaces used were initially designed for office spaces. Very few training organisations have the luxury of large teaching spaces.
- b) **Teaching Resources/Aids:** Many training organisations have limited teaching resources. For example, there were insufficient numbers of computers for adequate hands-on use and practice. Often the computers at hand were either faulty or crashed thus adding to the disadvantage for the trainees.
- c) **Teaching Methods/Procedures:** There are a wide range of teaching methods such as lecture, demonstration, practical or lab work used by the trainers. The standard and quality of these methods/approaches were dictated by factors such as trainer’s educational qualification and experience, the availability of teaching resources

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<sup>25</sup> The researcher visited Private Computer Training Organisations in Goroka, Mt. Hagen, Rabaul, Lae, and Port Moresby in 1994. Only Lae and Port Moresby areas were revisited during 1996 fieldwork.

within the organisations, the trainees' level of educational background, and other administrative responsibilities. For example, in one case, trainees were observed going through a disk-based tutorial at their computer terminal while the tutor/instructor was minding the switchboard and reading the newspaper in between at the time of observation. In another organisation, trainees were observed moving about aimlessly in the class without a physical presence of a tutor/instructor inside.

- d) **Educational Qualifications:** While many of the trainers possess higher degrees (See Table 7.2 for more details), there are still others whose qualification are suspect. Those with higher degrees are often owner/managers and therefore spend more time on management or administration instead of teaching. Many trainers have little formal teaching qualifications and experience. Some trainers are teaching subjects which they have no formal qualifications in.
- e) **Assessment Procedures:** Only one of the training organisations conduct end of semester examination and another gives periodic tests, while most training organisations have no such assessment system.
- f) **Certificate/Accreditation:** Various forms of Certificates are awarded at the completion of the course. The certificates do not carry any information which may be useful to employers, except that some organisations claim their awards or certificates are recognised or accredited by higher education institutions in both PNG and overseas.
- g) **Computing Curriculum:** The computing curricula are designed and developed in-house. Large organisations have other resources from which they consult and develop their curriculum accordingly. For example, one organisation developed its curriculum to suit large corporate organisations. A training provider told the researcher: *“What good is a computing curriculum if NTC staff do not take any*

*interest in the technical aspects of the curriculum material I developed for my company’? (Schwarz, 1994).<sup>26</sup>*

- h) **Inspection System:** There is no scrutiny (or quality control) in the form of inspection or external examination of the training program by external bodies in many training organisations. Many providers are at liberty to conduct training in any way they see fit. A few training organisations have established formal business links with other institutions in PNG and overseas in order to give credibility to their training programs and accreditation to the certificates awarded.

### 5.3.8 Overview of Private Training Providers

Since each training provider is solely responsible for maintaining standards and developing competencies, one can be certain that there would be many differences and discrepancies between the trainees completing the training programs in each of the training organisation in PNG. Furthermore, two training providers conducting computer courses with the same course names may have different assessment systems, evaluation methods, fees structure, length of course, certification and varied academic backgrounds of the trainers involved. These differences and variations add confusion and disparities inherent within the private training organisations. It is not only confusing among the trainees but also among the employers who need to know: what the different certificates means, what level of competency the trainee has attained, and whether the ‘skills the employers will be hiring’ are a worthwhile investment. The employees, sponsors, parents, trainees, and the general public should have some notion of the training involved, the standards enforced, the qualities used as input into the training programs, the strengths and weaknesses of the training environment and their potential. For the trainees, whether the skills they acquired are useful to a potential employer, or the training they have just obtained will open up new opportunities in advancing further if

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<sup>26</sup> Diary of interview notes with Mr Lothar Schwarz, City Electronics Pty Ltd in Port Moresby, PNG: June 22, 1994.

they wish to pursue that at a future date. Under the present system and within the existing policy environment, these questions cannot be adequately answered by anyone other than the training providers because they are aware of their own strengths and limitations.

The differences and disparities highlighted have serious ramifications for trainees as well as employers. An employer has already expressed her dissatisfaction about trainees who responded to her advertisement for a job which require word processing skills (Thompson, 1994). Thompson found that one applicant could not 'identify what a mouse is' after completion of the course. The trainees cannot acquire confidence and mastery in the training and apply them in their jobs because the private training organisations have no guidelines and standards to comply with in their training programs.

**Table 5.2** shows the differences between four training providers of *Lotus 1-2-3* and *WordPerfect 5.1 for Windows* courses including; course fees, course duration and award. This information was summarised from information received from the respective training providers and newspaper advertisements in PNG (*PNG Post Courier*, 1994).<sup>27</sup> Trainees have limited information and knowledge necessary to judge for themselves what is a worthwhile investment except to decide whether they can afford the fees or not. As one educator recently put it:

Computer courses are exaggerated by the advertisements placed in the newspaper and are given a high profile by owners/trainers to attract the attention of the ill-informed and unsuspecting trainees who look for opportunities to make a living for themselves (Ganavi, 1996).<sup>28</sup>

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<sup>27</sup> a) *PNG Post Courier*, Tuesday June 14, 1994. p. 41. b) *PNG Post Courier*, Friday June 17, 1994. p. 30. c) *PNG Post Courier*, Wednesday June 22, 1994. p. 6. and d) *PNG Post Courier*, Monday, June 27, 1994. p. 51

<sup>28</sup> Personal communication with Mr. Urban Ganavi, Lecturer, PNG IPA, Port Moresby, PNG: Diary of interview notes, July 3, 1996.

**Table 5.2 Four Training Providers of Lotus 1-2-3 and WordPerfect 5.1 (Windows Version)**

Training Provider	Course Name	Course Fee Charged	Duration	Weekly Rates	Award
CTC	Basic Lotus 1-2-3	K150.00	4 weeks	K37.50	Certificate to Diploma
	Advanced Lotus 1-2-3	K200.00	6 weeks	K33.33	
	Basic WP 5.1	K150.00	4 weeks	K37.50	
	Advanced WP 5.1	K200.00	6 weeks	K33.33	
NCBTC	Basic Lotus 1-2-3	K300.00	8 weeks	K37.50	Certificate
	Advanced Lotus 1-2-3	K300.00	8 weeks	K37.50	
	Basic WP 5.1	K300.00	8 weeks	K37.50	
	Advanced WP 5.1	K300.00	8 weeks	K37.50	
PSTC	Advanced WP 5.1	K250.00	4 weeks	K62.50	Certificate
	Advanced Lotus 1-2-3	K250.00	4 weeks	K62.50	
NCRTVTC	Basic Lotus 1-2-3	K250.00	3 weeks	K83.33	Certificate
	Advanced Lotus 1-2-3	K250.00	3 weeks	K83.33	
	Basic WP 5.1	K250.00	3 weeks	K83.33	
	Advanced WP 5.1	K250.00	3 weeks	K83.33	

**Key:**

CTC	= Commercial Training College
NCBTC	= Niugini Computers and Business Training Centre
PSTC	= Professional Staff Training Centre
NCRTVTC	= National Computer Resource Technology and Vocational Training College

### 5.3.9 Major Discrepancies in Computer Training Conducted

The courses offered by the private sector differ in many ways from one training organisation to another. There are many serious discrepancies in; course structure, course content, length of courses, course names (nomenclatures) and terminologies, course fee structure applied, certification or qualifications awarded, and the academic credentials of the trainers conducting such courses (Sinebare, 1992b). Already the output from such training organisations has been questioned by one employer from a non-government organisation in PNG (Thompson, 1994).<sup>29</sup> According to Thompson, the performance of those who have paid and attended computer training courses from private computer training organisations have not been impressive.

The concerns expressed by Thompson (1994) are worth quoting here in order to highlight the seriousness of the discrepancies in the computer courses provided by the private training organisations in PNG. This is particularly true where the computer

<sup>29</sup> Personal communication with Ms Bonnie Thompson, Education Officer with the Foundation for the Peoples of the South Pacific, Port Moresby, PNG: Letter dated August 12, 1994).



courses conducted are taken for granted by the clients (trainees) who wish to obtain such training but do not have the courage and the necessary background knowledge to critically assess the value and content of the courses. Thompson (1994) writes:

...I would like to share with you a recent experience I had as an employer. I wanted to hire an individual to do database entry for one of FPSP's research projects and thus ran an advertisement in the *Post Courier*. Over 50 people answered the ad, and I interviewed 23 of those. I also gave a computer test to each interviewee. All but one of the interviewees had attended a computer training programme in the last twelve months. The only person who knew what a computer 'mouse' is was the person who had not attended classes (computer training courses), but had worked in an office. None of the others had the slightest idea how to use the mouse.

Also, only one of the applicants who had been to a training course knew how to center, underline, bold information (texts) in a document. Most of the applicants did not even know how to place their hands correctly on a keyboard, and they hunted and pecked with one or two fingers.<sup>30</sup>

An independent observation was also made by an academic (personal communication, 1996) who had taught several computer courses at UPNG but also 'moonlighted' at one of the private training institutions in Port Moresby stated (paraphrased below):

A training provider who had earlier attended the computer courses conducted at UPNG, recycled the course materials provided there in his own training organisation. He asked me to teach the areas of the course where he cannot confidently teach by himself. That is how I came to know that he was merely using our course materials. I doubt whether any of his students fully understood the content delivered because those who attended the UPNG courses had matriculation status.<sup>31</sup>

From yet another critic, it was observed that:

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<sup>30</sup> Ibid. p.1

<sup>31</sup> Personal communication with the UPNG academic who was on study leave in Australia, 1995. The academic concerned requested for anonymity.

Little effort is made by ... training entrepreneurs to understand Papua New Guinea's cultural and business environment, or to adapt their overseas materials to suit PNG's needs. It is easier and cheaper to pick up Australian training packages and run them without alterations (Secomb, 1994, p.6).

Secomb made this comments in relation the private training providers brought in from overseas to conduct short intensive courses at various locations in PNG. There are many such fly-in-fly-out or mobile 'training consultants' who frequent PNG on 'training missions' throughout the year for both short and long courses brought in by large organisations who do not have permanent trainers in the country (Lewis, 1994).<sup>32</sup>

Another critical observation was made by an educator when presenting a paper at PNG University of Technology in Lae stating:

The mushrooming private computer training industry and its negative contribution to the field of computing is another reason for formalizing computing skills. Advertisements of computer training courses at different levels, including courses for school children during school breaks are posted in newspapers regularly. However, there is no quality control on these institutions and some of the institutions do not have qualified computer teachers on their staff. To the computer illiterate there is no way of interpreting the advertisements, or evaluating the course content. They enrol paying large sums of money, sometimes up to several thousand of Kina per course. Most students pass out no more literate in computers than they were before they enrolled (Jayawickrama, 1994, p.35).

The incidences quoted so far confirm the views held by this author (Sinebare, 1992b), two years earlier about private sector IT training and the call for a formalisation of computer education but this was ignored by authorities. (The NTC has only recently acknowledged this in reaction to Consumer Affairs Council's revelation of private schools operating without being registered (Sorariba, 1997, p.19; *The National*, July 29,

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<sup>32</sup> Personal communication with Mr Ian Lewis, Datec Pty Ltd, Port Moresby, PNG: Diary of interview notes dated July 1, 1994.

1997). If this has been the case with computer education and training on offer in the private training organisations then certainly, it requires an interventionist approach to be taken by the National Training Council and relevant statutory bodies to ensure that all training programs are thoroughly scrutinised, evaluated and approved as originally intended by the existence of such authorities. The legal framework within which such evaluation is carried out has already been put in place in the form of the *National Training Policy* and the *National Training Council Act 1991*.

Papua New Guineans who have put up with many such shoddy training programs have paid a lot of money for computer training courses but are unwilling to raise any complaints about them (Secomb, 1994). Their reluctance and unwillingness to raise complaints were due to the following reasons: non-availability of alternative training providers in the country, the old attitude that '*if the training organisation is from overseas it must be better than ours*', the passive nature of PNG trainees who often prefer not to confront or embarrass training providers of their shoddy training, and to some extent nepotism being practiced between certain training organisations and senior government executives who serve selfish interests (Secomb, 1994). With limited opportunities to obtain quality computer training in the country, and with many variations in the existing training organisations, PNG nationals have an even more limited choice so they have to continue relying on the existing training organisations even though they may be operating in contradiction to the existing policy guidelines and framework. The positive efforts of some training organisations such as the *Institute of Business Studies* and *Port Moresby Secondary College* in Port Moresby are just two examples of private training organisations which aim to provide relevant skills and quality training (Choi, 1994; Rei, 1997b).

## **5.4 Government Policy Initiatives**

### **5.4.1 Background Information**

It is difficult for the government to provide all the training requirements of the country mainly for economic reasons. However, because of the differing and ad hoc nature of computer related courses conducted by the private training providers and the need to recognise such training schemes, the Government enacted the *National Training Council Act 1991* (NTCA-1991) (Independent State of PNG, 1991). Through the NTCA-1991, the National Training Policy (NTP) was drawn up in order to formalise, monitor, regulate, and coordinate any training activity conducted in the private sector both within the country and outside the country for those PNG nationals undertaking training abroad (Independent State of PNG, 1989).

The accreditation policy, *Accreditation and Higher Education in Papua New Guinea* (AHEPNG) was developed by the Commission for Higher Education for accrediting training providers, training programs and institutions of higher education in PNG (Commission for Higher Education, 1995a). The AHEPNG was developed for the purpose of giving due recognition of PNG awards overseas as well as for PNG to recognise overseas awards. This policy came about because there was little comparability and/or equivalence between training programs and institutions, divergence in certificates and diplomas awarded, and little or no allowance for accreditation or cross-accreditation between training institutions (Commission for Higher Education, 1995a).

### **5.4.2 The Training Levy - Purpose and Nature**

The Training Levy stipulates that companies failing to train their employees face the imposition of a two percent levy on the company's payroll. This is to ensure that

companies contribute to the training of their employees with company-specific training. For example, according to the Internal Revenue Commission (IRC):

... the Government introduced Training Levy as a means to encourage employers to provide more training of their staff. The idea behind training (the) levy is that it is an additional tax on employers who do not spend sufficient money on actual training. (The) training levy is assessed as 2% of payroll but the amount actually payable is reduced by qualifying training expenditure so that if sufficient training has been done, there is no levy collected (McKie, 1996, p.1).<sup>33</sup>

Therefore, in order for companies to benefit from the Training Levy, they must positively encourage skills training and staff development within their organisation first rather than depending on government funded institutions or poaching from elsewhere for all their computing skills requirements. The government through the Training Levy encourages companies to invest in staff development especially for company-specific skills. Those companies which cannot provide any training have to pay the training levy for the training activities conducted elsewhere through government funded institutions or the private training organisations whose training programs have been approved for Training Levy purpose by the National Training Council (NTC). The Director of the NTC, Mr. Betuel Peril was quoted as saying: *'Some companies simply wait around and pick up workers who have been trained by other organisations.'* (PNG Post Courier, July 6, 1994).

The aspiring computer skills training provider (be it an individual, a group of individuals or an organisation) completes necessary documentation which is submitted to the IRC. An employer (in this case the training provider) whose annual payroll is less than K100,000.00 is exempted from the Training Levy fee. Without the Training Levy

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<sup>33</sup> Personal communication with Mr Ron McKie, Assistant Commissioner Revenue Assessment, Internal Revenue Commission, Port Moresby, PNG: Letter dated 4/7/96.

requirements, many companies would neglect training of their employees mostly for fear of poaching of the staff by their competitors which would mean that the same companies continue the endless cycle of training and re-training without any direct returns to themselves (McGavin, 1990).

From observation of the advertisements placed in the local newspapers between 1993 and 1997, most of the private training organisations claim that the courses they are offering are approved training programs (for purely taxation purposes only). They woo their clients with statements like: '*Climb the ladder of success with ....*', '*Here are your chances for brighter future*', '*You won't have to go too far to get the best training to get into the job of your dream*', '*Education is a lifetime investment*' and '*Join the winning team*' emblazoned on some of the advertisements placed in the newspapers. What they rarely mention is whether the courses have been approved by the NTC for accreditation purposes because the NTC is the only authority in PNG with which all training matters in the private sector are to be handled.

According to Dobunaba (1994), the private sector training organisations are required by the Income Tax Act to conduct 'approved business training course'. This points to the fact that both the NTC and IRC have had some loopholes in legal, organisational and policies matters (eg National Training Policy and Training Levy) pertaining to the registration of private training organisations (Tauwaole, 1996).<sup>34</sup> Therefore, it is within the powers of the NTC to approve such courses and institutions. Unfortunately, it hasn't been acknowledged whether NTC approval was initially granted in the first instance for

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<sup>34</sup> Personal communication with Mr Wesley Tauwaole, Coordinator, Private Sector Training, National Training Council Secretariat, Port Moresby, PNG: Diary of interview notes dated 2/7/96.

such courses before they were delivered by half a dozen training organisations<sup>35</sup>.

#### **5.4.3            The National Training Council Act 1991**

The NTCA-1991 authorises the NTC and its Secretariat to ensure the efficient implementation, supervision and management of the National Training Policy in PNG. The NTC was established under the NTCA-1991 and a Secretariat was also established to support the activities of the NTC. The objectives of the NTCA-1991 (Independent State of PNG, 1991, p.2) are to:

- a) foster the comprehensive development of training with regard to the needs and resources of the country;
- b) foster the co-ordination of training situations so that the most effective use can be made of resources available for training and related purposes;
- c) foster the type of training which ensures increased productivity and capacity building in the work force;
- d) plan and encourage the development of a system of training fitted to the requirements of the country and its peoples;
- e) establish, preserve and improve standards of training throughout the country; make the benefits of training available as widely as possible;
- f) make the most effective use of resources available for training and related purposes in so far as this can be done by legislative and administrative measures; and
- g) augment and support the role and functions of the Commission for Higher Education

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<sup>35</sup> Observations made by the researcher while visiting the private computer training organisations in PNG during the fieldwork conducted in June/July of 1996.

as specified in the Higher Education Act (Chapter 397), (Independent State of PNG, 1991).

#### **5.4.3.1 The National Training Policy (NTP)**

In view of the uncoordinated and ad hoc manner described earlier in which training activities have been conducted by various training providers in the private sector, the Government through the Ministry of Labour and Employment established the National Training Council (NTC). The NTC prepared the National Training Policy in 1989 whose objectives among others were mainly to address those areas of concern and problems identified to have existed extensively in the private training organisations in PNG (ILO Asian Regional Team for Employment Promotion, 1992).

Some of the concerns and problems that warranted the promulgation of the NTP according to the Chairperson of the NTC are:

- a) inadequate and unsuitable training programs in many private sector training providers or organisations;
- b) low productivity due to lack of training, skills training and on the job training;
- c) lack of professional support by staff and supervisors;
- d) unnecessarily slow process of localisation programs in the private sector;
- e) poor quality training organisations and centres of the private training providers;
- f) lack of rational career paths and training programs established in many professions;
- g) a general lack of policy, particularly the national training policy;
- h) lack of suitably qualified local training staff;
- i) ill-equipped training facilities;
- j) lack of credibility of the certificates awarded by different providers; and
- k) discrepancies inherent in course contents, training methodologies and possible accreditation between training providers and their certificates (Joel, 1992, p.1).



The National Training Policy; has been described as: “... *a framework for setting out objectives, mechanisms, priorities and guidelines for action. The task is not merely to declare a Training Policy but to develop the capacity, within Government and beyond, to design, implement and institutionalise the various components and ensure their effective operations.*” (Independent State of PNG, 1989, p.1). The National Training Policy aims to: ‘...*provide clear guidelines for planning, conducting, facilitating and evaluating training...*’ (National Training Council, 1993c, p.2), both in PNG and overseas.

The main objective is for the NTP to play a dynamic role in order to monitor, regulate and promote training standards through the process of registration and accreditation of programs (Maibawa, 1993b), so that any training conducted either in-country or elsewhere is given the recognition it deserves within PNG.

#### **5.4.3.2 The National Training Council Secretariat**

Under section 22 of the *National Training Council Act 1991*, the implementation of the Act and especially the National Training Policy has been vested with the National Training Council Secretariat (NTCS). The NTCS has been established to service the day to day operations and functions of the NTC with a staff of seven and headed by a Director. The Director is answerable to the National Executive Council and is accorded benefits and privileges similar to the constitutional office holders in PNG (Maibawa, 1993b). The Secretariat’s mission is to provide necessary services and support to the NTC including the implementation of decisions and directions as efficiently and cost-effectively as possible (National Training Council, 1993d, p.1).

The functions of the NTCS, are wide ranging and include among others:

- a) Supervise, monitor and implement the National Training Policy;

- b) Develop Training Standards and Creditation Policy, and any associated mechanisms, guidelines and procedures for private sector training;
- c) Coordinate the preparation of training proposal and training priorities;
- d) Receive and where necessary comment and recommend to NTC plans for development of, or any training program in, in-service training institutions, submitted by departments and companies or the private sector; and
- e) Work in conjunction with its committees or other specialist individuals as directed by NTC (National Training Council, 1993d, pp. 1-2).

The membership of the NTC comprises of representatives from Government departments and statutory bodies (for example; Labour and Employment, Education, Finance and Planning), private sector, commerce and industry, churches and voluntary organisations, trade unions, and the Director of the Secretariat. The members are appointed by the minister responsible for Labour and Employment by notice in the government gazette for an initial period of 3 years.

#### **5.4.3.3 Screening and Accreditation Committee (SAAC)**

Under section 16 of the *National Training Council Act 1991*, the National Training Council is empowered to establish a Screening and Accreditation Committee (SAAC).

The functions of the SAAC are to:

- a) to consider and review the programmes of private training institutions in relation to standards, relevance, costs, self-sufficiency and duplication of locally-available publicly-funded courses; and
- b) certify, in the prescribed manner, private training institutions as training institutions whose services may or may not be utilised by Government-funded agencies (Independent State of PNG, 1991, p.8).

As required by the NTCA-1991, all private training organisations in PNG, their training programs and courses will be subject to a screening and accreditation process to be administered by the NTC through the SAAC. The mission statement of the SAAC

according to the National Training Council (NTC, 1993b, p.6), is to promote quality and effective training which will enhance and improve integral human development as stipulated in the National Constitution. A similar accreditation policy has been formulated by the Commission for Higher Education for implementation in higher education in PNG (Commission for Higher Education, 1995a).

In the private sector, the accreditation process involves a legally instituted body such as the NTC to: (a) register all private training organisations, and (b) recognise training courses/programs that are of satisfactory standard. Accreditation of a course is the formal recognition by the NTC that the:

- a) content and standard of a course are appropriate to the credential received (or awarded);
- b) methods of delivering it fulfil the purpose for which they are introduced;
- c) assessment system used is appropriate for measuring the achievement of the course objectives (National Training Council, 1993b, p.9-10).

However, there are key agencies identified in the country (Independent State of PNG, 1989:19; ILO Asian Regional Team for Employment Promotion, 1992), with certain responsibilities to ensure that training and staff development in both the public and private sector is not ignored. The agencies identified by the government are:

- a) The National Training Council which will oversee the implementation of the National Training Policy, provide advice to the public and private sector in relation to training plans, programs and activities as well as screen, register and accredit courses conducted in the country;
- b) The Department of Personnel Management (DPM) which stimulates, promotes, coordinates, monitors and evaluates training and development across the public sector;

- c) Department of Labour and Employment (DLE) which stimulates, promotes, coordinates, facilitates, monitors and evaluates training and development across the private sector, including statutory bodies and authorities;
- d) The Commission of Higher Education (CHE) which is responsible for the Higher Educational institutions and their pre-service students;
- e) The Department of Finance and Planning (DFP) which is responsible for the running of the Resource Management System, advising the National Training Council on Financial and Training Plans, and facilitating links between NTC, DPM, DLE, CHE, Department of Foreign Affairs and other donors; and
- f) Every employer organisation in the public and private sector is required to plan, develop, conduct, monitor and evaluate its own training programs within the framework of the National Training Policy and in accordance with the professional inputs obtained from time to time in order to maintain standards and ensure that training meets specific needs (Independent State of PNG, 1989:19).

However, unlike other developing countries, no formal authority or structure was established to formally address information technology related education and training in PNG in both private and public sector educational institutions.

#### **5.4.4 PNG IT Policy for the Public Service**

##### **5.4.4.1 Brief Background**

The *PNG Information Technology Policy for the Public Service* was approved by the National Executive Council in 1991 for implementation within the public service. This policy was adopted by the government for several reasons:

- a) The widespread use of information technology in the public service in which different government departments opted to procure a wide range of information technology systems without standardisation. This made it difficult for information sharing not just between departments but within as well.

- b) The PNG public sector has often been criticised for being too large and inefficient in delivering goods and services not only between the different government departments at the national and provincial levels but also within each level.
- c) The procurement of computers or IT equipment in the public service has been unplanned or uncoordinated, equipment breakdowns are left without proper maintenance programs or even condemned and new equipment acquired. As a result the public service machinery which was supposed to serve the people often did very little in providing the service, hence it failed its responsibility.

#### **5.4.4.2 Objectives of the PNG IT Policy for the Public Service**

Given the above background, the government adopted an IT policy for the public service which identified several objectives. The general objectives are:

1. To improve the Productivity and efficiency of individuals and organizations within the Public Service, making most effective use of resources.
2. To ensure that the Technology, being used within the Public Service is the most appropriate to meet local conditions, with the introduction and maintenance of Standards, acquisition procedures and research into the development of Information Technology within PNG.
3. To establish and maintain Corporate Information systems, utilizing appropriate communications systems, to provide individual managers and the whole Public Service with reliable and timely information.
4. To promote Human Resource development to ensure appropriate remuneration packages, working conditions and training are introduced (Department of Personnel Management, 1991, p.1-2).

#### **5.4.4.3 Administrative Structures**

This policy proposed the establishment of two administrative structures, the Information Technology Board (ITB) and the Centre for Information Technology (CET). Both of these structures are established under the Ministry of Public Service. The former will be

the overall authority for all policy matters related to information technology in the public service while the latter is responsible for all technical functions.

The ITB specific responsibilities are to:

- a) Deliver and review information technology policies for the Public Service;
- b) Research, develop, monitor, evaluate and establish guidelines for the acquisition and use of information technology;
- c) Establish standards for information technology;
- d) Establish human resource strategies for information technology; and
- e) Where appropriate represent the Public Service in general information technology matters at the national and international level (Department of Personnel Management, 1991, p.4).

The responsibilities of CIT are to:

- a) Provide advisory services and support to the Board and line departments/agencies in all aspects of information technology;
- b) Liaise and cooperate with training institutions in the development and conduct of information technology courses;
- c) Carry out research and development in the use of and general application of information technology; and
- d) Undertake other activities as directed by ITB within the area of information technology (Department of Personnel Management, 1991, p.5-6).

The policy was intended for the Public Service only, unlike other developing countries like India and Pakistan whose Information Technology policies incorporates the private sector because they recognise the potential important contribution the private sector can make towards information technology development and applications in the economy. For example, in India the Department of Electronics has a responsibility which is aimed at ensuring that private initiatives in computer education and training are nurtured, encouraged, developed and recognised (Pawar, 1992).

The ITB has been lying idle under the Department of Personnel Management since its inception in 1991 while it was reported only recently that the CIT was established (*The National*, April 30, 1997). Since IT training responsibility falls under the CIT and the fact that it has just been established means little IT training has been coordinated with the existing public and private training organisations within PNG since the establishment of the *PNG IT Policy for the Public Service*. This also implies that IT education and training has not been given the necessary attention at that level even though some policy initiatives have been undertaken.

While this policy has a potential of serving the purpose for which it was initially formulated, several important questions were asked by Sinebare (1993) which remain unanswered about this policy. The questions include:

- a) How enforceable are the IT standards requirement?;
- b) Have the right skills been identified?;
- c) Is the coverage of the IT Policy wide enough?;
- d) Will the policy change the organisational culture?; and
- e) To what extent will the policy be implemented?

To date very little appears to be happening in PNG since the adoption of IT policy for the Public Service.

#### **5.4.5 PNG Science and Technology Council Act 1992<sup>36</sup>**

The PNG Government recognised the significance of Science and Technology (S&T) as being central to the economic well-being of the nation. For example, S&T is essential

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<sup>36</sup> Independent State of Papua New Guinea (1992). *Papua New Guinea Science and Technology Council Act 1992*, Port Moresby, PNG. Certified on 5/6/92 and Gazetted in Government Gazette No. G72/92 and Commenced (effective):10/9/92.

in recovering mineral resources, exploration and refining of oil and manufacturing of petrochemical products. S&T also has the potential to provide solutions to production and delivery of food, clothing, housing, health care systems, transport, telecommunications, and promote daily S&T awareness and education.

The *PNG S&T Council Act 1992* was enacted in 1992 in the first instance to establish a PNG S&T Council which would consist of a Chairperson who has at least a science degree and has relevant experience in the field of S&T for at least three years. The Council would be composed of ten other members appointed by the Minister responsible for S&T matters and would be served by a Secretariat (Independent State of PNG, 1992).

The functions of the S&T Council are as follows:

- (a) to gather, information on scientific and technological activities taking place of being planned or required and, through a process of analysis and consultation, determine their positive and negative implications and the optimum course of action; and
- (b) to maintain liaison with government agencies and organisations, private sector, universities, research institutions and non-government organisations and any international bodies and institutions to ensure cross-sectoral consideration of scientific and technological issues; and
- (c) to advise the National Executive Council, central agencies, government departments and other appropriate bodies regarding the merits, implications relative priority, potential duplication and the resource requirements of policies, programmes and projects; and
- (d) to review and co-ordinate prospective aid projects specifically related to science and technology and to advise upon priorities for additional donor assistance; and
- (e) to facilitate effective links - including joint research and the exchange of specialists between Universities, research Institutes, Statutory Authorities and private sector; and
- (f) to conduct or cause to be conducted technological assessments on the potential social, economic and cultural impacts (both positive and negative) of projects, and thus anticipate and plan for these consequences; and
- (g) to establish working groups, sub-committees and to implement other such arrangements as the need arises; and



- (h) in addition to sponsoring and supporting other scientific and technology activities, to award and encourage the awarding of grants for research, training scholarships, prizes, pilot applications, visits, special initiatives for women, conferences, exchanges, exhibitions, displays, directories of personnel and of work in progress, publication and other forms of information dissemination; and
- (i) to advise the National Executive Council and Central agencies of government regarding the best use of the presently available financial resources, facilities, scientists, technologist, educators and trainers (Independent State of PNG, 1992, p.2).

The goals as stated above are commendable but have fallen short of a concerted national approach to formulating a National Science and Technology policy. The establishment of the S&T Council would be a catalyst to formulate a national S&T policy which unlike the IT Policy for the Public Service will cover not just the public sector but also the wider community which includes the private sector.

Even though this Act was enacted in 1992, the S&T Council was not established until 1997 when the National Executive Council approved the creation of the new Ministry of Energy and Science (*The National*, May 2, 1997). This delay in establishing the appropriate ministry is probably due to the fact that S&T related functions have come under more than one Ministry over the years reflecting the priorities of successive governments. Little attention has been paid to S&T matters by the different ministries under this arrangement. For example, S&T functions have come under the Ministry of Higher Education, Research, Science and Technology in 1995 (*The PNG Times*, March 30, 1995), and Ministry of Education, Science and Culture in 1997 (*The National*, July 30, 1997, p.xii).

S&T matters have been overlooked for a long time. As one science and technology educator succinctly put it:

...the total stock of PNG's science and technology manpower is quite small in relation to its social needs, the government will have to set aside a much higher national investment in science and technical education to

meet the growing needs of the changing social system (Singh, 1997a, p.21).

No proactive measures have been taken to pursue S&T goals and objectives, even though S&T is essential for PNG to develop economically. In many developing countries like India and Sri Lanka, S&T is given priority and they even establish a ministry or a Commission with the sole function of pursuing S&T related goals and functions.

Given the manner in which S&T has been approached by successive governments in PNG, it is unlikely that S&T will progress as fast as in other developing countries with explicit IT policies and strategies to implement their S&T or IT policies. The consequence are serious as perceived by one proponent of S&T in PNG who stated that:

If our science and technology infrastructure is to make a great impact, then science and technology has to be deliberately planned and purposefully directed towards the fulfilment of national goals (Singh, 1994, p.21).

## **5.5 Summary**

Computer education and training scenarios in PNG in both the public and private sector institutions have been discussed. It has been shown through this discussion that computer education and training in PNG are sporadic and uncoordinated. Very few opportunities exist for PNG nationals to acquire computer related education and training from the public sector institutions because computer education is not formally available in the school curriculum. Individual schools are taking initiatives to introduce computer studies curriculum into the schools but this is only to be conducted as 'extra-curricula' activity. There are also limited opportunities in other post-secondary institutions to obtain computer education and training. For example, the universities have a limited capacity to provide such educational opportunities given that

computer related education is officially regarded as the responsibility of the universities, colleges and private institutions.

Computer education and training in the private training institutions are limited. However, since computer education and training opportunities in the public sector have been deliberately ignored at school level, the majority of those who pass out from the public sector educational institutions have no computer studies background. The fact that the workplace requires personnel with computing knowledge and background, thus creates a demand for computing skills in PNG.

This demand has been recognised by the government which placed top priority on human resource development in computing related profession in the country but this has been neglected by the successive governments. Computers and information systems have continued to be introduced in both sectors, hence increasing the computer skills demand. This demand triggered the growth and development of private computer training organisations which conduct computer training to meet that skills demand. The computer application courses are conducted as a business activity and registered as a commercial organisation. Under this framework, standards and quality consideration of the training programs have been compromised. Hence, serious discrepancies have been identified by trainers, employers, and educators with interest in private computer training organisations.

Several important policies and legislation have been formulated and adopted by the government in an uncoordinated manner. The policy initiatives and legislation passed over the last decade with a potential to help promote computer education and IT related matters have been highlighted. It has been pointed out that these initiatives are

inadequate to bring about IT education and training in the country in a planned and organised manner and therefore warrants government action immediately.

It can be seen that some positive actions with regard to IT adoption have been taken by:

- a) the government in the form of formulating various policies and enacting necessary legislation which have potential for promoting Information Technology applications;
- b) by the public sector educational institutions like the universities in developing academic programs aimed at meeting the demand of the workplace at a certain level;
- c) by the private sector in bringing into the workplace information systems; and
- d) by the private training organisations by providing computer education and training opportunities at the very basic level for computer applications jobs in the workplace.

What is obviously missing and what is urgently needed at this point in time is a dynamic body established by the government to liaise, coordinate, consult, influence, and communicate with the different organisations and take a proactive approach to achieving the different goals of the government. The necessary groundwork for policy and legal framework have been laid. The body so established could actively and strategically implement these policies so that computer education and training in PNG are planned, organised, and delivered without compromising quality and standards as is the case at present. This body could also be responsible for both the private and public sector.

The computer skills demand came about because of the lack of computer education and training opportunities in the schools. The demand for computer skills is well recognised by the government of PNG and it has gone as far as prioritising necessary training in computer related fields in order to address the problem of computer skills shortage in PNG and formulate necessary policies. But these policies have not been coordinated well in a manner that is conducive to educating the required number of computer professionals at various levels. Lack of coordination and implementation of the government policies have lead private training providers to develop their own computing curriculum and deliver them under their individual training programs with serious discrepancies.

## Chapter 6

# Private Computer Training in PNG

### 6.0 Introduction

This chapter describes Computer Training activities conducted in the private training organisations in Papua New Guinea (PNG). The different aspects of Private Computer Training Organisations (PCTOs) and their training programs are highlighted. By highlighting these aspects, it provides a description of the various types of computer application courses on offer, the computing curriculum designed and offered, the certification awarded, fees schedule applied, and assessment and evaluation procedures implemented by the individual training providers or organisations.

A broad description of the various computer courses on offer by the PCTOs in PNG is provided in the following pages in order to provide the reader with an overview of the different types of PC application software courses conducted. It must be stated here that not all courses offered are described in this chapter because the individual details have not been made available to the researcher by the respective training providers. Some of the reasons given for withholding important primary documents from the author include; materials out of stock, print limited copies for fee-paying trainees and their sponsors, 'confidential' document, disk-based CAI used in tutorial mode, bulky material and hence costly to reproduce for researchers, and that training providers were sometimes reluctant to give away their 'Intellectual Property'.

In section 6.1, brief background information about private computer training in PNG is provided. Sections 6.2 and 6.3 respectively describe the PC or Computer Applications Courses and the Integrated Training Programs available in the PCTOs. The detail

description of some of the PC application courses conducted in the PCTOs is provided in Appendix D.

The Administrative and Curriculum aspects of the PCTOs are highlighted in section 6.4 while the Positive Characteristics of PCTOs are presented in section 6.5. Before summarising the chapter in section 6.7, some of the problems resulting from commercialising computer training in PNG are described in section 6.6.

### **6.1 Brief Background Information**

Since the 1980's there has been an increase in the number of private training providers since the 1980s that have established commercial training organisations in PNG. There were private training providers who conduct a variety of fee-paying courses in non-computing subjects such as; driving school, basic motor mechanic, security guard training, salesmanship training, and variations of typing, secretarial, or office management schools to name a few.

Computer related training organisations were uncommon prior to the 1980's, because much of the computer training requirements of large firms and organisations were addressed at their individual company sites through on-the-job-training and in-house training (Cook, 1981). The large corporate organisations could afford to recruit qualified trainers, and provide necessary training facilities or resources such as procurement of computer equipment, making available training time, and setting aside resources to conduct company- or organisation-specific training. They conduct computer applications training on a limited scale but sufficient to support their individual company-specific requirements rather than training to meet the requirements of other organisations or employers. The curricula offered by in-house training providers were designed and developed with the company's specific requirements in mind, hence the training conducted was hardware-specific, company-specific, and focused on computer application software within the workplace.

From the mid 1980s, Private Computer Training Organisations (PCTOs) came onto the training scene in PNG and grew in response to the rise in the demands from school leavers, unemployed people, and those requiring re-training and re-skilling due to the modernisation of offices and workplaces which required people with appropriate qualifications and experience in computer related skills.

Table 6.1 is a list of Training Institutions which were given Interim Registration status by the National Training Council (NTC) to conduct computer related training in PNG. However, there were several other training institutions which have not been given 'interim registration' but nonetheless were also known to the author to be involved in conducting computer training activities in PNG.<sup>1</sup> These organisations have, however, registered their training organisations with the Internal Revenue Commission as a 'business venture' as required under the PNG Companies Act 1997 and for taxation purposes.

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<sup>1</sup> There were several Private Training Organisations which placed advertisements in the newspapers as conducting Computer Training in 1996 and 1997.



**Table 6.1: Interim Registered Private Training Institutions**

Reg. No.	Name of Institution	Date Approved	Subjects on Offer
PTI001	Project Solutions Pty Ltd	21.03.95	Computer Studies
PTI002	PNG Institute of Bankers	21.03.95	Management, Accounting
PTI003	Maea Professional Training Institute	21.03.95	Clerical, Bookkeeping
PTI004	Port Moresby Business Training Institute	21.03.95	Computer Studies, Office Management, Bookkeeping
PTI005	Commercial Training Centre	21.03.95	Computer Studies, Accounting, Banking, Commerce, Bookkeeping, Shipping Salesmanship,
PTI006	Computrain Computer Centre	21.03.95	Computer Studies
PTI007	Alu Signs Typing School	21.03.95	Typing, Clerical
PTI008	Peak Management Training & Consultants Pty Ltd	21.03.95	Computer Studies, Marketing, Management, Communications
PTI009	Institute of Business Studies	21.03.95	Computer Studies, Business Studies, Financial Management, Marketing, Banking
PTI010	Key Typing School	21.03.95	Secretarial Studies
PTI011	Price Waterhouse Urwick	21.03.95	Business Comms/Account
PTI012	Coopers & Lybrand	21.03.95	Management, Accounting
PTI013	National Secretarial Services Training	21.03.95	Clerical, Secretarial
PTI014	Integrated Development Services Pty Ltd	21.03.95	Financial Management, Secretarial
PTI015	Sally's Business School	21.03.95	Typing, Business Comms
PTI016	Daltron Electronic Pty Ltd	21.03.95	Computer Studies
PTI017	Powertrain (PNG) Pty Ltd	21.03.95	Management
PTI018	PNG Institute of Business Management	21.03.95	Management, Planning, Supervisory
PTI019	AT & T Global Information Solutions	21.03.95	Computer Studies
PTI020	Computers & Communications Training Centre	21.03.95	Computer Studies
PTI021	Able Computers (PNG) Pty Ltd	21.03.95	Computer Studies, Accounting,
PTI022	Small Business Development Corporation	21.03.95	Typing, Office Procedure, Bookkeeping
PTI023	F.T. Wimble & Company Ltd	21.03.95	Printing

**Source:** National Training Council (1995). Interim Registered Private Training Institutions. (A list obtained from Mr Wesley Tauwaole, Coordinator of Private Training Organisations, National Training Council, Port Moresby-PNG in July, 1996).

**Notes:**

- The registered institutions shown in shaded rows conduct Computer related courses.
- Some private computer training providers (including those registered with Internal Revenue Commission as well as those registered with the National Training Council) did not provide full details of their courses to the author.

That means there was more than one authority under which private training providers were to register. One authority was responsible for granting registration as a 'company'

conducting a genuine 'business activity' while another was responsible for granting registration as a 'training organisation' performing 'training functions' in PNG.

As has been mentioned elsewhere in this thesis, computer related knowledge and skills have not been made available to students in the public sector educational institutions, and therefore a 'computer skills vacuum' existed in the country. This vacuum looks set to remain for the foreseeable future given the government's current position not to formally introduce computer studies into schools in PNG (Rapese, 1994). However, the demand to acquire necessary computer applications training has been high and will remain so for sometime unless a national approach is undertaken to address the issue of computer skills shortage. So far only one provincial government - the Western Highlands Province has decided to introduce computer studies into its high schools which began in 1996 under its Ten Year Education Plan (Editorial Comments in *The National*, Sept 5, 1996).

Private computer training organisations have come about as a result of computer skills demand, following the laws of supply and demand - whenever there is a demand for acquiring computer skills, provision of such training is left to the commercially operated computer training organisations. As Mr Max Kep of the PNG Employers Federation stated:

Much of the training that takes place does so as a spontaneous response to [the] failure of the formal training institutions to provide appropriate and adequately trained persons... (*The PNG Times* , April 27, 1995, p.E10).

## **6.2 PC Application Software Training Courses**

The description of various PC Application Software Training Courses such as word processing, spreadsheet, database, dedicated software, programming languages, integrated software, operating systems, desktop publishing and presentation and

graphics software conducted by the private training organisations in PNG are appended in Appendix D. Further, other computer application courses such as: Introduction to Computers & Basic DOS and Introduction to Computer & COBOL Programming are also described.

### **6.3 Integrated Training Programs**

Unlike the popular PC Application Software courses (See Appendix D), there were few Private Training Organisations in PNG which conducted Integrated Training Programs in which more than one computer related course was offered in a package together with modules in other subjects which naturally lends itself well to subjects such as Bookkeeping.

#### **6.3.1 Certificate in Information Technology**

There were two training programs for the award of 'Certificate in Information Technology' (CIT) being conducted by two training organisations in PNG.

##### **6.3.1.1 Port Moresby Business Training Institute**

The 'Certificate of Information Technology' training program has been validated by the University of Cambridge Local Examination Syndicate (UCLES) in recognition of the competences demonstrated by training providers as well as trainers at various training organisations throughout the world (*Port Moresby Business Training Institute*, 1996a). The 'Cambridge Certificate in Information Technology' (CCIT) program lays down a framework of standards in information technology skills such as the mastery of particular computer software. Trainees or students who satisfactorily achieve these standards by demonstrating their mastery and acquisition of the established competences were certified by the syndicate, namely UCLES.

The *Port Moresby Business Training Institute* has been accredited by the University of Cambridge to conduct courses leading to the 'Cambridge Certificate in Information

Technology’ - an international qualification with strict professional and technical standards recognised and valued around the world (*Port Moresby Business Training Institute*, 1996a). The course modules available for the Certificate of Information Technology are given in Figure 6.1.

**Figure 6.1: Certificate in Information Technology Course Modules**

<ul style="list-style-type: none"><li>• 001 Computer Literacy</li><li>• 101 Word processing</li><li>• 102 Spreadsheets</li><li>• 103 Databases</li><li>• 105 Programming</li><li>• 111 Computer Art and Design</li><li>• 112 Accounts</li><li>• 114 Payroll</li><li>• 115 Desktop Publishing</li><li>• 116 Stock Control</li><li>• 118 Presentation Graphics</li></ul>
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**Source:** Port Moresby Business Training Institute, Courses for 1996b.

The structure of this program involves trainees in learning of a particular software application package for the module being studied. Trainees then **practise** these **basic skills** in a variety of contexts until they are fully competent. The trainees are then required to **demonstrate competency** by completing a written assignment as specified in the Cambridge Certificate in Information Technology (CCIT) module. Once the CCIT standards are satisfied, the trainees receive a **certificate** for each of the completed module. Trainees who have earned a certificate in any of the five modules are awarded a final certificate - The ‘Certificate in Information Technology’. The holder of this Certificate has demonstrated skills in using at least five different kinds of application software in appropriate business or commercial contexts and the certificate carries recognition for this broad base of information technology skills.

**6.3.1.2 Institute of Business Studies**

The second training program for the award of ‘Certificate in Information Technology’ has been conducted by the *Institute of Business Studies*. This training program was

different in many ways compared to that offered by the *Port Moresby Business Training Institute* as described below. The program provides a broad overview of computers (both PC and larger systems) and prepares students as either trainee operators or users of PCs in a business environment. There were a total of 9 subjects taught in three stages.

As can be seen from Table 6.2, in order for one to qualify for the award of ‘Certificate in Information Technology’ from the *Institute of Business Studies*, the trainee must put in a total of 285 hours of taught courses and pay K1885.00 in course fees. The courses are taught in three Stages (I, II and III) and each stage lasting 8 weeks or a total of 24 weeks for the whole program to be adequately covered. Students are assessed by a combination of written assignments and examination which are set and marked internally.

Certificates are awarded on the basis of the following criteria: ‘Statement of Attainment’ awarded to those who complete Stage I, ‘Certificate in Computer Operations’ awarded to those who complete Stage II; and finally ‘Certificate in Information Technology’ awarded to those who complete Stage III (*Institute of Business Studies Handbook*, 1996). Completion of the next stage is dependent on the successful completion of the previous stage. Therefore, anyone completing the third and final stage has successfully completed the first two stages. This award structure has been developed by the *Institute of Business Studies* so that trainees wishing to terminate their training at the end of each stage could do so without being disadvantaged. Trainees have been awarded at least a certificate for the training received.

**Table 6.2: Certificate in Information Technology Course**

	SUBJECTS	HOURS	FEE (K)
STAGE I	Introduction to Information Technology	40	280.00
	Operating Systems -MS DOS	25	175.00
	Business Communication	30	150.00
Total		95	605.00
STAGE II			
	Wordprocessing	20	140.00
	Spreadsheet	25	175.00
	Accounting Principles	25	125.00
STAGE III	Operating Systems - Windows	25	175.00
Total		95	615.00
STAGE III	Database	40	280.00
	Introduction to Programming	55	385.00
Total		95	665.00

Source: Institute of Business Studies Handbook 1996. p. 19.

**6.3.2 Certificate in Bookkeeping-Lotus 1-2-3**

‘Certificate in Bookkeeping-Lotus 1-2-3’ is an integrated course in which Basic Bookkeeping principles and spreadsheet application software are combined to help develop necessary bookkeeping skills required of an accountant or a bookkeeper (See Figure 6.2).

First, the training program discusses basic bookkeeping theory, concepts and principles, mechanics of basic accounting and the financial statement. Second, a general spreadsheet application software, namely *Lotus 1-2-3* was introduced to students or trainees as a technical part of the course. The course discusses the technical aspects of the software and the operational procedures in order for the trainees to be acquainted with it and apply the principles of bookkeeping with the help of computer software. In the second part, students were provided with exercises of real life situations where they were expected to enter raw bookkeeping data into the computer and produce books of original entries, trial balance, trading account, profit and loss statement, and balance sheet. Students manipulate data and visualise the effects when changes in either the rows or the columns are automatically computed by the software under different bookkeeping scenarios.



**Figure 6.2: Course Content - Certificate in Bookkeeping - Lotus 1-2-3**

<b>I. Principles of Bookkeeping</b> <ul style="list-style-type: none"> <li>• The scope of Accounting</li> <li>• Monetary measurement concept</li> <li>• Business entity concept</li> <li>• Business unit, Basic accounting equation</li> <li>• Concept of Gross Profit and Net Profit</li> <li>• Business Transaction and Bookkeeping</li> <li>• Double entry principle.</li> </ul> <b>II. Mechanics of Accounting</b> <ul style="list-style-type: none"> <li>• Source Document</li> <li>• Books of original entry</li> <li>• Ledger</li> <li>• Trial Balance Sheet</li> </ul> <b>III. The Financial Statements</b> <ul style="list-style-type: none"> <li>• Trading Account</li> <li>• Profit and Loss Account</li> <li>• Balance sheet</li> </ul> <b>IV. Bookkeeping Computer Application (Lotus 1-2-3 Rel 2.4)</b> <ul style="list-style-type: none"> <li>a) Lotus 1-2-3 Technical aspects <ul style="list-style-type: none"> <li>• Introduction to Lotus 1-2-3</li> <li>• Creating a Document</li> <li>• Saving a Document</li> <li>• Printing a Document</li> </ul> </li> <li>b) Bookkeeping Application <ul style="list-style-type: none"> <li>• Processing actual examples from source documents to financial statements</li> </ul> </li> </ul>
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**Source:** Port Moresby Business Training Institute, Course Brochure, 1996c.

The ‘Certificate in Bookkeeping-Lotus 1-2-3’ program is a 6-months course which was conducted for 2 hours per day (about 240 hours) from Monday to Friday with a choice of either a morning or the afternoon training sessions. It costs K650.00 per student.

### **6.3.3 Certificate in Salesmanship with Introduction to Computers & Basic DOS**

The art of salesmanship which includes the skill of persuasion, the skill to overcome objections and hesitations and many other relevant skills or techniques expected of a successful salesperson are taught and the trainees put these skills into practice during this course. This course integrates with ‘Introduction to Computers & Basic DOS’ to enable the modern salesperson to maintain accurate record of sales and available stocks.

The course is divided into two parts; Part A and B. The former contains the art of salesmanship which includes elements of business communications, business principles and social etiquette expected of a successful salesperson. The latter contains elements of computer knowledge; such as hardware configuration, basic Disk Operating System commands, installation of software, troubleshooting and 'peopleware' required to operate a computer. The emphasis however, was heavily tilted towards the salesmanship course. The whole training program runs for 16 weeks (or 4 months) with 2 hours per day contact time with students at a cost of K600.00 per person.

#### **6.4 The Administrative and Curriculum Aspects of Private Computer Training**

It is essential to point out that there were several administrative and curriculum aspects of the private computer training organisations which must be highlighted. These aspects are important because they make the private computer training organisations what they are and conduct computer training in the way they did under the current policy and curriculum framework.

##### **6.4.1 Entry or Admission Requirements**

Each training provider has its own entry requirements for those who wish to enrol in their training programs. Some of the training providers publish their requirements in the course brochures for the information of the trainees and general public.

The minimum entry requirement is the school leaving certificate or the Grade 10 Provincial High School Certificate. Some training providers even went to the extent of specifying a grade such as Credits in English and Mathematics - the minimum required to make it into the National High School system in PNG for year 11 and 12 studies. Those who do not make it through this were required to successfully complete a pre-qualifying test constructed and administered in-house at additional cost to the trainee. However, most training providers admit students with grade 10 basic secondary



education into their training program. Some trainees have completed post secondary education including universities from both within the country and abroad who due to the nature of their work have taken up computer applications training courses in order to enhance their performance and improve their productivity.

#### 6.4.2 Competency Levels

Most of the training organisations offer computer courses at Introductory, Intermediate, and Advanced levels (*Computers & Communications Training Centre*, 1996a; *Daltron Electronic Pty Ltd*, 1996a). The competences expected at the three levels are respectively defined as:

- a) Introductory level - *At the completion of this level a student will be able to **use the software with confidence**;*
- b) Intermediate level - *At the completion of this level a student will be **competent** with most aspects of a software; and*
- c) Advanced level - *At the completion of this level a student will **understand** all aspects of the software and be able to **create** complex documents (*Computers and Communications Training Centre*, 1996b) [Institutional Profile] (emphasis added).*

#### 6.4.3 Computer Applications Curriculum

Given the independent nature of Private Training Organisations, the PCTOs operating in PNG have little direction with regard to the computer skills curriculum or the course content from the authorities like the Internal Revenue Commission (IRC) and the National Training Council (NTC). This situation was confirmed by McKie (1996)<sup>2</sup>. Each individual training provider has its own notion of what 'curriculum' means. Each training provider designs its own 'Computing Curriculum' according to their specific requirements by compiling course outlines according to the criteria laid down by IRC (See Figure 6.3) as well as other information required by the NTC Secretariat. Many

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<sup>2</sup> Diary of Interview notes with Mr Ron McKie, Assistant Commissioner, Internal Revenue Commission, Port Moresby-PNG on 4/7/96.

training providers do not even wish to talk about ‘curriculum’ because they view it as falling strictly within the ‘formal educational’ domain; ie. the public schools system (Schwarz, 1994).<sup>3</sup>

**Figure 6.3: IRC Criteria for Obtaining Approval for Training Levy**

a)	Course name
b)	The objective or aim of the course
c)	Who the course is directed to (which category of employee)
d)	Any prerequisite for the course
e)	Course content/topics covered
f)	Duration of course
g)	Venue of course (particularly where this is not in PNG)
h)	Name of tutor/lecturer
i)	Qualifications of tutor/lecturer
j)	Cost of course (where no in-house)

**Source:** Personal Communication with Mrs B. Dobunaba, Internal Revenue Commission, Port Moresby: PNG. Letter dated 30 May 1994. Ref:AS.633/ASSG.

In general, a curriculum is: ‘... *a written document depicting the scope and arrangement of the projected educational program for a school...*’ (Beachamp, 1981, p.7). The characteristics of such a curriculum document on the main should include: a statement of intent as to how that curriculum is to be used in planning instructional strategies; a statement which outlines the specific goals to be achieved; a statement on the content of the subject matter to be transferred to learners; a scheme in which to evaluate if the stated goals/aims and subject matter (content) have been achieved and their overall effectiveness measured.

The training providers have their own particular versions of such a curriculum. However, there are four basic dimensions or elements in a curriculum- objectives/goals/aims, content or subject matter, the delivery methods, and evaluation procedures. A curriculum document is a broad description of what one hopes to achieve, the ground necessary to cover in order to achieve the goals, and the various

<sup>3</sup> Diary of Interview notes with Mr Lothar Schwarz, Manager/Owner of City Electronic Pty Ltd, Port Moresby-PNG on 14/6/94.

activities likely to enable one to achieve the stated goals (Kelly, 1977). The private computer training providers do not necessarily have a uniform curriculum, nor were they expected to do so by the relevant government authorities such IRC and NTC.

#### **6.4.4. Curriculum Implementations**

For the purpose of obtaining approval towards Training Levy exemption, the IRC expects each training provider to submit details of each course for its records. The criteria stipulated by the IRC are shown in Figure 6.3.

A similar but a more comprehensive and detailed description of individual courses, training providers, trainers and a list of their qualifications, are submitted by the individual training organisation to the NTC Screening and Accreditation Committee for its perusal. These forms are held in the shelves of the NTC Secretariat after the initial scrutiny is completed. The same is true with those materials deposited at the IRC. It remains anybody's guess as to whether or not each training provider implements its curriculum for each course as stated in their respective submissions to both IRC and NTC. Neither of these organisations has the resources to ensure the smooth implementation of the curriculum materials submitted by the training providers (Joel & Peril, 1994; McKie, 1996).

The curriculum and the course content offered by PCTOs vary between organisations in many respects. Whether or not the training providers adhere strictly to their published course outline as submitted to the IRC, no one can be sure as no formal mechanisms like the 'inspection' or the public 'examination' systems are instituted as is the case in the public education sector. There have been serious discrepancies between training organisations with respect to the courses conducted as described in the following pages under different headings. No two training providers conduct the same type of courses even though the course names may be similar or look identical. For example, the amount of time (normally in hours, days or weeks) set aside to cover the list of topics

intended to be taught differ. The depth of treatment of the content varies between training providers because of the variation in the course length. Evaluation of the courses also differs significantly and certificates awarded convey different meanings between training organisations and between different courses.

#### **6.4.5 Time-based and Competency-based Curriculum**

From observation and close examination of the course handbooks and course descriptions published by PCTOs, it can be safely concluded that a time-based training program was implemented because of many factors such as: high demand for potential trainees intending to enrol in the computer training program; limited physical and training facilities ie., limited number of PC units for individual student's hands-on training, and the length of time available for individual courses. The sooner the trainees completed their course, the better it was to make training available to the next lot of trainees, hence computer application training is made available to more people for shorter courses. This also meant a good monetary return for the training provider as the need to gain such training was in high demand among potential trainees.

A competency-based system of training is outcomes-oriented where emphasis is placed on what trainees are able to do in their workplace and not dependent on how long they spend on the training programme (Training & Development in Australia, 1995a). However, the competences or outcomes from one training organisation may not necessarily be the same in another training provider because of the huge disparities in many of the computer courses described earlier. These tendencies arose because of the fact that no such competences or outcomes have been specifically laid down by any official body in PNG. Furthermore, computer applications training has been left entirely up to the individual training providers to define and to determine the competences or outcomes and standards for each course or each training program.

The standards encompassed and incorporated into the training courses also vary between training providers. Some of the training providers and their courses are fully accredited by international institutions which ensured that the training accredited must comply with their standards. For example, the *Port Moresby Business Institute* claims that its ‘Certificate in Information Technology’ training programme is accredited by the University of Cambridge Local Examination Syndicate (*Port Moresby Business Training Institute*, 1995), and that the *Commercial Training College* also adopts standards established by the National Computer Centre - London (U.K) in the Certificates and Diplomas awarded (*The National*, Fri Nov 26, 1993, p.21)<sup>4</sup>. In the case of the *Port Moresby Business Training Institute*, one of the standards or competences expected in order to qualify for the award of the ‘Certificate in Information Technology’ was that trainees must be able to demonstrate knowledge and effective application of at least five different computer application software.

There were many training organisations which gave little attention to maintaining ‘standards’ because firstly, there are no implicit or explicit official guidelines on standards and secondly, in the absence of ‘official standards’, training providers devised their individual training ‘standards’ recognised only within their institutions.

#### 6.4.6 Course Length

As pointed out under each course being described in this chapter, different training organisation have different course duration for each of their courses. The course length varies between the training organisations and between the different courses conducted. Table 6.3 shows the different training organisations, range of course lengths, range of course fees charged, the list of certificates awarded and accreditation given for each award.

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<sup>4</sup> General information about the various courses advertised in *The National* newspaper.

#### 6.4.7 Fees Schedule

As shown in Table 6.3, the fees charged by individual training providers differ from one to the other. The fees charged range from as low as K100.00 per module or course from *UNISEARCH Pty Ltd* to K2500.00 at *Daltron Electronic Pty Ltd*. While some training providers gave details of their costing, eg. *Computers & Communications Training Centre* charges a fixed hourly rate of K25.00/hr plus K30.00 per person/course for course materials inclusive of Sales Tax where applicable. Many other training providers have neither published nor released any such detailed costing to the author.

The course fees of many training providers have been designed and aimed at the corporate sponsors. However, many of the trainees were self-sponsored. Two out of three of the trainees spoken to by the researcher indicated that they had obtained 'loans' from friends and relatives to pay for the course fees. Given PNG's per capita income of US\$820.00 in 1991 (*Pacific Economic Bulletin* Vol.8(1), June, 1993), the course fees charged were beyond the economic means of most of the trainees who were non-corporate sponsors.

**Table 6.3: Course Lengths, Course Fees, and Certificates Awarded**

Training Provider	Course Length	Fees Charged	Certificates	Accreditation
AT & T Global	<ul style="list-style-type: none"> <li>1 to 5 days</li> </ul>	<ul style="list-style-type: none"> <li>K700.00 to K2000.00</li> </ul>	<ul style="list-style-type: none"> <li>Certificate of Educational Achievement</li> </ul>	<ul style="list-style-type: none"> <li>All courses designed to meet the terms of the Australian Training Guarantee Act 1990<sup>5</sup>.</li> <li>Training Certified by mother company in Australia</li> </ul>
Commercial Training Centre	<ul style="list-style-type: none"> <li>4 to 16 weeks for the different courses</li> <li>A 1 year Course</li> </ul>	<ul style="list-style-type: none"> <li>K200.00 to K800.00</li> <li>K2000.</li> </ul>	<ul style="list-style-type: none"> <li>Certificate of Completion</li> <li>International Diploma in Computing</li> </ul>	<ul style="list-style-type: none"> <li>International Diploma is accredited from the National Computer Centre (NCC) in UK.</li> </ul>
Computers & Communications Training Centre	<ul style="list-style-type: none"> <li>1 day to 5 days in some courses</li> <li>3 hours to 15 hours in other courses</li> </ul>	<ul style="list-style-type: none"> <li>K250.00 to K470.00</li> </ul>	<ul style="list-style-type: none"> <li>Certificates of Completion for each course completed</li> </ul>	
Computrain Computer Centre	<ul style="list-style-type: none"> <li>2 to 4 days on some course</li> <li>1 week to 2 months for others</li> </ul>	<ul style="list-style-type: none"> <li>K288.40 to K309.00</li> </ul>	<ul style="list-style-type: none"> <li>Certificates of Completion in each Course</li> </ul>	
Daltron Electronic Pty Ltd	<ul style="list-style-type: none"> <li>1 to 7.5 days or</li> <li>6 hours to 15 hours</li> </ul>	<ul style="list-style-type: none"> <li>K195.70 to K481.53 for each application course</li> <li>K226.00 to K2500.00 for specialist courses</li> </ul>	<ul style="list-style-type: none"> <li>Certificate of Attendance for each Courses attended</li> </ul>	

<sup>5</sup> While the Australian Training Guarantee Act 1990 is not an accreditation instrument, this particular training provider indicated in its course booklet that its courses satisfy the requirements of that Act.

Institute of Business Studies	<ul style="list-style-type: none"> <li>• 95 hours</li> <li>• 190 hours</li> <li>• 285 hours</li> <li>• 6 months to 3.5 years</li> </ul>	<ul style="list-style-type: none"> <li>• K605.00</li> <li>• K1220</li> <li>• K1885.00</li> </ul>	<ul style="list-style-type: none"> <li>• Statement of Attainment</li> <li>• Certificate in Computer Operation</li> <li>• Certificate in Information Technology</li> </ul>	<ul style="list-style-type: none"> <li>• All teaching staff possess graduate and postgraduate qualifications from PNG &amp; overseas universities</li> <li>• Courses endorsed by partner-institutions overseas for 'credits' towards future studies.</li> </ul>
Niugini Computers & Business Training Centre	<ul style="list-style-type: none"> <li>• 2 to 3 months per course</li> </ul>	<ul style="list-style-type: none"> <li>• K200.00 to K500.00</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of Completion</li> </ul>	
Peak Management Training & Consultants Pty Ltd	<ul style="list-style-type: none"> <li>• 3 to 5 days</li> </ul>	<ul style="list-style-type: none"> <li>• K350.00 to K380.00</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of Completion</li> </ul>	
Port Moresby Business Training Institute	<ul style="list-style-type: none"> <li>• 3 weeks to 40 weeks</li> <li>• 6 months</li> </ul>	<ul style="list-style-type: none"> <li>• K180.00 to K1500.00</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of Completion in each short application Courses</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate in Information Technology (IT) from Cambridge University</li> </ul>
Professional Staff Training Centre	<ul style="list-style-type: none"> <li>• 1 day (8 hours) and</li> <li>• 2 to 14 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• K150.00 to K700.00</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of Attainment awarded</li> </ul>	
Project Solutions Pty Ltd	<ul style="list-style-type: none"> <li>• 24 hours (3 x 8 hours or 4 x 6 hours)</li> <li>• 4 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• K160.00 to K480.00</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of Achievement in Advanced Software Training</li> </ul>	
UNISEARCH Pty Ltd	<ul style="list-style-type: none"> <li>• About 2 to 3 weeks per module</li> <li>• 2 to 4 hours per week for each module</li> </ul>	<ul style="list-style-type: none"> <li>• K100.00 to K300.00 per module (6 modules) or</li> <li>• K850.00 for all modules</li> </ul>	<ul style="list-style-type: none"> <li>• Certificates of Completion</li> </ul>	<ul style="list-style-type: none"> <li>• Carries UPNG Logo on each Certificate</li> <li>• Taught by University Lecturers</li> </ul>
Management Development Centre	<ul style="list-style-type: none"> <li>• Course conducted over 5 days</li> </ul>	<ul style="list-style-type: none"> <li>• K500.00</li> </ul>	<ul style="list-style-type: none"> <li>• Certificate of Completion</li> </ul>	<ul style="list-style-type: none"> <li>• Carries PNG Unitech Logo on the Certificate</li> <li>• Taught by University lecturers</li> </ul>

**Sources:** Data from above table was extracted from the following sources:

- Respective Course Descriptions or Handbooks from the different Training Providers,
- Newspaper advertisements placed in PNG by the different Training Providers between 1994 and 1996.



c) Institutional Profiles of Private Computer Training Organisations submitted to the National Training Council seeking Interim Registration.

#### **6.4.8 Certification and Accreditation**

Different training providers award trainees with different versions of a Certificate at the completion of a course. Examples of the different versions of Certification include:

- Certificate of Attainment;
- Statement of Attainment;
- Certificate of Attendance;
- Certificate of Completion;
- Certificate of Achievement in Advanced Software Training;
- Certificate of Educational Achievement;
- Certificate in Computer Operation;
- Certificate in Information Technology; and
- International Diploma in Computing.

Whatever each Certificate meant in terms of value for money, academic credential and worth in the eyes of the general public is unclear and cannot be easily determined, as one educator aptly stated:

As a generalisation, I would say that there are many different operators who don't have any recognition beyond their own certificates or the award they offer. There is no system of cross-accreditation in place (Truscott, 1996).<sup>6</sup>

Only the institution offering the course and to a lesser extent the trainees concerned recognise the value of the certificate awarded and what they meant to them. No one else outside of the training organisation concerned has the slightest notion of the value of the certificate (Sinebare, 1992b). Non-recognition of certificates by employers and the public was due to the fact that each training provider has total control over its

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<sup>6</sup> Personal Communication with Mr Bill Truscott, Pacific Adventist College, Port Moresby-PNG. Written statement dated 10/7/96 and subsequent telephone conversations.

curriculum, teaching methodologies, assessment and evaluation procedures, trainer's academic or training qualifications, and/or educational resources used. There are no official guidelines and policies as to the nature of the curriculum offered

At least three training providers (*Commercial Training College, Port Moresby Business Training Institute, AT&T Global Information Solutions*), claimed that their training programmes were recognised outside of PNG through their affiliation with overseas institutions and training providers (See Table 6.3). The individual efforts to affiliate with external organisations indicate that training organisations are genuine about standards, accreditation of courses, and certification of training conducted. A nationally recognised system for recognising qualifications endorsed or awarded by non-university and/or private/commercial training institutions (both in and outside PNG) is essential to give credence to certificates awarded. Equally important is the need to establish a system (eg, a Qualification Framework), which not only recognises the certificates awarded but also establishes the criteria to determine comparability and meaning or equivalence of what each qualification represents among the many training providers. These concerns have been highlighted by the Commission for Higher Education (1995a) in preparing and submitting the policy, *Accreditation and Higher Education in Papua New Guinea*. However, this policy is only applicable to those institutions covered by the Higher Education Act 1983. All training providers were to be covered under this framework as stipulated in the above-mentioned policy:

... all institutions and programs established under their own Acts; **all institutions located in PNG** and claiming to teach a program leading to an **academic award**; and all offshore institutions which advertise through the media academic programs and awards to be delivered onshore through correspondence, tutorials or other means... (Commission for Higher Education, 1995a, p.1-3). (emphasis added)

However, private training providers operating as commercial training organisation such as the ones discussed here do not appear to fall under the above policy. These training

organisations do not offer an ‘academic award’ as stated above. They are covered under the *National Training Policy (White Paper) 1989*, which among other things aims to provide guidelines for planning, conducting, facilitating and evaluating training activities in both PNG and abroad to raise workers’ motivation, performance and productivity in their respective workplaces (Independent State of PNG, 1989).

#### **6.4.9 Assessment and Evaluation**

Many training organisations visited by the researcher in PNG during fieldwork/research (in both 1994 and 1996) have not released any documents regarding Assessment and Evaluation procedures used. Almost all the course descriptions, course outlines, course handbooks and newspaper advertisements emphasised the significance of the course lengths, course fees, and the certificates awarded. No mention of testing and assessment were given.

Very few training providers conduct their training programs in order to award grades at the end of the training sessions. Only one training provider stated in an earlier correspondence with the author that there were no formal tests or exams given at the end of the courses (M’laseula, 1996).<sup>7</sup> Trainees have only been issued with a certificate after the ‘end’ of their courses and not necessarily at the ‘satisfactory completion’ of the course, implying that tests or exams were unnecessary.

Some training providers may have testing and evaluation procedures but two training providers reported applying extensive testing and evaluation procedures after the completion of the courses to assess individual students. The first training provider devised its own grading system which is almost similar to the norm-referenced or normative assessment system employed in the PNG secondary schools in order to grade each trainee completing a training program (See Table 6.4). It also has other criteria

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<sup>7</sup> Personal Communication with Ms Rita M’laseula, Training & Support Coordinator, Daltron Electronic Pty Ltd, Port Moresby-PNG: Letter dated 14/3/96.

such as: attendance, class participation, general and professional attitudes towards studies and staff, which a course tutor takes into account when determining a final grade. These general comments are provided in written form for sponsors and a trainees’ record at the completion of the course.

**Table 6.4: Professional Staff Training Centre Grading System**

Grade	Level	Percent of Scores
A	High Distinction	85 - 100
B	Distinction	75 - 84
C	Credit	65 - 74
D	Upper Pass	55 - 64
E	Pass	50 - 54
F	Fail	1 - 49
S	Satisfactory	
U	Unsatisfactory	
P	Conceded Pass	
X	Supplementary Examination	
DNS	Did Not Sit	
W	Results Withheld	

Source: Professional Staff Training Centre (PSTC). Course Information 1996, Port Moresby.

The second training provider did not make its assessment procedure available to the researcher but instead provided evidence of heavy ‘academic style’ examination papers for each course module for trainees. This training provider is probably the only training organisation which enters into an ‘institutional partnership’ or a ‘franchise’ agreement with other institutions such as universities, Colleges of Advanced Education, and TAFE in both PNG and overseas countries like Australia and United Kingdom. Hence, the trainees who have missed out on university placing in PNG not only have the opportunity of obtaining a UPNG-recognised Diploma through this training provider but also earn an overseas Diploma or Certificate (*Institute of Business Studies*, 1996). In fact this particular training organisation, the *Institute of Business Studies* operates in a most transparent manner compared to the other organisations studied. It lists all the details of the courses, modules of different programmes offered, profiles from past trainees, corporate information such as its objectives and course overview, and teaching

staff list with their qualifications in the Institute's Course Handbook which was not only made available to the Internal Revenue Commission and National Training Council Secretariat as a requirement of its operation but also to trainees and the public for their information.

It must be stated here that the grading and assessment systems used by individual training organisations were by no means consistent nor comparable with each other. Hence, each institution use different grading system which makes it difficult to find comparability and equivalence between the different training institutions. Further, the content matter delivered differ between training providers as pointed out in Chapter 6 and Appendix D. The non-standard nature of assessment and grading system in the private training organisations raises the question of credit worthiness, standards and comparability of private training courses in PNG. However, the Bachelor degree level courses offered in PNG universities have some parity with Australian Bachelor level courses (National Office of Overseas Skills Recognition (NOOSR), 1991).

The third training provider did not formally test or examine its trainees. This provider uses tests to diagnose the trainees prior knowledge (through **pretest**) and determine whether there is any marked improvement after the course (through **post test**) as well as evaluate the course (Trainees' perception of the course or **Feedback**). The form of Assessment given on (the first section of) the Course Report includes details such as: the name of the course, name of the participant, sponsor/employer name, when and how long this course was conducted.

The second section of the evaluation sheet contains the Assessment criteria which rates the participant's aptitude, attitude and practices (or performance) against one of the three categories; *Needs Improvement*, *Satisfactory*, and *Commendable*. (See Table 6.5). In the third section, the course instructor writes his/her personal comments about the

trainee. The Course Report form is presented together with the ‘Certificate of Educational Achievement’ to the trainee at the completion of the course.

**Table 6.5: AT & T Global Information Solutions Assessment Criteria**

	Needs Improvement	Satisfactory	Commendable
<b>APTITUDE</b> (suitability, potential)			
<b>ATTITUDE</b> (industry, willingness to learn)			
<b>PRACTICE</b> (performance in class exercises, contribution to group work)			

Source: Adapted from AT & T Global Information Solutions, (1996). Course Report. Sydney - Australia: AT&T Global.

**6.5 Positive Characteristics of Private Computer Training Organisations**

Conducting fieldwork and collecting primary documents or data for this research included: interviewing key personnel at the National Training Council Secretariat, Internal Revenue Commission, Private Computer Training Organisations, consulting professional colleagues, and administering the Research Questionnaire. Many positive characteristics emerged from the individuals interviewed, the materials collected, insights gained whilst talking with trainers and trainees, and observations made which are useful for the purpose of this research. Following are descriptions of some of the positive characteristics found to be in play within the private computer training organisations.

### **6.5.1 Course Outlines or Course Descriptions**

The course outlines or course descriptions provided by *Daltron Electronic Pty Ltd* for every course conducted was probably the most comprehensive and detailed of those seen by the researcher which provided the reader with all the basic information about the courses. The main features of the course outlines or descriptions included: course aim, course length, course fee, pre-requisites, equipment needed, software package to be used, and the topics covered in the course. Similarly the course description provided by *Computers & Communications Training Centre* also provided comparable detail about each course.

### **6.5.2 Course Booklet**

Most of the training providers produced individual course booklets, outlining step by step the course content, which were used either during the course or for hands-on activities by trainees at their computer terminals. Each booklet had been designed and intended to supplement the formal teaching that took place during the course. However, one training provider lamented that his course Booklets were taken and reproduced for a similar course in another training organisation (Thirumoorthy, 1996).<sup>8</sup> This is probably one of the reasons why many training providers were reluctant to make their course booklets or course materials available during the fieldwork.

The private training providers' initiative to develop computer courses indicates that there is no shortage of motivation and local expertise to develop courses to suit different categories of trainees and job markets in the country. This initiative could be nurtured, formalised and encouraged to create a conducive environment for individual training organisations to be creative.

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<sup>8</sup> Personal Communication with Mr M.N.T. Thirumoorthy, Lecturer in Commerce, UPNG, Port Moresby-PNG in July 1996.

### **6.5.3 Handbook**

The *Institute of Business Studies* is one of the few training providers that operate in the most 'transparent' fashion because all its training activities and related information for both trainees and the general public were clearly laid out in their Course Handbook. The Handbook, which among other features contained information such as: introduction to the Institute, the Institute's objectives, course overview, description of each training program, number of hours required for each course, entry requirements for each programme, fee structure, alternative arrangements to pay the course fees, registration and enrolment dates, the syllabus outlining the content of the course to be covered, profiles of past students, details of the certificate or awards given, information on the franchise arrangements with training organisations and educational institutions both in PNG and abroad, the list of electives offered, reference list of textbooks useful to the core course and electives, staff list and their educational qualifications, and general information to help students organise their time and develop strategies in order to maximise their learning.

### **6.5.4 Integrated or Structured Courses**

While many training providers conduct short courses based on the use of computer software applications, there were a couple of training organisations which conduct Integrated Training Programs in order to maximise job opportunities for its trainees. The *Port Moresby Business Training Institute* is one notable training provider which integrates commercial application of general purpose spreadsheet software with accounting and bookkeeping theory. This integration makes learning to use spreadsheet meaningful to the trainees who can apply computers as a tool to solve bookkeeping problems in the business world. Another training provider which deserves a mention is the *Institute of Business Studies* which also integrates computer courses with accounting or bookkeeping subjects.



The Integrated Training Programs developed by institutions like *Port Moresby Business Training Institute* and *Institute of Business Studies* are strong pedagogically because they provide the trainees with computer application skills to further enhance their repertoire of practical skills.

#### **6.5.5 Formal Examinations**

Not many training providers build into their training program formal examinations. However, there are some training providers which make examination of trainees knowledge in the subject taught an essential component. Testing and examination are an essential component of assessment and evaluation which determined the level of grades given to a trainee. The *Institute of Business Studies* is one such training organisation which conducts semester long courses and an examination at the end of the course. The certificate awarded by the Institute carries the ‘accreditation’ from both overseas and PNG based training institutions which gives ‘recognition’ to its awards.<sup>9</sup>

#### **6.5.6 Grading or Assessment System**

It is not obvious whether many of the training providers use any form of assessment or grading system in their training program. However, the *Professional Staff Training Centre* is one of the few that devised its own grading system somewhat similar to the norm-referenced system used in the PNG schools system (See Table 6.4). The *AT&T Global Information Solutions* also uses an objective assessment system to assess its trainees (See Table 6.5).

An assessment or grading system as developed and used by *Professional Staff Training Centre* and *AT&T Global Information Solutions* adds value and judgement on the

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<sup>9</sup> For Example:

(a) Institute of Business Studies had ‘certification’ from UPNG and Open Learning Institute of TAFE in Queensland,  
(b) Port Moresby Business Training Institute has been ‘accredited’ by the University of Cambridge Local Examinations Syndicate in UK in recognition of its competence and training programs,  
(c) Commercial Training College has been ‘accredited’ by the National Computer Centre in UK, and  
(d) AT&T Global Information Solutions applied AT&T Global and ISO 9000 standards.

certificates awarded to trainees. Grades entered on a certificate say more about the trainee than those without it. Students or trainees need this to have a sense of achievement while the employer needs this to clarify any doubts he/she may have about the capabilities and potential of the trainee.<sup>10</sup>

#### **6.5.7 External Accreditation**

The *Port Moresby Business Training Institute* and *Commercial Training Centre* both have 'external' bodies namely, University of Cambridge Local Examinations Syndicate and National Computer Centre (NCC), United Kingdom respectively that determine the competency level the trainees should perform in a particular course of study in order to qualify for the 'external qualifications'. The qualifications awarded (Certificates and Diplomas) by *the Institute of Business Studies* have the 'external accreditation' from those institutions that it had special prior arrangements with. The *AT&T Global Information Solutions* courses carry the 'quality standard' rating awarded to all AT&T training abroad as well as the Australian Training Guarantee Act 1990.

Certification and accreditation granted in joint affiliation with other training providers either from PNG or abroad gives credibility to the courses conducted. This gives the trainees added advantage in gaining a qualification which is not only recognised within the country but also elsewhere. However, external accreditation needs careful scrutiny so as not to lead students and sponsors to believe that 'overseas qualifications' are always better than those awarded from within the country.

#### **6.5.8 Workshop or Tutorial Session**

One training provider used the workshop or tutorial concept in which trainees come together and share their common problems and successes encountered either during the training session or at work which they brought in to share with others in order to find a

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<sup>10</sup> Personal communication with a parent whose son attended a computer course conducted by a Private Training Organisation. Incidentally, this parent is an academic at one of the Universities in PNG. Date: 16 July, 1996 in Port Moresby.

solution or if it was encountered by others, suggest how it can be solved. The small group tutorial approach used by this training provider was taken seriously by trainees to socialise amongst their peers as well as assist each other with problems and difficulties arising from the lesson or encountered at work (Morlin, 1996).<sup>11</sup> The Trainees have the backup support from the trainer (for the duration of the course) together with appropriate resource materials such as relevant text books, course manual, the computer terminal and presence of other trainees to exchange views and find solutions to common problems.

#### **6.5.9 Participants Feedback**

Feedback from trainees is essential information for trainers and training providers to take into account. It helps to revise or change the course from time to time to reflect the changing needs of the workplace as well as the level and motivation of trainees. Most training providers require some form of feedback or evaluation from the trainees. The feedback could be verbal or written, but many trainers prefer feedback in written form because they can either describe in greater detail or simply circle in or tick the appropriate alternative comments to express their views. The Feedback form used by *AT&T Global Information Solutions* contains information about the course content, course workshops and exercises, instructor evaluation, general topics, overall impression about the course, what they would like to see incorporated in the course, where they perceive the need for improvement, and self evaluation as to their achievement after the training.

In one training organisation, for example, the *Business Training Institute*, former trainees write back to the institute commending it for not only the quality but also of the relevance of the training received which enable them to apply the skills in the workplace

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<sup>11</sup> Personal Communication with Ms Helen J Morlin, Systems Support Analyst, AT&T Global Information Solutions, Pty Ltd, Konedobu-PNG. Diary of interview notes on 11/7/96.

(Hoiba, 1996)<sup>12</sup>. The relevance in training conducted has helped trainees to successfully gain employment which reward them by way of promotion, salary increases and job security (Nenekai, 1995)<sup>13</sup>. Such feedback helps training providers to strengthen their training programs with the knowledge that it has contributed meaningfully towards the workplace and the job market.

#### **6.5.10 Work Experience**

The *Port Moresby Business Training Institute* is one of the notable training organisations which placed trainees in the private sector to practice their skills and knowledge. This enables the trainees to try out their theoretical classroom knowledge in real-life work situations as well as gaining insights into the work culture and practices of the workplace. Many companies have written to the Institute praising the contribution the students made during their practical or work experience component of the training program. The work experience exercise made it possible for trainees to return to work with the companies after they have completed their studies. The Institute often gets input from the companies about what they wished to see done in the training program of the Institute. The Institute incorporates the views and comments into their courses every year to ensure that it conducts courses that are relevant to the workplace.

Computer courses with job experience component incorporated into the training program as seen at *Port Moresby Business Training Institute* is commendable. Job experience or practical work attachments with potential employers provide trainees with insights into the workplace which gives trainees an advantage over those in other training organisations. Work experience helps broaden the trainees knowledge and skills because they have an opportunity to put the theory learnt in class into practice, learn valuable lessons about the course from the perspective of the workplace, the work

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<sup>12</sup> Copy of letter addressed to the staff of Business Training Institute, Port Moresby, July 16, 1996. [Obtained by Courtesy of Mr Carmelo P. Imperial (Manager/Owner).

<sup>13</sup> Copy of letter addressed to the Principal, Business Training Institute, Port Moresby, July 20, 1995. [By Courtesy of Mr Carmelo P. Imperial (Manager/Owner).

related skills, work culture and develop personal insights and motivation which helps them to see what the theoretical course offers and adapt them to suit the needs of the workplace. Trainees interviewed by the author have all spoken very highly of the job experience component.

## **6.6 Problems with Commercialised Computer Applications Training**

The commercially operated computer training organisations have been aggressive and are gaining popularity in the area of computer applications training because of the large number of people demanding such training. The very existence of private training providers is encouraged and facilitated by the type of policies and regulations governing the training activities. For example, the PNG Companies Act (as amended from time to time) enabled private training organisations to register as a company but conduct training activities with little scrutiny on their curriculum, training programs, and certification of their awards.

First, the public sector educational institutions have been traditionally responsible for providing the basic education in the 3 Rs - Reading, wRiting, and aRithmetic. Now there is an added demand to provide a fourth R, 'compeRacy' or Computer literacy. McMillan (1996), proposed the term 'comperacy' to denote the skills required to use a computer confidently and competently at office, home or workplace. However, the PNG government with a myopic view sees IT literacy (or *comperacy*) as inappropriate because the bulk of PNG students may not come across using a computer (Rapese, 1994). Hence, for the public sector institutions (especially at school level), the government has not taken any responsibility in formally developing a computer studies curriculum. However, this stance from the Ministry of Education does not mean that an individual school cannot go ahead and conduct computer studies curriculum in an 'extra-curricula' mode if they have the necessary staff expertise and financial resources to achieve their objectives.

Second, the government has stated clearly that any such computer related education training should remain the sole function of higher education and private sector organisations in PNG (Department of Education, 1993), hence permitting the private training providers to assume the computer related education and training responsibility. However, this responsibility was given without any formal guidelines to training providers - they were given a blank cheque to do anything they wished. For example, a diverse group of training providers operate in PNG with curriculum, certification, assessment procedures, teaching methodologies, fees structure, accreditation, course length, and the course content covered varying from one training organisation to another. There is neither a standard in the form of official policy guidelines nor a curriculum statement to determine a 'line of best fit' which takes into consideration the variations between individual courses and between individual training organisations.

Third, private training providers come under the aegis of two separate government entities; The National Training Council (NTC) and the Internal Revenue Commission (IRC). Under the National Training Council, the private training providers are required to deposit copies of course handbooks or teaching materials such as; course outline, assessment and evaluation procedures, course aim, staff list and their qualifications. Such materials are also submitted to the IRC for Training Levy exemption. These materials are then used to compile an Institutional Profile for the NTC to 'assess' the private training providers' suitability to conduct training in PNG before granting interim registration. The sources within the IRC remarked that it (IRC) is not in the business of education and training and has no future interest in it and therefore all training and education functions would be transferred to the NTC when all the loopholes have been sorted out (McKie, 1996).<sup>14</sup>

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<sup>14</sup> Diary of Interview notes with Mr Ron McKie, Assistant Commissioner, Internal Revenue Commission, Port Moresby-PNG on 4/7/96.

The Internal Revenue Commission however, registers the training providers as having satisfactorily met the requirements for taxation reasons. A similar format for materials was also submitted to the IRC to obtain approval for Training Levy exemption purpose. At the time of the research fieldwork, both the NTC and IRC were not clear as to what each was responsible for because, '*... there were many loopholes in legal, policy and organisational matters that have not been clearly defined... until such loopholes are addressed, no organisation was given full registration...*' (Tauwaole, 1996).<sup>15</sup>

Some of the loopholes or the discrepancies alluded to in the private training scene in PNG include:

- a) no clear demarcation between who is responsible for various types of training institutions;
- b) absence of a monitoring system to monitor and assess the training programs of the private training organisations;
- c) many training organisations registered fail to meet the requirements and standards established by the NTC,
- d) lack of consultation and communication between private training organisations;
- e) different authorities registering different categories of training organisations;
- f) private training organisations have registered with one authority (IRC) rather than registering with the other (NTC); and
- g) misunderstanding by many training organisations because of the confusion created by the legal and policy requirements of the existing government departments and statutory organisations (Bayagau, 1997).

In May 1997, a **Memorandum of Agreement** (MOA) was signed by representatives of key government departments with interest in the training industry such as; National Training Council, Commission for Higher Education, Investment Promotion Authority,

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<sup>15</sup> Diary of Interview notes with Mr Wesley Tauwaole, Coordinator of Private Sector Training, National Training Council Secretariat, Port Moresby-PNG on 2/7/96.

Department of Commerce and Industry, and Department of Industrial Relations (Bayagau, 1997). While the signing of the MOA is a welcome sign, many of the discrepancies and the loopholes in the existing arrangement should be attended to as a matter of urgency.

The private training organisations have also been conducting training courses in other non-computing subject areas as well. These courses were conducted as part of a commercial venture and were totally independent from any direct control in terms of curriculum except for the initial purpose of obtaining 'registration' from NTC and when seeking 'approval' for the purpose of Training Levy exemption from the IRC.

While there were many training providers who were genuinely involved in computer related training activities in PNG equipped with modern training facilities, and adequate resources such as qualified training staff, the author has been aware of certain incredible incidences with the private training organisations (through professional contacts and personal insights) that require urgent government intervention to put these inconsistent and discrepant practices right so that its citizens are fairly treated in computer related training. It might just help if some of these incidences noted by the author during the research period are briefly highlighted point-by-point:

6.6.1 A training provider in Port Moresby brought in so-called training consultants from overseas, mainly from Australia, New Zealand, Philippines and Singapore to conduct computer training for a few weeks (Lewis, 1994).<sup>16</sup> The course participants are brought into Port Moresby at their employer's expense to stay in hotels and guest houses for the duration of the short course (up to 1 week). At the end of the course they return to their respective places of work. According to a training provider, trainers from the Philippines are the cheapest training providers he could afford (Haworth, 1994).<sup>17</sup> They

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<sup>16</sup> Diary of Interview notes with Mr Ian Lewis, Datec Pty Ltd, Port Moresby-PNG on 22/6/94.

<sup>17</sup> Diary of Interview notes with Mr Greg Haworth, Workhouse Computer Training, Mt. Hagen-PNG on 1/6/94.



have been recruiting on a short-term basis as a matter of convenience. In this mode, courses developed outside were brought in and ‘delivered’ in the time the trainers have without considering cultural relevance of the training courses in PNG setting and knowledge of individual trainees’ workplace requirements. Disregard for Papua New Guinean needs and insensitivity to the cultural relevance of the imported training packages used by ‘training consultants’ have been criticised (Secomb, 1994).

6.6.2 One Training Provider purchased a set of ‘condemned’ typewriters from a nearby higher education institution for use in its ‘secretarial training course’.<sup>18</sup> Another similar training provider had a handful of PCs for a Word processing course without much practical hands-on exercise for the trainees. An employer once highlighted to the author (See Section 5.3.9), the inability of former trainees from such computer training organisations who could neither identify what the ‘mouse’ was nor perform simple text processing, raising further questions about the quality and/or relevance of the training offered, the integrity of the training providers and the credentials awarded to trainees (Thompson, 1994).<sup>19</sup>

6.6.3 Another Training Provider had little computing background. The training provider had participated earlier in a computing course offered at UPNG. The training provider returned to his private ‘school’ and offered a ‘watered-down version’ of the course he had attended at UPNG, but charging twice as much as UPNG. Since he could not cope with the course demands, he engaged his UPNG tutor to teach those demanding parts outside the tutor’s normal working hours.<sup>20</sup>

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<sup>18</sup> The author is personally aware of one particular Training Organisation which purchased the ‘condemned’ electronic typewriters from a nearby tertiary institution.

<sup>19</sup> Personal Communication with Ms Bonnie Thompson, Foundation for the Peoples of the South Pacific, Port Moresby: Papua New Guinea on 12/8/94.

<sup>20</sup> Personal Communication with the UPNG Tutor was conducted in Australia in February 1996. The tutor asked not to be named.

6.6.4 Many trainers do not possess formal qualifications in trainer of trainers. They have been self-taught in the application of certain computer software. They received no formal education in computing discipline but picked up pieces along the way to claim knowledge and authority among their trainees (Kalimet, 1996).<sup>21</sup>

Due to the huge demand for computer related skills, Papua New Guineans have been flocking the private computer training organisations to enrol. The training programs offered vary in different ways. Although the course information was supposed to be deposited with the NTC for their records, training organisations were at liberty to either strictly follow their published curriculum or alter it as they please in the course of delivering the courses in the training room. There are no standards established to ensure compliance by training providers or to ensure that the entrepreneurial nature of conducting a training activity does not compromise the quality, effectiveness, efficiency, and ‘educational value’ of the courses which the government has the responsibility to provide to its citizens.

6.6.5 A trainee attended one of the training organisations for a whole year, paid up all the necessary fees and completed all the course requirements but has not received his ‘certificate’ in 1996.<sup>22</sup> That was almost a year after the course was completed.

6.6.6 There were many trainers with academic credentials or qualifications obtained from PNG and overseas educational institutions. There were also others, mostly PNG nationals who have either been used as fronts in securing the training organisation status or placed in charge of training sections. There was a small number of training personnel who should not have been in the business of conducting education and training because of their ‘educational qualifications’ or lack of it (See Table 7.2).

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<sup>21</sup> Personal Communication with Mr Cornelius Kalimet, a Health Educator/Administrator from PNG whose relatives attended Private Computer Training Organisation. Mr Kalimet was on study leave at University of Wollongong, Australia: August 1996.

<sup>22</sup> Personal Communication with the concerned trainee’s father in Goroka: PNG in August 1996.

This dissonance of private computer training practices identified so far indicate the lack of agreement or standards under which computer application training is conducted in PNG. In the absence of a formal policy and curriculum guidelines, the private computer training in PNG will continue to be detrimental to the trainees despite the good intentions of the training providers as highlighted here.

## **6.7 Summary**

This chapter described the various aspects of the Computer Skills Curriculum conducted by the Private Computer Training Organisations in PNG. Brief background information has been provided about private training organisations which ‘commercialise’ discrepant computer training activities and carry out ‘questionable’ training practices within the country. The computer skills curriculum which includes PC Application Software Training courses and Integrated Training programmes has been given prominence in this chapter.

In Computer Application Training, it was obvious that the curriculum used differed between training providers and between courses. Every training provider has its own view of what computer skills curriculum is supposed to include particularly in computer application software courses. Many courses in application software also differ between training providers. Each course aims/goals and list of possible topics to be covered at different levels such as Introductory, Intermediate, and Advanced have been highlighted. Other related areas such as: Course length, Fees charged, Certification and Accreditation, and Assessment and Evaluation of the training courses and training programs have been described. Training Providers have also differed in this area. For example, there has been a wide variety of ‘certificates’ with differing assessment and evaluation systems used to assess trainees in each course or training program.

There is a general need to regulate the activities of private training providers in PNG although there were many aspects of the training providers either collectively or individually which are positive and which could be adapted for collective benefit of the private computer training industry. Similarly, there were many negative aspects of these training providers which ought to be corrected or improved in order to obtain maximum common benefit.

What transpired from either the materials contained in this chapter or while researching for this chapter could be best summarised under the following points:

6.7.1 In order to enrol in any one of the training providers, trainees need to possess a minimum of grade 10 education. However, one must be able to afford the necessary course fees. For the average PNG national, the amount of money required are well beyond the much used indicator of per capita income.

6.7.2 A diverse group of private computer training organisations is operating in PNG with a wide range of differences and similarities in the computer skills curriculum offered, the certificates and accreditation awarded, assessment procedures used, delivery method employed, fees charged per course, duration or course length followed, and the course content covered.

6.7.3 The existence of this diversity in both the training programs and training providers has been accommodated by the fact that the National Training Council (NTC) and Internal Revenue Commission (IRC) have been working with short-term views of their respective briefs without much consideration for the trainees. This gives training providers much freedom to take advantage of the situation and to gain considerably from this situation but no consideration has been given to the ad hoc nature of training obtained by Papua New Guineans. The ad hoc nature of training has been allowed to continue because there have been many loopholes in existing legal and policy

instruments such as the *National Training Policy (White Paper)* and the PNG Companies Act (See Chapter 7).

6.7.4 Training providers submit course details in compliance with the criteria designed by the IRC if the training providers wish to obtain the license to conduct training in PNG. However, there is no guarantee that each training provider complies with its stated course descriptions and thereby achieves its stated objectives because there were no formal systems such as ‘national examination’ or ‘inspection’ system established to ensure that they accomplish their intended objectives.

6.7.5 A time-based training program is more common than a competency-based one in order to make more training places available for as many people as possible in short time slots. In this way, whether the stated objectives have been achieved or not is of lesser importance to the training providers. Therefore, more trainees get on a training program if they can afford the fees. Since some training providers do not formally assess or examine their students, there is no way of knowing how much of the content is achieved by the trainees or the level of competence reached.

6.7.6 There were many types of Certificates awarded to trainees for attending different computer training courses in the country. Each measuring a different set of standards and carry different meanings depending on the different training courses conducted and different competences demonstrated. Employers have every right to be sceptical of the ‘certificates’ and what the certificate holder is able to perform and deliver as a result of the training obtained.

6.7.7 Some private training organisations in PNG have taken up a ‘franchise’ of training programs from other institutions both from PNG and overseas (eg Australia and United Kingdom). In addition to granting certificates from within their institutions, overseas qualifications were also granted to those who satisfied the additional criteria

for that particular training program. Once again each award means different things to different people and therefore a need arises for a system that would establish comparability or equivalence in these ‘qualifications’.

6.7.8 The strict definition of ‘Curriculum’ such as objectives, content, delivery methods and evaluation procedures have not been adhered to by training providers because of one or more of a combination of the following reasons: they only teach and no assessment is carried out; certificate is awarded on the basis of ‘attendance’ and not necessarily on completing the course requirement either by tests or examination; and the training program is a time-based one and not competency-based.

6.7.9 Some training providers were not given ‘interim registration’ status by the National Training Council (NTC), either because they have not submitted any documentation to NTC, or if they had, the ‘interim registration’ process has not been completed at the time of writing the thesis. At least three of them were conducting computer related training without such registration.

There were at least half a dozen training organisations which are known by the author to be conducting training activities by claiming that their courses have been ‘approved’ by the Internal Revenue Commission for Training Levy exemptions but were not registered by the NTC to conduct approved training program (one of the loopholes in the registration process).<sup>23</sup> Which body has the final authority to determine whether or not a training provider can or cannot conduct training? Is one authorisation from one body sufficient or should there be two bodies responsible for granting ‘approval’ or giving ‘interim registration’? There were a number of training organisations actively

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<sup>23</sup> The author is aware of this because; a) Individual Training Organisations concerned placed newspaper advertisements in 1996 and 1997 in *The Independent* and *The National* announcing their training activities; and b) The list of those training organisations which advertised in the newspapers are not on the NTC ‘Interim Registered Private Training Institutions’ list (See Table 6.1).

conducting training activities with approval from just one body. These loopholes and others were being sorted out at the time of writing this thesis (Bayagau, 1997).

6.7.10 Short PC Application Software Courses were popular among many trainees and equally popular were the Integrated Training Programs which as the name implies integrated computer related courses to provide trainees with the best of two worlds. For example, spreadsheet software *Lotus 1-2-3* course was integrated with Bookkeeping theory and principles into a neat package where computing concept was applied in the bookkeeping environment, hence making it a practically useful course.

## Chapter 7

# Results and Discussion

### 7.0 Introduction

The results of the research are presented in this chapter. These results are presented in the order in which the initial research questions were posed in Chapter 1. The subsequent discussions pertaining to each individual research questions are also presented in a similar manner at the end of each specific discussion points.

An account of the various data collection methods and sources such as interview of key individuals, analysis of primary documents (eg, newspaper ads and articles, policy documents and course brochures), use of research Questionnaires, the literature in general, professional contacts, the research procedures applied such as administration of the research questionnaires and the list of subjects which participated in the completion of the questionnaires have been described in Chapter 4. However, in this chapter only specific data sources consulted in order to answer individual research questions (**Research Questions 1 to 4**) will be highlighted at the beginning of the respective sections.

### 7.1 Results and Discussion

#### 7.1.1 Research Question One

What is the nature of computer skills training methods or schemes used by private training providers in PNG?
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#### 7.1.2 Data Sources Consulted

The objective of section 7.1 is to answer **Research Question One**. To do that, the following data sources were consulted and utilised:



- a) Individual course brochures or course materials obtained from the private computer training organisations;
- b) 'Institutional Profiles' obtained from the National Training Council;
- c) Newspaper advertisements and articles on private computer training in PNG; and
- d) The researcher's personal observations during the fieldwork.

As pointed out in Chapter 6, the computing curriculum and training or teaching methods employed by training providers differ from one training provider to the other and from one course/program to another. Sections 7.1.3 and 7.1.4 are devoted to identifying and describing the similarities and differences found in the private training organisations engaged in computer education and training activities in PNG before answering **Research Question One** in section 7.1.5.

### **7.1.3 The Similarities**

It is probably easiest to identify the similarities in such a diverse group of training providers because of the small number of private computer training organisations. The few inherent similarities are (inter alia):

#### **7.1.3.1 Number of Computer related Training Organisations**

There are many private training providers operating in PNG. However, a very small number (n=10) are on official record as conducting computer related courses (See Table 6.1). This figure does not include those conducting private computer training without formal registration. There are at least 5 others that the author is aware of which are also involved in conducting computer training but are not on the official record of the National Training Council. Nevertheless, they all have something in common (ie., conducting computer related courses in their training organisation).

### **7.1.3.2 Private Commercial Training**

The Computer training organisations are all conducting private commercial training for fee-paying students or trainees as a commercial activity. These organisations are complementing the public education system with work-related computer application skills which are essential in the workforce but are not officially made available in the public sector education system.

### **7.1.3.3 Compliance with National Law and Policy**

The computer skills training providers comply with the laws of the country by registering themselves as a commercial entity with the Internal Revenue Commission (IRC) under the *Papua New Guinea Companies Act* (as amended from time to time), the National Training Council (NTC) under the *National Training Council Act 1991*,<sup>1</sup> and the *National Training Policy (White Paper)*<sup>2</sup> as it applies to them.

### **7.1.3.4 Registered under relevant Authorities**

In order to operate as a 'registered' training provider, each provider must submit certain documents to the Internal Revenue Commission (IRC) and the National Training Council (NTC). The NTC and IRC respectively grant 'permission' to conduct training programs or courses as a company are approved (for Training Levy exemptions) and 'registration' to be recognised as a private training organisation/institution are approved. Each authority requires a similar set of information as specified under their respective circular or instruction (For example, See Figure 6.3).

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<sup>1</sup> Independent State of Papua New Guinea (1991). *National Training Council Act 1991*, Port Moresby - PNG.

<sup>2</sup> Government of Papua New Guinea (1989). *National Training Policy (White Paper)*, Port Moresby - PNG.

#### **7.1.4 The Differences**

There are more differences than similarities amongst the private computer training providers operating in PNG. Most of the differences have been highlighted in Chapter 6. There are also additional differences which are listed below (inter alia):

##### **7.1.4.1 Course Content or Curriculum**

Even though the courses on offer bear some resemblance in the course-names; the curriculum or the course content, the necessary prerequisites required, the course duration, the certificates awarded, the fees charged, and the physical training environment under which training is conducted are different from each other. These differences are summarised in Table 6.3. Other tables and figures in Chapter 6 are also testimony to the presence of these differences among the training providers.

##### **7.1.4.2 Training Providers Mission Statement**

The mission statement of the training providers is unique to the individual training provider and are stated either in writing (eg, course brochures, handbooks, newspaper advertisements) or unwritten as revealed by the *Port Moresby Business Training Institute*. These statements are summarised in Table 7.1.

**Table 7.1      Summary of the Mission Statement**

Training Provider	Mission Statement
1) Computrain Computer Centre	<i>Provide training on different computer software Applications and increase the chances of school leavers to find better job.</i>
2) Port Moresby Business Training Institute	<i>Not written (down) but it is aimed at educating PNG people in commercial environment and workplaces.</i>
3) Able Computing Pty Ltd	<i>'...provide the necessary training skills for trainers to both understand the theoretical and practical aspects of the software they are trained on'.</i>
4) Computers & Communications Training Centre	<i>To offer the highest level of computer training to bring the standard of computer literacy in PNG to a competent level.</i>
5) Institute of Business Studies	<i>To provide skilled Training in all business studies for both employed and unemployed Papua New Guineans to obtain recognised qualifications.</i>
6) Peak Management Training and Consultants Pty Ltd	<i>To transform organisations through staff training, management, development, and consultancy services.</i>
7) Project Solutions Pty Ltd	<i>To provide quality training for business, Middle Management and Executive persons throughout PNG in order that they may upgrade their skills in information management and communication in their profession.</i>
8) Commercial Training Centre	<i>To contribute towards the professional and trade skills development of PNG trainees who miss out in having the opportunity to advance through the educational and training institutions in PNG.</i>

Source: Data extracted from individual Institutional Profiles held by the National Training Council Secretariat, Port Moresby, 1996. Courtesy of Mr. W. Tauwaole. Please note that there are at least three registered training providers (Daltron Electronic Pty Ltd, AT&T Global Information Solutions and Commercial Training College) whose Institutional Profiles have not been located.

**7.1.4.3 Trainers Educational Qualifications**

Individual trainer’s educational qualifications are wide ranging. While some trainers are professionally qualified in the subject with academic qualifications obtained from both PNG and overseas educational institutions, others possess qualifications in disciplines other than in computing fields. These persons are professional people in their own right in those fields but are practising in the field of computer related education and training. According to the Institutional Profiles obtained from the National Training Council, the educational qualifications and nationalities from which the trainers come from are wide ranging. The list of educational qualifications possessed by the trainers from different nationalities who are conducting computer related training in PNG are given in Table 7.2.

**Table 7.2 Summary of Trainers' Educational Qualifications & Their Nationality**

<b>Institution (Initials of)</b>	<b>Educational or Academic Qualifications of Trainers</b>	<b>Training Qualification or Experiences of Trainers</b>	<b>Nationality</b>
CCCC	Chemical Engineering	Many years training experience	Filipino
	B.Arts (English major)	Many years training experience	Filipino
	Grade 8	In-house training	PNG
PMBTI	B.S., B.Admin, Certificate in Systems design & programming	Trainer certificate (Australia)	Filipino
	B.S Information Systems degree.	Trainer certificate (Australia)	Filipino
AC	M.A. Com, M.A. Technology	University Lecturer	Indian
	B.Engineering, Ass. Dip. Eng., Dip.Digit.Com	Teacher	Australian
	B.Applied Science	Teacher	Australian
C&CTC	B.Sc, Dip Comp, B.A.	Specialist Teacher Certificate (Aust)	Australian
	Dip.Sec Teaching	Teaching Certificate	PNG
	B.Comp (Currently studying via Distance Education in Aust.	Train the trainer certificate, Learning Assistance Certificate	Australian
IBS	B.Ed, MPA	University Lecturer	Sri Lankan
	Dip. Commerce, B. Commerce	Many years teaching experience	PNG
	MAAT	Teaching and Working in PNG	Sri Lankan
	Dip M.	Teaching experience	Sri Lankan
	B.Com	Teaching experience	Sri Lankan
	ACMA	Teaching experience	Sri Lankan
	B.Com	Teaching experience	Sri Lankan
	B.A., Dip. M.	Teaching experience	PNG
PS	B.Technology	Teaching experience	PNG
	Dip. Technical design	Registered Builder, Qld Master Building Award, Training a Trainer Course (Australia)	Australian
CTC	B.Technology (CompSci)	Systems Analyst, 15 years work experience	PNG
	Certificate in Computer Studies	7 years teaching experience	PNG
PMT&C	MBA	Nil	Nigeria
	Grade 10, Computer 'graduate'	Nil	PNG
	B.Sc., Member of PNG AA	Nil	PNG

**Source:** Data extracted from individual Institutional Profiles held by National Training Council Secretariat, Port Moresby, 1996. Courtesy of Mr. W. Tauwaole. Please note that there are at least three registered training providers (Daltron Electronic Pty Ltd, AT&T Global Information Solutions and Commercial Training College) whose Institutional Profiles have not been located.

Trainers listed in Table 7.2 are deemed acceptable to the National Training Council, hence the registration of their training organisation to conduct computer educations and training activities. Trainers other than PNG nationals tend to possess graduate and postgraduate qualifications. PNG nationals on average possess graduate qualifications while a large majority are non-graduates. Many of the qualifications held by trainers shown in Table 7.2 are in areas other than computing disciplines.

### 7.1.4.4 General Course Objectives

Each training provider’s general course objectives differ between training organisations. Some of the general course objectives may be summarised as shown in Figure 7.1.

**Figure 7.1      Summary of General Course Objectives**

- |  |
|--|
| <ul style="list-style-type: none"> <li>a) To impart to trainees, knowledge and skills so that they may use computers effectively when organising their daily tasks of information and communication;</li> <li>b) To train the general workforce of PNG through the courses offered and to provide training opportunities for students who can’t go through the formal system;</li> <li>c) To prepare Papua New Guineans for recognised qualifications in all business studies;</li> <li>d) To allow the trainees to become efficient users of the software taught;</li> <li>e) To develop a trainee with various skills and principles in order for them to apply in their work; and</li> <li>f) To increase productivity through training.</li> </ul> |
|--|

**Source:** Data extracted from individuals Institutional Profiles held by National Training Council Secretariat, Port Moresby, 1996. Courtesy of Mr. W. Tauwaole. Please note that there are at least three registered training providers (Daltron Electronic Pty Ltd, AT&T Global Information Solutions and Commercial Training College) whose Institutional Profiles have not been located.

### 7.1.4.5 Delivery Methods

The delivery methods as seen appropriate by training providers in order to achieve their general course objectives and their overall mission statements also vary from one training provider to the other. Some of the methods identified by individual training providers are summarised in Figure 7.2.

**Figure 7.2      Summary of Delivery Methods Identified by Training Providers**

- |   |
|---|
| <ul style="list-style-type: none"><li>• Group and individual instructions</li><li>• In-house Training</li><li>• Demonstration (Practical lesson, computer laboratory system)</li><li>• On-the-job-Training</li><li>• Lecture (Face-to-Face, discussion, simulation)</li><li>• Hands-on activities (Tutorial sessions)</li><li>• Handouts (eg, sheets/notes)</li><li>• Assignments &amp; mock examinations</li><li>• Classroom instruction, set exercise (Computer based tutorial)</li></ul> |
|---|

**Source:** Data extracted from individual Institutional Profiles held by National Training Council Secretariat, Port Moresby, 1996. Courtesy of Mr. W. Tauwaole. Please note that there are at least two registered training providers (Daltron Electronic Pty Ltd, AT&T Global Information Solutions and Commercial Training College) whose Institutional Profiles have not been located.

**7.1.4.6 Teaching Resources/Facilities**

Every training provider has a variety of teaching resources or facilities under which computer education and training is conducted in pursuing their individual training goals and objectives. Some training organisations have a modern computer laboratory in an air conditioned room which is networked to a server together with data display unit such as overhead projector, whiteboard for use during the session, desks, chairs and other amenities for the comfort of the trainees. They even have telephone, facsimile machine to service those trainees who are on released time from their employers to keep in touch with their job/office. They also provide coffee and tea making facilities to promote relaxation and socialisation throughout the session for the course participants. While this could be an ideal facility to have in all training organisations in a place like Lae or Port Moresby, in practice many training providers have limited computer terminals for hands-on exercises. Some training organisations have limited classroom or teaching spaces which are often overcrowded and pose grave concerns for personnel safety as well as risks in the event of an emergency such as fire.

One training room, barely large enough to seat 7 students, looked overcrowded and would certainly be a health hazard in the event of a house fire as no fire extinguisher was seen anywhere in that room nor down the hallway. Further more, immediately below the training room (on the ground floor), is a Take-Away Food Bar. (This is serious if the success rate of the Port Moresby Fire Services is anything to go by). These are the sorts of facilities used by some training providers to conduct training purposes. Some training providers have to lease classroom spaces because they do not have the necessary resources to provide for themselves. Most of the training rooms were not initially designed for this purpose. They likewise lease furniture and computer hardware for use in their training. Hence the cost of leasing classrooms, the furniture, and computer hardware is passed on to the trainees.

#### **7.1.5 Nature of Computing Skills Training Methods and Schemes**

From analysis of primary documents obtained from the National Training Council Secretariat in Port Moresby, the main similarities and differences inherent within the private computer training providers have been identified. The similarities are in: conducting computer related training, complying with the national laws and policies, and registering under existing laws with relevant authorities, while the differences have been highlighted as: computer course content or curriculum, mission statements, general course objectives, trainer's educational qualifications, and teaching facilities at their disposal.

The nature of computing skills training methods and schemes used by training providers in PNG have also been highlighted in both Chapter 6 and to a lesser extent in this chapter. By nature of the various private computer training organisations operating in PNG, each training provider is unique in more ways than it is similar.



The training providers have also differed from one another in the following areas (no special ordering):

- admission or entry requirements;
- the individual courses offered;
- the depth of treatment of the course content;
- the teaching or delivery methods used;
- the competency or the standard (eg, goals) expected to achieve;
- the testing and evaluation procedure applied;
- teaching and learning facilities or resources made available for use;
- length or course duration of the training programs;
- quality of trainers involved in the training process;
- the certificates and any 'external' accreditation attached to them;
- the experience gained from conducting computer training activities;
- the fees charged for each course or training program;
- the course handbooks or course descriptions/outlines produced;
- the fact that they are merely complementing the public sector education system by pursuing individual goals to develop human resource skills required in the PNG workforce.

These differences are valuable and deserve encouragement from relevant authorities such as the National Training Council (NTC). However, what is one's strength is probably another's weakness and therefore some of the differences ought to be reviewed by relevant authorities in order to provide the trainees with the best available system to advance further in their career or training, whichever is applicable and immediate.

Despite these differences, private computer training providers have complied with the official guidelines by submitting their respective course details in a condensed *Institutional Profiles* to the NTC. This compliance is evident in the number of training providers granted ‘interim registration’ status by the NTC and ‘approved training for Training Levy’ purpose by the Internal Revenue Commission (IRC). Those who failed to comply with the guidelines are not given ‘interim registration’ but they have obtained ‘approval’ from the IRC. Many training providers with approval from the IRC are not necessarily granted similar approval by the NTC. This discrepancy together with other legal and policy loopholes have been said to be the main cause of misunderstanding between NTC and IRC<sup>3</sup>. Measures were being taken in 1997 to ensure the discrepancies identified were corrected so that no one is disadvantaged (*The Independent*, May 9, 1997, p.23).

**7.2 Results and Discussion**

**7.2.1 Research Question Two**

What are the views of the key players (Training Providers) involved in computing skills training and development in PNG which are directly affected by the PNG National Training Policy?

**7.2.2 Data Sources Consulted and Used**

The objective of section 7.2 is to answer **Research Question Two**. In order to answer this question, an attitudinal questionnaire (or opinionnaire) was used. The Opinionnaire, *Private Computing Skills Training Providers’ Attitudes Towards Papua New Guinea National Training Policy* was administered in 1994. The description of the administration of the questionnaire, background information of the training providers participated in the study, and data collection methods and procedures used are described in the report of the same title and appended as Appendix A. (The questionnaire is annexed to the end of

<sup>3</sup> Interview with Mr. Ron McKie, Assistant Commissioner, Revenue Assessment, Internal Revenue Commission, Port Moresby on 4/7/96. and Mr Wesley Tauwaole, Private Sector Training Co-ordinator, National Training Council, Port Moresby on 12/7/96.)

Appendix A). Additional details on the research methods and procedures have been described in Chapter 4.

The Opinionnaire contains six parts. Each part is related to a particular aspect of the National Training Policy. A brief summary of the opinionnaire is given in Table 7.3. The results and discussion on each part ranging from Part A to F are respectively presented in sections 7.2.4 to 7.2.9. The general comments under Part F of the opinionnaire is addressed separately in section 7.2.10.

**Table 7.3**      *Summary of the Private Computing Skills Training Providers’ Attitudes Towards Papua New Guinea National Training Policy Opinionnaire*

Part of Opinionnaire	Items Related to	No. of Items
Part A	The National Training Policy	12
Part B	The National Training Council and its Secretariat	11
Part C	Private Computer Training Organisations	15
Part D	Certification of Trainers and Training Providers	11
Part E	Purpose or Objectives of Training	19
Part F	Open-ended Completion questions <ul style="list-style-type: none"> <li>• Suggestions to Policy makers regarding computer education and training;</li> <li>• The Perceived weaknesses of the National Training Policy;</li> <li>• The Perceived strengths of the National Training Policy;</li> <li>• General comments</li> </ul>	4

### 7.2.3              Description of how the Results were Computed

The attitude questionnaire is classified and discussed in six parts (sections 7.2.4 to 7.2.9). Each part is designed to identify the training providers’ belief about the different aspects of the National Training Policy (NTP). The survey items or statements related to the different aspects of the National Training Policy are boxed in under the respective parts and precedes the individual discussions. The order in which the discussion is presented was based on descending order of popularity in opinions expressed for the three alternatives; Agreement, Disagreement, and Neutral opinion.

The statements about each aspect of the NTP (ie. parts A to D of the Opinionnaire) was rated using a Likert scale. A 5 to 1 scale of response was used where the subjects checked whether they Strongly Agree (SA), Agree (A), Unsure (UN), Disagree (DA) or Strongly Disagree (SDA). The reverse scaling was used for negative statements (Shaw & Wright, 1967).

According to Thurstone (1967, p.77), attitude is '*... the sum or total of a man's [sic] inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats and convictions about any specified topics.*' It was in this context that attitudes of computing skills training providers in PNG towards the NTP was investigated.

For agreement on an item, the total attitudes scores (eg, sum of SA and A) was calculated to be interpreted as Positive Responses or positive attitudes towards a statement. While for disagreement, the total attitudes scores (the sum of SDA and DA) was calculated to be interpreted as Negative Responses or negative attitudes towards a statement. Scores for neither agreement nor disagreement were interpreted as Neutral Responses (no computation required) (See Tables 7.4 to 7.7). Each statement is scored according to the Likert scale and the total percentage responses towards positive, negative, and neutral attitudes were calculated. A descriptive approach is used to measure the subjects' attitudes as shown in their acceptance or rejection of the opinion put forward (statements) in the research questionnaire (Thurstone, 1967). A fourth category, Error was also calculated to show; a) the blanks left in the questionnaire where the respondents failed to indicate their choice, and b) where the respondents mistakenly made more than one response (two or more choices) instead of just one of the five alternatives.

**7.2.4            National Training Policy (NTP)**

Items or statements related to the National Training Policy (NTP) are shown in Figure 7.3 and the respective results of the opinion expressed are tabulated in Table 7.4

**Figure 7.3       Items or Statements related to the NTP**

- |  |
|--|
| 1.    The goals and objectives of the National Training Policy could be achieved by my organisations.  |
| 2.    The National Training Policy is simple to understand.  |
| 3.    The National Training Policy requires my training organisations to do extra administrative work.   |
| 4.    The expectations of the National Training Policy on private sector training organisations are realistic.   |
| 5.    The PNG Government encourages the private sector involvement in the development and training of computer skilled personnel in the country.           |
| 6.    My level of awareness of the National Training Policy as it relates to my training organisations is satisfactory.                                    |
| 7.    The Government encourages private sector training organisations to develop and train computer personnel in overseas training institutions.           |
| 8.    The Government's effort through the National Training Policy to give recognition to the private sector training organisation came at the right time. |
| 9.    The training levy concept for private training organisations is a way of encouraging training of personnel in PNG.                                   |
| 10.   Credit transfer between training institutions benefits the trainees more than the institutions.  |
| 11.   My training organisation had difficulty getting some of its courses registered by the National Training Council.                                     |
| 12.   I have read the National Training Policy document.   |

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part A].

**Table 7.4      Percentage Breakdown of Responses to Statements about the National Training Policy (n=13)**

ITEM No	% Positive Response (n)		% Neutral Response (n)		% Negative Response (n)		% Errors or Blanks (n)	
1	(9)	69.23	(3)	23.08	-		(1)	7.69
2	(8)	61.54	(3)	23.08	(1)	7.69	(1)	7.69
3	(4)	30.77	(5)	38.46	(3)	23.08	(1)	7.69
4	(7)	53.85	(5)	38.46	(1)	7.69		-
5	(6)	46.15	(5)	38.46	(1)	7.69	(1)	7.69
6	(7)	53.85	(2)	15.38	(3)	23.08	(1)	7.69
7	(3)	23.08	(6)	46.15	(3)	23.08	(1)	7.69
8	(8)	61.54	(4)	30.77	(1)	7.69		-
9	(9)	69.23	(4)	30.77	-			-
10	(6)	46.15	(6)	46.15	(1)	7.69		-
11	(1)	7.69	(4)	30.77	(6)	46.15	(2)	15.38
12	(8)	61.54		-	(2)	15.38	(3)	23.08

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

As can be seen from Table 7.4, there is (in general) a highly positive attitude shown in the responses to various statements about the National Training Policy (See Figure 7.3). Most of the responses were well above 40% with the exception of items 3, 7 and 11.

**7.2.4.1      Neutral**

In items 3 and 7 the respondents were neutral in their view towards the extra administrative work required when complying with the NTP and whether the government encouraged the private Training Providers involvement in computer skills training. In item 11, they disagreed that they had any difficulty in obtaining registration for some of their courses with NTC. It is interesting though that there were still several training organisations which have not registered with the National Training Council by 1996.

**7.2.4.2      Agreement**

Furthermore, there was a high positive attitude (over 60%) shown towards items 1, 2, 8, 9, and 12. This respectively indicates that computer training providers believed that: the goals or objectives of NTP are achievable within their organisation, NTP is simple to understand

(for those who have read it), NTP is a welcome introduction to recognising private sector Training Providers, and the Training Levy concept encourages training of personnel in PNG to develop local staff expertise in computer application skills.

The next level of agreement (nearly 54% for items 4 and 6) respectively indicate that the NTP's expectations of the training providers were realistic and that their level of awareness of NTP as it relate to their training organisation was satisfactory. In item 5 the respondents view that the government encourages (through the NTP) the training and development of computer skilled personnel in the country.

There was a tie or parallel response for item 10 between positive and neutral responses towards transfer of credits between training institutions. This was probably because the mechanisms necessary for transferring credits between training institutions were being discussed only in the public sector (Commission for Higher Education, 1995a).

**7.2.5 National Training Council and National Training Council Secretariat**

Statements or items related to the National Training Council (NTC) and the NTC Secretariat are given in Figure 7.4 and the results of the response to these statements are shown in Table 7.5.

**Figure 7.4      Items related to NTC and NTCS**

- 
1. A representative of the National Training Council Secretariat should visit my training organisation in a supervisory or inspection capacity.
  2. The National Training Council should monitor the private sector training organisations to avoid exploitation of Papua New Guineans.
  3. The establishment of the National Training Council is a threat to private entrepreneurship of training organisations.
  4. The penalty of K1000.00 imposed for failing to supply information or for supplying false information to the National Training Council is lenient.
  5. The training standards requirement of the National Training Council are easy to achieve in my training organisation.
  6. The quality requirement of the National Training Council are easy to achieve in my training organisation.
  7. The National Training Council Secretariat is prompt in helping my organisation with its inquiries.
  8. The National Training Council described the specific training needs of computing personnel in the National Training Policy.
  9. The National Training Council has provided my training organisation with clear guidelines on computer education and training in the private sector.
  10. Computer related training courses should be periodically reviewed by the National Training Council on the basis of fees charged and the content of the course.
  11. Computer related training providers or institutions should be registered under the National Training Council.

Source: *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part B].

**Table 7.5      Percentage Breakdown of Responses to Statements about the NTC and NTCS (n=13)**

ITEM No	Positive Response (%)		Neutral Response (%)		Negative Response (%)		Error or Blanks (%)	
1	(8)	61.54	(3)	23.08	(1)	7.69	(1)	7.69
2	-	-	(1)	7.69	(12)	92.31	-	-
3	(3)	23.08	(3)	23.08	(7)	53.85	-	-
4	(2)	15.38	(7)	53.85	(4)	30.77	-	-
5	(7)	53.85	(6)	46.15	-	-	-	-
6	(8)	61.54	(5)	38.46	-	-	-	-
7	(3)	23.08	(7)	53.85	(3)	23.08	-	-
8	-	-	(8)	61.54	(4)	30.77	(1)	7.69
9	(2)	15.38	(6)	46.15	(5)	38.46	-	-
10	(9)	69.23	(3)	23.08	(1)	7.69	-	-
11	(13)	100.00	-	-	-	-	-	-

Note: Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.



#### **7.2.5.1 Disagreement**

A 92% negative response for item 2 shows training providers believed that NTC/NTCS should not monitor the computer skills training providers and, nearly 54% (item 3) disagree that NTP is a threat to the entrepreneurial nature of training activities. One respondent stated thus: *'It is not a threat, it helps foster good training standards'*, while the second one stated: *'... this is long overdue - should have been formulated long time ago to serve the purpose which all can benefit'*, and yet another said: *'There must be some control on who is doing what and the quality expected.'*

#### **7.2.5.2 Agreement**

A high agreement (100%) was shown in item 11 that computer training providers should be registered under NTC. There is a further agreement with statements 1, 6, and 10 (62% - 70% agreement). For example, the respondents agreed that there should be periodic visits by NTC representatives in a supervisory or inspection capacity. But during the interview, one of the trainers commented: *'...there is no point visiting the training providers when the person visiting shows no interest in the technical discussion.'* This particular trainer claimed that the representative from the NTC said computers and computing were too technical for him and left immediately without contributing anything meaningful to their discussions in Port Moresby.

Items 6 and 10 (nearly 60% and 70%) respectively showed favourable attitude towards the statement that: the quality requirements of the NTC were easy to achieve by the Training Providers and that all Training Providers be reviewed by the NTC on the basis of fees charged and course content planned and delivered. Nearly 54% (item 5) responded favourably that training standards requirement of the NTC can be achieved by the private computer skills Training Providers.

**7.2.5.3        Neutral**

Neutral opinion was demonstrated on items 4, 7, 8, and 9. For example, nearly 54% (items 4 and 7) of the respondents were undecided on: the penalty of K1 000 imposed by the NTC for falsifying or failing to supply the information requested by it, and were uncertain of any prompt responses from NTC to inquiries raised by Training Providers. Nearly 62% (item 8) of the respondents were uncertain if the NTC had described the specific training needs of computing personnel in the NTP document. About 46% were also uncertain as to whether the NTC gave Training Providers clear guidelines on matters concerning computer skills training while nearly 39% disagreed, meaning that guidelines were given.

**7.2.6    Computing Skills Training Providers**

The statements or items related to the Computer Skills Training Providers are shown in Figure 7.5 and the respective results are presented in Table 7.6.

**Figure 7.5      Items related to Computer Skills Training Provider**

- |   |
|---|
| <ol style="list-style-type: none"><li>1. My training organisation had trainers who are qualified to teach in their specific fields.</li><li>2. The training courses offered in my organisation meets the criteria for accreditation from the National Training Council.</li><li>3. Courses offered in my organisation are unique from those offered by other training organisations.</li><li>4. My training organisation is run on a for-profit-basis.</li><li>5. My training organisations conducts joint training courses with other training organisations.</li><li>6. The course fees charged for a computer course offered by my organisation varies.</li><li>7. My training organisation will recognise accredited courses conducted by other training organisations.</li><li>8. My training organisation sees that there is a need for Papua New Guineans to be trained or educated for computer related jobs in the private sector.</li><li>9. My training organisation had difficulty getting registered by the National Training Council.</li><li>10. Obtaining individual Course Accreditation from the National Training Council is easy.</li><li>11. Obtaining Institutional Accreditation from the National Training Council is easy.</li><li>12. The training courses offered by my organisation are independently evaluated.</li><li>13. The training offered by my training organisation will enhance job prospects for the unemployed.</li><li>14. The training courses conducted by my training organisation are designed and delivered with Papua New Guineans needs and conditions in mind.</li><li>15. The providers of computer related training must ensure that trainees are covered against financial exploitation.</li></ol> |
|---|

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part C].

**Table 7.6      Percentage Breakdown of Responses to Statements about Computing Skills Training Providers in PNG (n=13)**

ITEM No	Positive Response (%)		Neutral Response (%)		Negative Response (%)		Error or Blanks (%)	
1	(13)	100.00	-	-	-	-	-	-
2	(8)	61.54	(5)	38.46	-	-	-	-
3	(9)	69.23	(3)	23.08	(1)	7.69	-	-
4	(8)	61.54	(4)	30.77	(1)	7.69	-	-
5	(1)	7.69	-	-	(10)	76.92	(2)	15.38
6	(7)	53.85	-	-	(3)	23.08	(3)	23.08
7	(7)	53.85	(5)	38.46	(1)	7.69	-	-
8	(13)	100.00	-	-	-	-	-	-
9	(2)	15.38	(4)	30.77	(5)	38.46	(2)	15.38
10	(3)	23.08	(6)	46.15	(2)	15.38	(2)	15.38
11	(3)	23.08	(7)	53.85	(2)	15.38	(1)	7.69
12	(7)	53.85	(1)	7.69	(4)	30.77	(1)	7.69
13	(10)	76.92	(2)	15.38	(1)	7.69	-	-
14	(10)	76.92	(3)	23.08	-	-	-	-
15	(11)	84.62	(2)	15.38	-	-	-	-

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

#### **7.2.6.1      Agreement**

There was a high positive response (ranging from 50% to 100%) to most items. The respondents overwhelmingly agreed (100%) on items 1 and 8 where they respectively indicated that their training organisation had trainers who were qualified to teach in their specific field and they saw that there was a need for PNG nationals to be trained or educated for computer related jobs in the private sector.

The next level of agreement (nearly 85% for item 15) indicate that Training Providers must make sure that the trainees were covered against financial exploitation. The respondents (almost 77% for items 12 and 14) further agreed that the training offered by their organisations would enhance job prospects for the unemployed and that their training program is designed and delivered with PNG needs and conditions in mind.

The Training Providers' agreement (60% - 70%) with items 2 and 3 indicate that the trainers believed the courses conducted by the private sector satisfy the criteria for accreditation from the NTC and that the courses were unique from other Training Providers.

For items 4, 6, 7 and 12 (between 50% and 60% agreement), the respondents respectively expressed a belief that: their training organisation were run on a for-profit-basis, the fees charged varied between Training Providers, they would recognise accredited courses conducted by other Training Providers, and the training courses they conduct were independently evaluated (within their organisation).

#### **7.2.6.2 Disagreement**

It was evident that each training organisation was operating independently from others because 77% responded negatively to item 5 which was intended to determine if there was any training course conducted jointly with other Training Providers. Two Training Providers in PNG indicated they have joint courses in association with overseas based training organisations, such as the National Computer Center in United Kingdom. There was also a slight negative attitude towards item 9 (nearly 39%) which meant that the Training Providers had no difficulty obtaining registration for their training organisation while nearly 31% were uncertain.

#### **7.2.6.3 Neutral**

The results from items 9, 10 and 11 indicate that the respondents found it neither easy nor difficult to obtain individual course accreditation from NTC. The same was true for obtaining institutional accreditation from NTC.

7.2.7 Certification of Computing Skills Trainers and Training Providers

Items or statements related to certification and registration of trainers and training providers are shown in Figure 7.6 and their respective results tabulated in Table 7.7.

Figure 7.6 Items related to Certification of Trainers

- |   |
|---|
| <ol style="list-style-type: none"><li>1. All computer related training staff must be registered with the National Training Council.</li><li>2. Trainers and their qualifications be screened before they are allowed to teach computer related courses.</li><li>3. All training staff in the private training organisations must be qualified trainers in a specialist area in order to deliver training in PNG.</li><li>4. Computer related trainers may also engage in any other income generating activities.</li><li>5. Trainers must be fluent in English as a language of Instruction.</li><li>6. My training organisation is financially well-placed so that the trainees are not disadvantaged in the even of sudden loss of training opportunities eg, in the event of liquidation, closures or mergers.</li><li>7. Training facilities such as classrooms or teaching laboratories must be assessed and certified by the National Training Council.</li><li>8. Providers of computer related training must observe and practices highest standard of ethics in their relationships with trainees.</li><li>9. Trainers must possess trainer's qualifications as well as relevant technical and education qualifications from recognised institutions before they are registered.</li><li>10. Certification of training staff in the private sector training organisation by the National Training Council is inadequate.</li><li>11. The system of accrediting training organisations encourages my organisations to offer quality programs.</li></ol> |
|---|

Source: Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy questionnaire. [Part D].

**Table 7.7      Percentage Breakdown of Responses to Statements about Certification of Training Providers (n=13)**

ITEM No	Positive Response (%)		Neutral Response (%)		Negative Response (%)	Error or Blanks (%)
1	(11)	84.62	(2)	15.38	-	-
2	(10)	76.92	(2)	15.38	(1) 7.69	-
3	(11)	84.62	(1)	7.69	(1) 7.69	-
4	(5)	38.46	(3)	23.08	(5) 38.46	-
5	(11)	84.62	(2)	15.38	-	-
6	(6)	46.15	(4)	30.77	(2) 15.38	(1) 7.69
7	(10)	76.92	(2)	15.38	(1) 7.69	-
8	(11)	84.62	(2)	15.38	-	-
9	(9)	69.23	(3)	23.08	(1) 7.69	-
10	(6)	46.15	(4)	30.77	(2) 15.38	(1) 7.69
11	(9)	69.23	(1)	7.69	-	(3) 23.08

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

As can be observed from Table 7.7 there was a high positive response (over 40%) for all items except item 4 (Figure 7.6).

**7.2.7.1      Agreement**

In general the respondents agreed (almost 85% for items 1, 3, 5 and 8 respectively (See Figure 7.6) that all:

- a) Computer related trainers must be registered;
- b) Training staff must also be adequately qualified in a specialist area to deliver training;
- c) The trainers be sufficiently fluent in their spoken English in order to communicate meaningfully with trainees; and
- d) Training Providers should observe and practice the highest standard of ethics and morals in their dealings with trainees.

The next level of agreement registered (in descending order) for items 2, 7, 9 and 11 respectively (See Figure 7.6) showed that training providers believed that:

- a) individual trainers and their educational qualifications be screened by NTC before they are allowed to practice or conduct training activities as a business venture;

- b) all training and teaching facilities such as a classroom and teaching laboratory must be assessed and certified by NTC before training is conducted;
- c) trainers must possess a trainer's qualification as well as relevant academic qualifications from recognised institutions before they are registered and granted permission to practice their 'skills or knowledge'; and
- d) the proposed system of accreditation encourages training providers to offer quality programs.

An agreement of 46% (for items 6 and 10) showed respectively that: (a) their training organisation was financially well-placed to provide training where the trainees will not be unfairly disadvantaged in the event of liquidation, closure or mergers, and (b) the certification of training staff in the private training organisation was unnecessary. This situation is likely to change once the idea of certification of training staff (trainers) is implemented.

#### **7.2.7.2 Uncertain**

In item 4, the respondents were evenly divided on the issue of whether or not training providers should engage in other income generating activities. This item was included because a few training providers were known to be involved in fast food outlets which raised concerns among the critics like Cox (1994).

#### **7.2.8 Rank Ordering of Statements of Training Objectives**

The list of objectives related to conducting private computer related training (shown in Figure 7.7) and the result from ranking these objectives in order of importance as seen by the respondents are shown in Table 7.8.



**Figure 7.7**      **Items related to Ranking Training Objectives**

1.

To improve workers motivation & performance
2.

To upgrade the morale and skills of the workforce
3.

To improve productivity & efficiency of workers
4.

To enable individuals to develop their marketable skills
5.

To improve the individual trainees' quality of life
6.

To fill a training gap which is unavailable in PNG
7.

To meet a demand from citizens to acquire computer skills
8.

To generate the greatest profit from the training courses
9.

To have large number of course offerings in my organisation
10.

To completely satisfy PNG National Training Policy
11.

To compete against other Training Organisations
12.

To help produce local computer expertise in the workforce
13.

To encourage equal participation of women in the workforce
14.

To help decrease dependency on non-citizen staff
15.

To implement localisation process in the country
16.

To help develop the full potential of the citizen trainees
17.

To help citizens to improve their qualifications
18.

To equip workers with relevant job skills to function well
19.

To develop skills for specific jobs in the country

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part E].

**Table 7.8**      **Rank Ordering of a List of 19 Training related Objectives or Purposes as perceived by the participants.**

Item No	Statements or list of Training Objectives	Rank Order
3	To improve productivity and efficiency of workers	1
7	To meet a demand from citizens to acquire computer skills	2
5	To improve the individual trainee's quality of life	3
18	To equip workers with relevant job skills to function well	4
12	To help produce local computer expertise in the work force	5
2	To upgrade the moral and skills of the work force	6
4	To enable individuals to develop their marketable skills	7
17	To help citizens to improve their qualifications	8
1	To improve workers motivation & performance	9
16	To help develop the full potential of the citizen trainees	10
6	To fill a training gap which is unavailable in PNG	11
19	To develop skills for specific jobs in the country	12
15	To implement localisation process in the country	13
10	To completely satisfy PNG National Training Policy	14
14	To help decrease dependency on non-citizen staff	15
8	To generate the greatest profit	16
11	To compete against other Training Organisations	17
9	To have large number of course offerings in my organisation	=18
13	To encourage equal participation of women in the work force	=18

**Note:** Numbers in the first Column represents the Statement Number as given in the 1994 Research Questionnaire. (See also Figure 7.7).

A list of 19 training objectives or purposes (See Figure 7.7) was given for training providers to rank from the most important (number 1) to the least important (number 19) as perceived by the respondents. The overall mean rating of each item was computed and ranked from the smallest mean value to the largest mean value, where the least mean value on an item indicate a high ranking order while a high mean rating on an item indicate a low ranking order (See Hildebrand, Laing & Rosenthal, 1977). The result of this ranking is shown in Table 7.8. As shown on Table 7.8, the top 7 most important training objectives were those about individual trainees and potential workers. The objectives according to the respondents (in descending order of significance) were:

- a) To improve the productivity & efficiency of workers;
- b) To meet a demand from citizens to acquire computer skills;
- c) To improve the individual trainees' quality of life;
- d) To equip workers with relevant job skills to function well;
- e) To help produce local computer expertise in the work force;
- f) To upgrade the skills and morale of the work force; and
- g) To enable individual's to develop their marketable skills.

All these objectives were also stated by the NTC as important (National Training Council, 1993a). This shows that training providers are aware of the NTC expectation in their training organisations.

The second most important training objectives (in descending order) were:

- a) To help citizens to improve their qualification;
- b) To improve workers motivation & performance;
- c) To help develop the full potential of citizen trainees; and
- d) To fill a training gap which is unavailable in PNG.

The 7 least important training objectives were:

- a) To develop skills for specific jobs in the country
- b) To implement localisation process in the country
- c) To decrease dependency on non-citizen staff
- d) To generate the greatest profit from the training courses
- e) To compete with other training providers
- f) To have large number of course offering in my organisation
- g) To encourage equal participation of women in the work force.

Issues such as localisation, dependency (Joel & Peril, 1994), encouraging women's participation in the economy (Kila, 1995), and development of appropriate skills for specific jobs would normally attract much debate and support from the wider spectrum of the community. The training providers however, considered them as insignificant objectives in their training organisation as shown in their ranking of the set of objectives.

While training has been conducted as a commercial activity, the respondents rated competition, private enterprise and generation of profit from such training activity very low in the bottom 7 of the list of 19 training objectives.

### **7.2.9 Open-ended Statements**

In this section, participants were asked to answer the following open-ended statements (boxed Figure 7.8). Responses to the first three statement are respectively presented under sections 7.2.9.1 to 7.2.9.3 while the responses to the last statement are presented in section 7.2.10.

**Figure 7.8      Items related to Answering Open-ended Statements**

- |  |
|--|
| <ol style="list-style-type: none"><li>1. List three (3) most important suggestions you would like to make to policy makers such as the National Training Council regarding computer education and training in private training organisations in PNG.</li><li>2. List in order of importance eg, from the most important to the least important) any <b>weaknesses</b> you perceive of the National Training Policy as it relates to computer education and training in your training organisation.</li><li>3. List in order of importance (eg, from the most important to the least important) any <b>strengths</b> of the national Training Policy as it relates to computer education and training in your training organisation.</li><li>4. Please write below any other general comments you have about the National Training Policy as it relates to your particular training organisation that in your view need to be raised.</li></ol> |
|--|

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part F].

#### **7.2.9.1            List of Suggestions [Part F:1]**

The list of suggestions made by the respondents were wide ranging. However, the suggestions fall into specific headings and are discussed accordingly.

Under **standards issues**, many respondents showed that an independent authority be established. For example, one of the respondents stated that: *'...an independent body be established to set standards specific to computing skills training, regulate and monitor its implementation, and evaluate it from time to time.'* The standard established will be used by all Training Providers to comply with or implement and this independent body will be empowered to obtain computer related skills requirement from all Training Providers in the country and set training guidelines and standards geared to achieving the NTP objectives.

Related to the standards issue are the **coordination and screening** of Trainers and Training Providers. The general views of the respondents indicated (in the questionnaire) that this independent body comprising of professional people (from both the government and private sector organisations) with expertise in computer education and curriculum, should be able to coordinate and liaise with: universities in PNG for relevance in training; the private sector for training needs or requirements; and other Private Training Providers to develop

and deliver an efficient training program geared towards meeting the needs of both trainees and the industry in a most rational and cost-effective manner.

In terms of screening, the respondents were of the view that the independent body established should:

- a) Thoroughly screen all computer skills instructors or trainers, and Training Providers to ensure that trainers were qualified in their specialist areas;
- b) Ensure that Training Providers must have an adequate financial base;
- c) Have adequate physical teaching and learning resources to teach effectively; and
- d) Periodically assess the courses offered, scrutinise the qualifications of trainers recruited, and maintain regular contact with all Training Providers to ensure that only those who are competent and qualified engage in any training activity in PNG.

The respondents also indicated that the NTC should ensure that all courses offered by private Training Providers must have the potential to foster employment opportunities in the future. Some respondents stated that computer skills training must be introduced as one of the secondary school subjects in the country.

Some respondents indicated that the NTC's communication channels be improved because the Training Providers felt they were kept in the dark in the lead up to the launching of the NTP when the advertisement placed in the newspaper left little time for those outside of Port Moresby to be physically present at the launching in the capital. The respondents cited cases where more awareness of the NTP was needed to inform, educate and familiarise Training Providers (the NTC staff have visited some provinces (Joel & Peril, 1994)). This is because, many Training Providers were either unaware of the existence of the NTP (at the time of research in May - June 1994) or have not seen the policy document even though they have been in the training business since long before the NTP was enacted and the NTC

established. Others have not been sent the policy documents even after repeated correspondence originating from Training Providers to the NTC Secretariat<sup>4</sup>.

#### **7.2.9.2 Perceived weaknesses of the National Training Policy [Part F:2]**

The most common weakness as perceived by the respondents is that the NTP is too broad. For example, as one respondent wrote: ‘ (The NTP)...*is too broad and very generalised and does not address training and development of specific skills such as computing skills training.*’ The respondents commented that the lack of adequate computer literacy and background knowledge in computing among NTC staff will be the greatest impediment to professionally assess standards and provide professional advice or monitor quality of computing skills training and development in PNG.

Those who have read the policy document claimed that the NTP was lacking cohesion and stated that implementation will be difficult. One of the respondents commented that: ‘...*the NTP is too broad and generalised and does not address computing skills training issues.*’ Another claimed that the private Training Providers were ‘*over-regulated*’, and that the NTP was an extra burden.

#### **7.2.9.3 Perceived strengths of the National Training Policy [Part F:3]**

The respondents stated that the strengths of the NTP as they perceived it would help to achieve the following:

(a) Regulate/monitor training programs in the country and in the process sort out the ‘mess’ created by those Training Providers whose motive is ‘quick profit’. An example cited is the ‘fly-in-fly-out’ training consultants who enter the country to conduct ‘training’ and zoom off several days later.

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<sup>4</sup> Personal communication with Training Providers in Lae and Port Moresby in May/June, 1994.

(b) As one respondent stated, the NTP is long overdue and welcomed it. She stated that: *'...it (NTP) will enforce training in information technology area in PNG and would encourage the maintenance of uniform training standards in training and human resource development in the country.'*

(c) Another training provider stated that the NTP will provide an, *'...impetus for full cooperation between government, private sector, and non-governmental organisations to address the issue of computer training in PNG.'*

(d) Help support and recognise the contribution made by the private Training Providers in the overall education and training program of citizens.

(e) Ensure trainees get the best deal for their money as well as obtaining a qualification to indicate their accomplishment.

#### **7.2.10 General Comments [Part F:4]**

The general comments made by the respondents (in Part F:4 of the questionnaire) point to the following:

(a) That the intentions and motives for the NTP were considered valuable. However, the more specific details in the field of computer skills training should be clearly defined and addressed in the wider context of private computer training.

(b) It (NTC) must continue to involve private training institutions to contribute towards formulating relevant policies, set guidelines and maintain standards. One of the trainers commented: *'NTC should maintain a regular contact with all private training providers to implement the standards set by the NTC .... to avoid commercialism, profiteering and*

*exploitation of trainees to use their hard-earned money.'* Regular meetings or conferences should be conducted by the NTC between senior NTC officers and administrators of private Training Providers so that opinions expressed by the participants might enable the authorities to implement and/or revise the existing policies and further achieve their objectives in the most cost-effective way.

(c) Set up a research division in order to guide Training Providers in determining new training requirements, identify additional training needs, design or develop specialist training programs as demanded by the workplace requirements and advice the NTC on computer education and training related matters.

(d) The establishment of a watchdog (eg, NTC) on training matters is commendable. However, concerns were raised as to how the NTC could minimise the number of Training Providers and properly supervise the many Training Providers engaged not only in computer skills training but also in a range of other subjects. One respondent commented: '*(I) Hope NTC does not end up being a white elephant or ghost organisation. It must be seen to serve its purpose.*' Already the NTC indicated the financial and staffing constraints under which it is operating needs urgent attention if it is to effectively perform its functions (Joel & Peril, 1994).

(e) Fly-in-fly-out training consultants engaged in training activities in PNG should be carefully monitored and screened prior to conducting any training activities in PNG. Both wholly foreign-owned or wholly nationally-owned and partly PNG-owned training organisations should also be screened in the same manner, to ensure that course syllabus, instructors' academic credentials or background satisfy the requirements of the National Training Policy.



## **7.3 Results and Discussion**

### **7.3.1 Research Question Three**

Are the existing policies (eg, The National Training Policy, Training Levy, The PNG Science and Technology Council Act 1992, and PNG IT Policy for the Public Service) effective for or conducive to facilitating IT education and training in PNG?

### **7.3.2 Data Sources Consulted and Used**

In order to answer the above research question, several existing policies and legislation are analysed in terms of whether they are conducive to facilitating IT education and training in PNG. While being mindful of the limitations of conducting such a policy analysis (discussed in Chapter 1), the major types of policy analysis applied here predominantly involves the use of ‘intuition’ and ‘muddling through’ approaches (Quade, 1989). Intuitive and muddling through approaches are applied using several data sources including the following:

- a) The individual policy or legislative documents;
- b) Professional contacts of individuals and organisations in PNG maintained by the author;
- c) Newspaper articles, advertisements, press releases, letters to the editor;
- d) The author’s professional experience and knowledge of IT education and training scene in both public and private sector in PNG; and
- e) Personal communication with several key individuals involved in various aspects of private computer education and training in PNG.

The contacts with individuals were established in the following manner during the early stages of the research exercise when initial inquiries were made by the researcher with:

- known training providers from private computer training organisations;

- officials from relevant statutory organisations such as the Internal Revenue Commission, the National Training Council, the Commission for Higher Education; and
- Professional colleagues who have offered their views and comments about this research.

A summary of government policies, regulations and initiatives relevant to Private Computer education and training in PNG which are briefly analysed in order to answer **Research Question Three** is presented in Table 7.9.

**Table 7.9      Summary of Government Policies and Initiatives**

Policy Initiative	Year Adopted	Policy Intended for	Implementing Agency
The National Training Policy <ul style="list-style-type: none"> <li>• National Training Council Act 1991</li> <li>• National Training Policy (White Paper)</li> </ul>	1991  1989	Private Training Organisations	National Training Council
The Training Levy <ul style="list-style-type: none"> <li>• Authority to approve for Training Levy given by Income Tax Act 1959 (as amended from time to time)</li> </ul>	(Income Tax Act 1959) as amended	(To encourage general) Employers to invest in Training of their staff	Internal Revenue Commission
PNG IT Policy for the Public Service	1991	The Public Service	Department of Personnel Management
PNG Science and Technology Council Act 1992	1992	Mainly within the Public Sector	Science & Technology Council (Not yet established in January 1998)
Accreditation and Higher Education in PNG	1995	Public and Private Sector Educational institutions	Commission for Higher Education

### **7.3.3 Brief analysis of each Policy Initiative**

Each policy or legislation which has a potential to affect IT education and training in PNG has been highlighted in Chapter 5. In the following sections, each individual policy or legislative document will be analysed on the basis of whether it is conducive to facilitating IT education and training in PNG.

#### **7.3.3.1 National Training Policy**

As has been discussed at length in Chapter 1 (section 1.5.1), Chapter 5 (section 5.4.3) and Chapter 7 (section 7.2), the enactment of the *National Training Council Act 1991* and the subsequent formulation of the National Training Policy (NTP) contributed little to facilitating IT education and training in PNG. The NTP is too broad and does not specifically address IT education and training. While the NTP acknowledges computer related training as important (Independent State of PNG, 1989<sup>5</sup>), there is no evidence to suggest that IT education and training in PNG is given any special consideration under the policy.

For example, regardless of the subject or courses offered, all private training providers and their training activities are governed by the NTP. In this regard, the NTP facilitate training activities in the private training organisations and ‘IT education and training’ is implicitly included among the many training programs conducted by the private sector. However, no special consideration is given to IT education and training in PNG under the NTP.

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<sup>5</sup> Paragraphs 6.4, 6.5 and 6.148 of the National Training Policy (White Paper).

### **7.3.3.2 The Training Levy**

The concept of Training Levy has a potential to facilitate IT education and training in PNG. However, almost all training programs in non-computing subjects are also given training levy exemptions. To date, most private computer training organisations advertise their computer skills training programs as being approved by the Internal Revenue Commission (IRC) for Training Levy exemption purposes. This function is to be transferred from IRC to the National Training Council (McKie, 1996). The NTC will grant approval of training identified to be in high demand locally for Training Levy exemptions. IT education and training activities would fall into this category.

The authority to approve training programs for Training Levy is given by Division 14D of the Income Tax Act. Approval granted for Training Levy purposes does not imply that the training program has been given academic scrutiny and clearance in terms of quality and standards of training. However, under the current practice, the training providers are conveying to the general public the impression that the courses approved by the IRC for Training Levy purposes are 'approved' with all the necessary 'credential' to be recognised as an acceptable academic training program.

Another misunderstanding observed was that having been registered as a private firm under the Companies Act to conduct a 'business venture', computer education and training can still take place without registering as a 'training organisation' under the National Training Council. Several loopholes or discrepancies have been identified in these policies. No special consideration is given to IT education and training.

### **7.3.3.3 PNG IT Policy for the Public Service**

As the name suggest, the *PNG IT Policy for the Public Service* was drawn up by the Department of Personnel Management specifically to help improve the efficiency in the Public Service. The details of this policy were highlighted in Chapter 5 (sections 5.4.4).

Since this policy was formulated for implementation in the Public Service, it is not implemented by the private computer training organisations. The private training providers have no responsibility to implement the IT Policy intended for the Public Service. There is no policy compelling them to do so. Therefore, the *PNG IT Policy for the Public Service* does not facilitate IT education and training within the private computer training organisation.

Further more, it has several inherent limitations which have been discussed in some details by Sinebare (1993) and again in Chapter 5 of this thesis. The PNG IT Policy for the Public Service stands little chance of ever being implemented by the private computer training organisations under the current policy framework.

### **7.3.3.4 PNG Science and Technology Council Act 1992**

The government enacted the PNG Science and Technology (S&T) Council Act in 1992 because it recognised the importance of S&T in the economic development of the nation. Under the S&T Council Act 1992, S&T functions and activities were to be facilitated and implemented by the S&T Council as spelt out in section 4 of the Act. Under section 2 of the same Act an S&T Council was to be established.

Through the enactment of the *PNG Science and Technology (S&T) Council Act 1992*, the S&T Council will then set about to perform its functions to promote science and technology development and applications in the country. At the time of finalising this thesis (January

1998), the S&T Council has not yet been established and so the functions identified for the Council to implement have no means of being implemented.

IT education and training is a subset of the Science and Technology in a broad sense. Unlike other developing countries with explicit policies, well formulated strategies and mechanisms to effectively implement S&T, the PNG S&T Council Act 1992 has to be revived with new vigour by those well educated and qualified persons appointed to the S&T Council to immediately implement S&T development initiatives in the country.

Until such time as the S&T Council is established, the PNG S&T Council Act 1992 will remain unimplemented. Hence, IT education and training in PNG will continue to be on the current course - '*... uncoordinated, unregulated, error-prone and wasteful of both financial and human resources*' (*The National*, Sept 3, 1997).

#### **7.3.3.5 The Accreditation Policy**

The accreditation policy, *Accreditation and Higher Education in Papua New Guinea* (AHEPNG) was designed to accredit training providers, training programs and institutions of higher education in PNG (Commission for Higher Education, 1995a). The AHEPNG was developed to establish what the various certificates and diplomas offered in the country mean and comparability of the certificates and diplomas awarded, and equivalence between training programs and institutions.

According to AHEPNG, the scope of the policy covers all programs and awards including, '*... all institutions located in PNG and claiming to teach a program leading to an academic award*,' (Commission for Higher Education, 1995a, p.1-3). By implication, all private training organisations (including computer training providers) are included in the above statement.

However, whether the awards (mostly ‘certificates’) awarded to the trainees on completion of their training program can be classified as ‘academic awards’ under the proposed categories and criteria of academic awards is unclear as this term has not been defined (Commission for Higher Education, 1995a). The AHEPNG clearly defined other categories of academic awards such as Associate Diploma, Diploma, Bachelor’s degree, Postgraduate Diploma, Masters degree and Doctorate degree. Since private computer training organisations in PNG are not providing these awards, it again implies that private training organisations do not come under the aegis of AHEPNG.

The National Training Council (NTC) which is responsible for private training organisations has the authority under section 16 of the *National Training Council Act 1991* to establish a Screening and Accreditation Committee to be responsible for the quality control and monitoring of standards, evaluate and monitor training programs, screen and accredit training programs (National Training Council, n.d).

It was evident from the analysis that the *Accreditation and Higher Education in Papua New Guinea* (AHEPNG), was not intended for the private training organisations because no specific criteria was specified for ‘Certificates’ as opposed to the post-certificate awards beginning with Diplomas and higher. Even the NTC had not defined the different ‘levels of certificates’ as defined by the Australian Qualification Framework (AQF). The AQF clearly defined the different competencies or learning outcomes for each level (Certificate I to Certificate IV) (*Training and Development in Australia*, 1995b, p. 8-9).<sup>6</sup> To date, accreditation of training organisation and accreditation of an individual course means very little under the present scenario.

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<sup>6</sup> The Australian Training Information Network (1996). The Australian Qualification Framework. [Online] Available URL: <http://www.opennet.net.au/partners/bvet/train/tra1123.html> [Accessed 7 June, 1996].

**7.3.4            Are the Policies Conducive to IT Education and Training in PNG?**

At present there appears to be two accreditation systems, one for the public sector higher education institutions and another for private sector training organisations. Both have the potential to facilitate IT education and training in PNG provided the necessary IT policy and curriculum guidelines are formulated. These policies and guidelines can then be implemented by the relevant authorities. A coordinated effort is needed between the government agencies such as the NTC and Commission for Higher Education and the private training providers themselves to make an input towards this process. From Table 7.9 and the brief analyses of the various policy initiatives described, the existing government policies and initiatives are not conducive to facilitating IT education and training in PNG.

**7.4               Results and Discussion**

**7.4.1            Research Question Four**

What are the characteristics of an appropriate curriculum in computer skills training and development in PNG? How can these characteristics be translated and incorporated into future government policies in the context of computing skills training and development curriculum?
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**7.4.2            Data Sources Consulted and Used**

In order to address the above research questions, responses from the Private Computer Training Organisations through the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire (See Appendix B) was collated and qualitatively analysed. The questionnaire was designed originally with the intention of using it in a face-to-face interview with key individuals from computer skills training organisations. However, due to circumstances beyond the control of the researcher, the Questionnaire was personally hand delivered to those training organisations (completed in 1996) which:



- a) have been given 'interim registration' status by the National Training Council (n=10),  
[only one training organisation refused to participate in the research when approached;
- b) advertised in the newspapers in PNG as conducting 'approved training' courses (n=2)  
'approved' by the Internal Revenue Commission; and
- c) operate as the business arm of existing tertiary institutions which offer computer courses  
as a commercial activity (n=2).

Other sources of documents such as; diary of interview notes with key personnel from IRC and NTC, government policy documents, newspaper articles and advertisements, and personal communications with individuals are amongst the materials and primary sources of information consulted and used in answering **Research Question Four**.

A summary of the composition of the *Private Computer Training in PNG: Current Practices and Future Policy Directions* questionnaire is presented in Table 7.10. The administration of this questionnaire and the research methods or procedures applied have been described in Chapter 4.

**Table 7.10      Composition of *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire**

Part	What are the Questions in each Part About?	No. of Questions
Part A	Introduction to the Questionnaire and general information for the training providers	Nil Information for the Participants
Part B	MAJOR CHARACTERISTICS such as: <ul style="list-style-type: none"> <li>Strengths or Weaknesses of the individual Training Programs;</li> <li>Reasons why Training programs should be recognised</li> </ul>	3
Part C	PROBLEMS FACED BY PRIVATE TRAINING PROVIDERS <ul style="list-style-type: none"> <li>Difficulties currently faced; and</li> <li>The perceived areas to change.</li> </ul>	3
Part D	REGULATE/DE-REGULATE PRIVATE COMPUTER TRAINING <ul style="list-style-type: none"> <li>Regulating private computer training;</li> <li>Reasons for regulating computer training;</li> <li>Areas to be regulated</li> </ul>	4
Part E	A NATIONAL FRAMEWORK <ul style="list-style-type: none"> <li>National Qualification Framework; <ul style="list-style-type: none"> <li>-Levels of computing qualifications;</li> <li>-Criteria for recognising computing qualification;</li> </ul> </li> <li>National Computing Curriculum - <ul style="list-style-type: none"> <li>-Important features of the curriculum</li> <li>-Aims of the Computing Curriculum</li> <li>-National Computing Exams</li> </ul> </li> <li>National IT Body <ul style="list-style-type: none"> <li>-Functions of this body;</li> <li>-Membership composition</li> </ul> </li> </ul>	10
Part F	THE FUTURE OF COMPUTER EDUCATION RELATED TRAINING IN PNG <ul style="list-style-type: none"> <li>Current trends;</li> <li>necessary changes perceived; <ul style="list-style-type: none"> <li>-Curriculum changes,</li> <li>-Structural changes,</li> <li>-Policy changes</li> </ul> </li> <li>the role of the government</li> </ul>	5
Part G	LEVEL OF COMPUTER DEVELOPMENT: <ul style="list-style-type: none"> <li>Current level of computer development</li> <li>Which direction PNG is heading?</li> <li>The preferred level of computer development</li> <li>What actions PNG should take as a nation?</li> </ul>	5
Part H	OPEN-ENDED STATEMENT: <ul style="list-style-type: none"> <li>General Suggestions</li> <li>Ideal environment for conducting Private Computer Training</li> </ul>	2

In order to answer the research question posed in section 7.4.1, the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire (See Appendix B) have been organised under the following sub-headings:

- a) Features of the present computer skills training curriculum (section 7.4.3);
- b) Regulation versus de-regulation of computer skills training curriculum (section 7.4.4),
- c) Proposition for a National Framework (section 7.4.5);
- d) Current level of computing developments in PNG (section 7.4.6);
- e) The future of computer training courses and where it is perceived to be heading section 7.4.7);
- f) The ideal environment under which to conduct computer training (section 7.4.8); and
- g) The general comments and suggestions as to how private computer training in PNG might be helped (section 7.4.9). These are presented in the following sections.

### **7.4.3 Features of the Present Computer Skills Curriculum<sup>7</sup>**

The features of the computer skills curriculum used by different training providers were many and wide ranging which reflects the diversity of such training organisations and their respective computer skills curriculum. The common features have been further divided into positive and negative features as presented in the next couple of sections. Due to the different background of the individual training providers, for example, the person completing the questionnaire and the individual training organisation, the respondent's view their present curriculum as unique and different from their competitors. Hence, finding commonality among them is not easy. However, some common threads run through some of the features identified (sections 7.4.3.1. to 7.4.3.3).

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<sup>7</sup> *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part B].

### 7.4.3.1 Strengths or Positive Features

The respondents identified many positive features which in their view were the strengths of their training organisations. The features of training organisations in order of popularity identified by the respondents, and their common characteristics are shown in Table 7.11. The training providers showed that in their view the strengths of their curriculum (as shown in this table) motivated them to conduct computer skills training courses and therefore would like their training organisations recognised for these very reasons.

**Table 7.11 Summary of the Strengths of the present Computing Curriculum**

Strengths of the Curriculum	Characteristics
Computer Education/Training	<ul style="list-style-type: none"> <li>• Computer literacy</li> <li>• Learn about computers</li> <li>• Learn to use computers</li> <li>• A basis from which to advance</li> </ul>
One-to-one Training	<ul style="list-style-type: none"> <li>• Personalised training</li> <li>• Small group customised training</li> <li>• Self-paced individualised lessons</li> </ul>
Reputation of the Training Institution	<ul style="list-style-type: none"> <li>• Reputable Institution</li> <li>• Large output of graduate yearly</li> <li>• Qualifications awarded</li> <li>• Employment prospects</li> </ul>
Appropriateness/Usefulness	<ul style="list-style-type: none"> <li>• Relevance of the courses</li> <li>• Job-specific skills</li> <li>• Meeting a changing need</li> </ul>
Training Facilities/Resources	<ul style="list-style-type: none"> <li>• Modern Computer Laboratory</li> <li>• Latest Computer Hardware</li> <li>• Latest Computer Software</li> </ul>
Qualifications (Certificates)	<ul style="list-style-type: none"> <li>• Awareness of Computer power</li> <li>• Meeting standards eg, ISO 9000</li> </ul>
Qualified Computer Trainers	<ul style="list-style-type: none"> <li>• Trainers are well qualified</li> <li>• Many years training experiences</li> </ul>
Computer Courses Offered	<ul style="list-style-type: none"> <li>• Well-researched and developed</li> <li>• Designed to meet a need</li> <li>• Variety</li> </ul>
Approved Computer Training	<ul style="list-style-type: none"> <li>• Approved by authorities eg, NTC</li> <li>• Carrying International 'certificate'</li> </ul>

**Source:** Data extracted from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part B:1, 3.1, 3.2 & 3.3].

### 7.4.3.2 Weaknesses or Negative Features

The negative features or weaknesses in the present curriculum of private training providers are many. However, there were several features identified as most common amongst the respondents. The negative features or weaknesses indicated by different training providers are summarised and tabulated in Table 7.12. The respondents stated that their training activities have been hampered by these problems and would like them addressed by relevant authorities as soon as possible.

**Table 7.12      Summary of the Weaknesses in the Present Computing Curriculum**

Weaknesses of the Present Curriculum	Details or Comments
1) Inadequate Capital	<ul style="list-style-type: none"> <li>To purchase new hardware</li> <li>To improve teaching facilities</li> </ul>
2) Shortage of Qualified Trainers	<ul style="list-style-type: none"> <li>Insufficient funds to attract highly qualified staff</li> <li>Qualified local staff are rare</li> </ul>
3) Low level of Computer Literacy	<ul style="list-style-type: none"> <li>No prior computer background among students;</li> <li>Ignorance of computer skills</li> <li>Lack of computers awareness</li> </ul>
4) High Cost of Computer Servicing	<ul style="list-style-type: none"> <li>Costly repair bill for Computer Hardware</li> <li>Parts have to be imported too</li> </ul>
5) Absence of Copyright Protection	<ul style="list-style-type: none"> <li>No protection for materials produced locally</li> <li>Imported training materials are also unprotected</li> </ul>
6) Financial Instability	<ul style="list-style-type: none"> <li>Exchange rate fluctuations</li> <li>High inflation rate</li> </ul>
7) High Import Tariffs	<ul style="list-style-type: none"> <li>High tariff (11%) on Computer hardware &amp; Software</li> <li>Academically priced software editions inoperative by PNG-based vendors</li> </ul>
8) Limited Access to Computers	<ul style="list-style-type: none"> <li>Little hands-on time</li> <li>Training concentrated in towns</li> <li>Large student population-less access time</li> </ul>
9) Unregulated Training Environment	<ul style="list-style-type: none"> <li>Low-quality training organisations under-cut high-quality training organisations</li> </ul>
10) High Cost of Course Fees	<ul style="list-style-type: none"> <li>High cost of hardware and software is passed onto trainees in their fees</li> <li>Little or no government/corporate sponsorship for private training</li> </ul>
11) Others Features Identified	<ul style="list-style-type: none"> <li>Little government support although they are also developing human resources</li> <li>Lack of incentives by employers to release employees to train with private trainers</li> <li>General law and order problem affect their training</li> </ul>

Source: Data extracted from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part B:2, Part C: 1 & 2].

#### **7.4.3.3 Perceived Changes to the Present Curriculum [Part C:1]**

In light of the strengths and weaknesses identified in their present computing curriculum, the Private Computer Training Organisations have indicated several changes that must be undertaken by various institutions such as the government, the banks, and the training organisations themselves in order to further enhance their strengths and make an attempt to improve their weaknesses. These changes among others are:

- a) Financial institutions such as the banks to provide special loans for educational purposes to equip computer laboratories for teaching or learning purposes;
- b) The Government to: support or encourage computer literacy efforts in PNG schools, reduce import tariffs on computer hardware/software, recognise computer training institutions, grant tariff exemptions for registered training organisations, and reactivate the *Copyright Act 1978* to protect all intellectual property which includes course materials produced in-house to aid trainees;
- c) Formation of an peak body, for example PNG Information Technology Council (PNG-ITC) with membership strategically drawn from the wider community; and
- d) Individual training organisations to structure a comprehensive training course for the whole year, rather than on ad hoc basis as prevalent at present. (See also section 7.4.7).

#### **7.4.3.4 Brief Summary of this particular Section**

As has been shown in Chapter 6, every computer training organisation operating in PNG under existing legislation is different in many respects. The private computer training providers have individually identified what they considered as their strengths which enabled them to conduct computer training courses. Strengths of their curriculum lies in the:

- Type of training and the course they conduct;
- Usefulness of the courses in the workplace;
- Quality of training delivered by the training program;
- Facilities and resources used;

- The certificates awarded to trainees; and
- Fact that their courses and the institutions have been approved by the National Training Council (See Table 7.11).

These are considered as their strengths because the training providers themselves are responsible for the design, planning, delivery, assessment and certification. The National Training Council only assesses their training program, inspects, validates, and approves their training organisation as an approved training organisation.

The training providers have also identified their perceived weaknesses (See Table 7.12). However, the list of weaknesses identified by training providers were in the main, factors which were external to the training providers and are therefore beyond their control. For example, the absence of copyright law, high import tariff, unregulated training environment, financial instability and shortage of qualified trainers were all beyond the control of the training providers.

Given the perceived strengths and weaknesses, the training providers identified several factors which they consider would enhance their training activities. The perceived changes or factors identified have little to do with their present computer skills curriculum but rather requires the government and other organisations such as the banks to make necessary policies and policy changes to existing ones to encourage and support computer training. For example, the government should reactivate the dormant Copyright Act 1978 (or revise it to accommodate for PNG's interest) and for the banks to provide concessional loan facilities to enable training organisations to acquire latest computer equipment and software. Likewise, the government should drastically reduce import tariffs on computer hardware and software for educational purposes.

7.4.4 Regulation versus Deregulation<sup>8</sup>

As to whether computer training courses conducted in PNG should be ‘regulated’ or not, an overwhelming majority (over 80%) of the training providers supported the view that computer courses should be regulated while the remainder indicated otherwise.

7.4.4.1 What aspects should be Regulated?

The majority of the Training Providers (over 80%) agreed that the following aspects shown in Figure 7.9 should be regulated.

Figure 7.9 Training Aspects to be Regulated

a)	Aims/Objectives/Outcomes/Competencies
b)	Teaching Methods and Materials
c)	Training Facilities (eg, Classroom, laboratory)
d)	Resources (eg, Trainers)
e)	Assessment and Evaluations procedures
f)	Job experience (eg, Practical work in the workplace)
g)	Qualification of Trainers

Source: Data extracted from the responses to the ‘Private Computer Training in PNG: Current Practices and Future Policy Directions’ Questionnaire. [Part D:2]

In fact all these details were supposed to be forwarded to the National Training Council for inspection and assessment before a training organisation is deemed acceptable to NTC expectations. Only those deemed satisfactory were granted ‘*interim registration*’ to practice as a training provider (See Table 6.1 for list of training providers).

7.4.4.2 Reasons for Regulating Training Activities

Many training providers were in favour of regulating private training organisations as opposed to the few who were against regulating training activities. The major reasons for favouring regulation are summarised in Figure 7.10:

<sup>8</sup>Private Computer Training in PNG: Current Practices and Future Policy Directions Questionnaire [Part D:1].



**Figure 7.10    Summary of Reasons for Regulating Computer Training**

- |  |
|--|
| <ul style="list-style-type: none"><li>a) Sets a standard for all participating training organisations to follow a uniform policy;</li><li>b) Provides the ultimate consumer, quality and guarantee good education and materials;</li><li>c) Courses will be structured from one level to the next;</li><li>d) Links will be established between courses offered by other institutions where trainees progress from one to another without the need to repeat;</li><li>e) Only genuine training organisations and approved trainers would operate in PNG;</li><li>f) Certificates awarded will be recognised; and</li><li>g) Students get value for money training.</li></ul> |
|--|

**Source:** Data extracted from the responses to the *‘Private Computer Training in PNG: Current Practices and Future Policy Directions’* Questionnaire. [Part D:1.2].

**7.4.4.3 Other Areas to Regulate**

Given the above reasons for regulating computer training activities, the training providers were asked to comment on other important elements of the course/s which in their view should be regulated if computer training or computer skills curriculum offered were to be of any value to the workplace. A summary of these areas as identified by training providers are given in Figure 7.11.

**Figure 7.11    Summary of Other Areas to be Regulated**

- |  |
|--|
| <ul style="list-style-type: none"><li>a) Regulate standard evaluation and assessment procedures;</li><li>b) All courses developed should be assessed, approved and validated by a panel of experts drawn from a wide cross-section of the society. These experts must possess relevant academic qualifications as well as many years relevant work experience in both the industry and the government;</li><li>c) Rules and Regulations to protect the interests of both the trainers, the trainees and the training organisations;</li><li>d) Ensure that the courses conducted must have a genuine need in the country’s workplace and that it is based on well researched and developed effort on the part of the training provider; and</li><li>e) The Government and private sector organisations must take a keen interest in the Human Resource Development activities conducted in the private training organisations.</li></ul> |
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**Source:** Data extracted from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part D:4].

One of those training providers which opposed (less than 17%) regulating computer skills training stated in the Questionnaire very bluntly that: *‘...Computing is a very big field and it will be difficult to regulate or standardise such a training...’*

#### **7.4.4.4 Brief Summary of this Particular Section**

Many training providers (over 80%) felt that the computer curriculum and computer related training organisations in PNG should be regulated. It should be regulated by the National Training Council which would assess and approve training courses as well as register training organisations on the basis of information supplied to it.

The reasons private computer training courses and organisations should be regulated (See Figure 7.10), far outweighed the reasons given for deregulation (or no regulation). This was mainly because by regulating training organisations the training providers believed the training quality will be monitored, the training standards will be enforced, the courses offered will be structured and approved by appropriate authorities, the qualifications of trainers will be screened, the certificates awarded would be recognised, computer literacy in the country would be set into motion, and the trainees get value-for-money training.

#### **7.4.5 National Framework<sup>9</sup>**

At present every training provider awards certificates unique to itself reflecting: the different course modules, covering different set of topics/content, taught for varying lengths of time (hours, days, weeks, months), assessed and evaluated using different methods, which have been presented or taught by diverse groups of trainers with different qualifications and work or training experiences, in equally divergent teaching facilities and resources in each training institutions. Should there be a national framework to ensure maintenance of standards in the private training organisations? What should the standard be and how can these be instituted and implemented? These and other related questions are addressed in the next sections (7.4.5.1 to 7.4.5.5).

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<sup>9</sup> *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part E].

#### **7.4.5.1 Perceived Features of a National Framework**

Responses to the questionnaire on the question of what should be some of the features that must be included in such a national framework has attracted positive answers which have been summarised and categorised into four main areas. The four main areas are:

- a) Form an apex body or a panel of experts to set and maintain academic, professional or ethical standards;
- b) Maintain a transparent course syllabus or curriculum independently developed by individual training organisations but endorsed by the above Panel before it is implemented;
- c) Establish a National Qualification Framework which endorses and recognises certificates awarded by training providers; and
- d) Institute a staff development and training program where capable students are sponsored for advanced training either in-country or abroad.

The respective features and the possible functions or roles to be played are summarised and presented in Table 7.13.

**Table 7.13      Summary of Features of the National Framework and their respective Functions**

Features	Possible Roles or Functions
An apex Body or Panel of Experts	<ul style="list-style-type: none"> <li>• Membership drawn from computer experts in government and private sector;</li> <li>• Set standards (eg, Entry criteria, Exams, Qualifications, Competency standards);</li> <li>• Advise NTC on computer related training issues;</li> <li>• Award people in recognition of their achievement in computer fields;</li> <li>• Validate trainer’s educational qualifications;</li> <li>• Endorse and validate exams set by institutions;</li> <li>• Set Professional exams for trainees;</li> <li>• Determine structure or level of qualifications;</li> <li>• Training institutions to be professionally affiliated with this body if they meet standards set;</li> <li>• Formulate and enforce Code of Ethics for practitioners.</li> </ul>
Syllabus or Curriculum	<ul style="list-style-type: none"> <li>• Syllabus to be developed by individual training providers based on research findings;</li> <li>• Course must be transparent for all parties concerned;</li> <li>• Job-oriented training program;</li> <li>• Course design (Application or hands-on, job experience component);</li> <li>• Assessment and evaluation procedures;</li> <li>• Theoretical component;</li> <li>• Endorsed by the Panel before it is implemented.</li> </ul>
National Qualification Framework	<ul style="list-style-type: none"> <li>• Certification of competency in computing environment according to level of course attended;</li> <li>• Recognised Seal from the Panel of experts affixed on the Certificate upon satisfactory completion of a Professional exam validated by the Panel;</li> <li>• Level of certificates granted must mean something to both the certificate holder, the provider and the wider public.</li> </ul>
Staff Development & Training Program	<ul style="list-style-type: none"> <li>• Policy on sponsorship for further studies or training both in-country and abroad;</li> </ul>

**Source:** Data extracted from the responses to the ‘*Private Computer Training in PNG: Current Practices and Future Policy Directions*’ Questionnaire. [Part E:1].

**7.4.5.2 Structure or Level of Qualifications [Part E:2]**

The respondents indicated that there should be a clear differentiation between *basic*, *intermediate* and *advanced* level courses across the board and each be awarded an appropriate certificate. In that way course work covering content matter at beginner’s level would be awarded a qualification that merits the content covered at that level instead of either grossly overstating or understating it with a different qualification.

There is a common agreement in the responses that the levels of qualifications awarded should range from Certificate, to Diploma or Degree. However under the current climate, the latter two awards are not awarded by private computer training providers. According to one training provider the qualifications awarded should be based on: User Levels (Basic, Intermediate, Advanced); Developer Level and Solution Provider Level. Each level should be classified according to the level of competencies achieved or demonstrated at the completion of the different levels.

For one provider, the following competencies have been established where:

- a) At the **Basic or introductory level** course, the trainee is expected to be *able to use the software with confidence*;
- b) At the **Intermediate level**, the student is expected to *be competent with most aspects of the software*; and
- c) At the **Advanced level**, the trainee or the student is expected to *understand all aspects of the software* and *should be able to create complex documents* (Computers & Communications Training Centre, 1996g).

However, it has also been suggested by another training provider that given the rapid changes occurring in the computer industry, students should be assessed and graded on both their *attitude* and *aptitude* by their training provider. This will give a balanced assessment on a trainee which takes into account the result of the course work undertaken, the general motivation, and attitude towards the course undertaken because employers demand and value employees with positive attitudes towards work as well as good grades on 'paper'.

Individual training organisations should design and develop their courses according to these levels. This would, to a large extent, depend on staff experience and qualifications, the institution's past reputation, and the quality teaching facilities or resources used to enrich

the teaching/learning. As mentioned earlier (See Table 7.13), the individual courses would be designed/developed by the respective training providers. The courses developed must be validated and endorsed by an authority like the present National Training Council except that this body will consist of members with academic and professional qualifications in the subject and relevant work experience in the industry. The members would be drawn from the computer industry who will then advise the NTC. This entity will also be responsible for endorsing and validating the Certificates awarded according to its established standards.

**7.4.5.3 Criteria for ‘Recognising’ Computer Courses [Part E:3]**

When requested to suggest on what criteria the computer courses conducted by private computer training organisations should be *recognised*, the respondents indicated the following areas as the most important criteria:

- a) Whether or not the aims and objectives of the courses are practically feasible given the resources available;
- b) Is the quality of training provided acceptable to the appropriate authorities, for example the NTC;
- c) Whether the quality of the course designed meets the standard established by the authority; and
- d) The reputation of the training providers given its resources and output among other considerations.

The summary of individual suggestions is presented under the above-mentioned criteria in Table 7.14.

**Table 7.14      Summary of Criteria for ‘Recognising’ Computer Courses  
Conducted by Private Training Providers**

Criteria for Recognition	Comments of Details
<b>a) Aims and Objectives</b>	<ul style="list-style-type: none"> <li>• <i>Are the stated aims &amp; objectives feasible or realistic?</i></li> <li>• <i>How are these aims to be achieved?</i></li> <li>• <i>How can they be measured?</i></li> </ul>
<b>b) Quality of Training Provided</b>	<ul style="list-style-type: none"> <li>• <i>Quality of trainers engaged?</i></li> <li>• <i>What resources and facilities are available?</i></li> <li>• <i>Are available resources satisfactory?</i></li> </ul>
<b>c) Reputation of Training Provider</b>	<ul style="list-style-type: none"> <li>• <i>Are the Trainers adequately qualified?</i></li> <li>• <i>Type and value of awards granted;</i></li> <li>• <i>Popularity and success rate in trainees getting a job.</i></li> </ul>
<b>d) Quality of Courses Offered</b>	<ul style="list-style-type: none"> <li>• <i>Relevance or usefulness;</i></li> <li>• <i>Course content covered;</i></li> <li>• <i>Duration of course taught;</i></li> <li>• <i>Assessment and evaluation.</i></li> </ul>

**Source:** Data summarised from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part E:3].

Criteria a, b and d are currently taken into account by the National Training Council (NTC) under the present system where private training providers submit their course descriptions/handbooks which contains aims and objectives, list of topics or content to be covered, and the duration of the course among other things for the NTC to assess and recommend registration prior to conducting their training programmes.

The computer skills training providers were asked to comment on whether computer courses conducted in the private training organisations could be organised in such a way that there could be cross transfer of credit from one provider to the next. In this way trainees could accumulate both the relevant skills and credits by taking advantage of the courses provided by different training providers.

One training provider (owner/manager) indicated that since most computer training in PNG is skills-oriented and is related to the use of computer software, it would be difficult to

suggest any formal method or criteria for recognising past knowledge and skills or qualifications. He further stated that:

Software training is specific to the end user and cannot be awarded credits as such - employers are looking for trained employees with skills to get the job done. I do not think certification and credits are vitally important to a prospective employer (Warner, 1996)<sup>10</sup>.

However, according to the responses from the majority of the respondents; past skills, knowledge and qualifications obtained from one training provider can be given recognition by another provider if certain conditions are met. The summary of their responses about these preconditions are tabulated in Table 7.15.

**Table 7.15      Summary of Criteria for Recognising Past Knowledge, Skills and Qualifications**

Condition or Criteria	Details or Comments
a) Endorsed Syllabus	<ul style="list-style-type: none"><li>• A uniform 'minimum topics to be taught' syllabus;</li><li>• Uniform syllabus guidelines;</li><li>• Defined competencies for each course level.</li></ul>
b) Reputation of Training Organisations	<ul style="list-style-type: none"><li>• Trainees with qualifications from recognised institutions;</li><li>• A training institution must be registered with NTC;</li><li>• Training tailored to meet workplace demands.</li></ul>
c) Implement Established Standards	<ul style="list-style-type: none"><li>• Common Examination</li><li>• Use of common 'minimum' syllabus endorsed by the Panel of experts;</li><li>• Engage staff who are qualified and experienced.</li></ul>

Source: Data summarised from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire (Part E:4).

A system of testing is used in at least two training organisations. One Training coordinator stated that:

<sup>10</sup> Personal communication with Mr Ben Warner, Managing Director, Project Solutions Pty Ltd, Port Moresby-PNG (Fieldnote July 4, 1996).



...students from another training organisation were asked to sit for an entry exam to test whether they really have gone through the course. The certificate they produce as evidence of past training course is not taken as a proof (Tipora, 1996).<sup>11</sup>

#### **7.4.5.4 PNG Information Technology Council (PNG-ITC) [Part E:6]**

The respondents were asked for their views on the possible formation of a national body such as PNG-ITC. This independent body (PNG-ITC) would be comprised of specialists drawn from: computing fields, curriculum and education fields, private computer training providers, and private sector organisations. The functions of this body will be among other things to; formulate guidelines for computer curriculum, set or establish educational standards such as national examination in computer studies, and certify nationally recognised computer skills qualifications to trainees.

There were four questions asked:

- a) Who else in addition to those mentioned above should serve on the PNG-ITC?;
- b) What would be some of the aims and objectives of this body?;
- c) What suggestions would you like to make that might help PNG-ITC to perform its duties and carry out its responsibilities well?; and
- d) What additional functions apart from those stated above which you see as being performed by the PNG-ITC? [These questions are respectively addressed in the following sections].

##### **7.4.5.4.1 Membership of the PNG-ITC [Part E:6.1]**

As mentioned earlier that this independent body is not intended to replace the National Training Council but instead would assist it by providing professional and technical advice regarding computer education and training in the private computer training organisations.

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<sup>11</sup> Personal Communications with Mr Teddy Tipora, Centre Coordinator, Commercial Training College in Port Moresby: PNG. Diary of interview notes, 8 July, 1996.

The membership of this body (PNG-ITC) will consist of representatives from Government departments and/or Statutory bodies and private sector organisations.

The responses to the questionnaire (Part E:6.1) indicated the inclusion of the following representatives from the Government department or statutory bodies: Education Department (ie Curriculum Development Division & Measurement Service Unit); Labour and Employment Department, Attorney General’s Office, Internal Revenue Commission, Office of Higher Education and the universities. And the representatives identified for the private sector include: computer hardware and software vendors, private training organisations, employer groups, and the Chamber of Commerce while the representatives from independent organisations will come from non-government and non-profit organisations.

**7.4.5.4.2      Functions of the PNG-ITC [Part E:6.3]**

The perceived functions of the PNG-ITC according to the respondents are wide ranging. However, the responses fall into five main functions, namely: a) Planning; b) Developing & Administering Standards or Policy Guidelines; c) Accessing relevant information & Delivering them; d) Consultation; and e) Supervision. The summary of the responses categorised according to the five major functions are tabulated in Table 7.16.

**Table 7.16      Summary of the Responses on the Functions of PNG-ITC**

Major Functions	Brief
a) Planning Functions	<ul style="list-style-type: none"><li>• Conduct nationwide surveys on the level of Computer literacy;</li><li>• Determine where the country is now and where it is heading and plan accordingly;</li><li>• Conduct needs analysis on computer skills demands, job opportunities etc.</li></ul>
b) Development & Administration of National Policies or Guidelines	<ul style="list-style-type: none"><li>• Set list of Competencies expected (at different levels);</li><li>• Certification;</li><li>• Examination;</li><li>• Syllabus/Curriculum;</li><li>• Trainers (competence and qualifications);</li><li>• Code of Ethics.</li></ul>
c) Access & Delivery Functions	<ul style="list-style-type: none"><li>• Give support such as unlimited access to computer information;</li><li>• Engage external expertise if none available locally;</li><li>• Incorporate latest information to make its decisions.</li></ul>
d) Consultative Functions	<ul style="list-style-type: none"><li>• Represent the interest of the training providers;</li><li>• Review and Revise standards established;</li><li>• Design formula for setting course fees.</li></ul>
e) Supervisory Functions	<ul style="list-style-type: none"><li>• Ensure implementation of endorsed Curriculum;</li><li>• Grant and terminate training licenses if standards are not met;</li><li>• Assess and validate training qualifications, facilities/resources and curriculum matters including assessment and certification.</li></ul>

Source: Data extracted from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part E:6.2 & 6.3].

**7.4.5.5 National Information Technology Curriculum (NITC) [Part E]**

Under the proposed National Framework, a NITC will be implemented. Although the individual courses will be developed by private training providers as is the case now, under the proposed national framework, the individual courses designed in this manner must take into consideration the guidelines established by the PNG-ITC. These guidelines must be complied with as PNG-ITC will have the authority to endorse or validate the courses before they are implemented by the individual training organisations.

Respondents were asked to suggest the possible aims or goals of such a curriculum. Figure 7.12 is the summary of the aims or goals of the proposed NITC.

**Figure 7.12                      Summary of the Perceived aims of the NITC**

- |   |
|---|
| <ul style="list-style-type: none"><li>• Set the minimum and maximum number of hours for each course;</li><li>• Set guidelines on Assessment and Evaluation of each course;</li><li>• Ensure that the courses are relevant to the needs of trainees;</li><li>• Maintain transparent curriculum for all parties concerned;</li><li>• Standardise courses and provide uniformity throughout PNG;</li><li>• Ensure national skills requirement is met;</li><li>• Raise computer literacy levels in the country for different work environments, eg, Users, Analysts, Technicians, Administrators, etc;</li><li>• Further enhance people with experience and knowledge in software, hardware, and communications equipment in the workplace;</li><li>• Develop a career path for those wishing to progress onto higher levels;</li><li>• Set guidelines for trainers to operate within the parameter defined;</li><li>• Regulate computer skills training programmes in PNG; and</li><li>• Develop a mechanism by which courses offered are monitored for their compliance of guidelines and procedures established.</li></ul> |
|---|

**Source:** Data summarised from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part E:5.2].

**7.4.5.5.1              Perceived Important Features of the National IT Curriculum**

Additional features of the NITC perceived as important by private computer training providers are many and different reflecting their different backgrounds and objectives. While some features mentioned are similar to the aims and functions of the NITC, there are others which are unique to this section. The unique features considered important in the NITC are summarised in Figure 7.13.

**Figure 7.13**                      **Summary of Important Features of NITC**

- *Practically oriented and applicable to meeting job demands;*
- *Upgradeable to advanced levels or changed to accommodate changing environment and technology;*
- *Structured to cater for all levels (beginners to experienced, simple to hard, basic to advanced);*
- *Standard training methods;*
- *Provision for different areas in the industry (eg. Users, Analysts, Administrators, Technicians;*
- *Provision to assess the trainees and evaluate the programme;*
- *Provide for minimum and maximum number of hours required;*
- *Description of each course (aims/objectives, prerequisites, materials/resources, list of topics/content, assessment/evaluation,.*

**Source:** Data summarised from the responses to the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part E:5.1].

#### **7.4.5.5.2          National Computer Examination**

Under a national framework (eg, PNG Information Technology Council and National Information Technology Curriculum), the respondents were asked if there should also be a national examination in the private computer training organisations. While 63% of the respondents were in favour of a national computer skills examination, 37% opposed such an examination.

Those arguing in favour of a national examination were of the view that such an examination will ensure that computer skills curriculum delivery maintains a high standard. One training provider commented that the use of national examination: *‘...will really determine the effectiveness and quality of training provided for the trainees and this will give the public a better view of the different training institutions.’* Another pointed out that a national examination is one way of nationally ‘recognising’ the training provided by private training institutions. The certificates or the awards received under such scheme will carry much more value and weight because they would be based on a recognised national curriculum and nationally examined subjects.

One training provider who argued strongly in favour of a national exam said: *'As it is now, people are given certificates at the end of the course for **attendance**, it (should instead) be certificates based on **performance**, so people (trainees) can put some effort into achieving high grades.'*<sup>12</sup> (emphasis added).

In contrast, those opposing the idea of a national examination on IT Curriculum were of the view that: *'It will be difficult to conduct 'national' level exams for software application usage'*, stated one training provider. Another provider argued that, *'...there are too many areas to cover because for most training institutions (given their resource limitations), it will be difficult to organise such an exam.'*<sup>13</sup>

Another stated that rather than a 'national' level computing examination, *'...each individual training provider can still administer their own short tests for each course...'*, and further suggested that: *'....semester-long courses should be arranged and examined under this scheme.'*<sup>14</sup> The idea of national examination is taken up further in the next section as well as Chapter 8 (section 8.1.2.3)

#### **7.4.4.6 Brief Summary of this Particular Section**

At present private computer training in PNG is conducted by individual training organisations without any formal framework. Each training provider does virtually anything it considers worthwhile to pursue its commercial interest and goals. There is no order - except only recently when the National Training Council and the Internal Revenue Commission with completely different briefs, (the former is responsible for all private

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<sup>12</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

<sup>13</sup> Comments extracted from a response made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire

<sup>14</sup> Comments extracted from a response made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

training institutions while the latter is responsible for collecting taxes for the government) came together to provide ‘some order’ in private training organisations in PNG.

Under a National Framework, private computer training and private training providers will adopt and implement set standards, thus bring about ‘order’ in computer education and training in the country. Features considered important under this framework include:

- Establishment of a national body or panel of experts and interest groups to pool their expertise;
- Set standards and monitor or enforce them;
- Approve Computer Course syllabus or curriculum for use in PNG;
- Validate and certify qualifications awarded by private training organisations; and
- Encourage staff development and training in computer studies subjects (See Table 7.13)

The courses offered under this framework should be structured from beginner level to advanced, each achieving specific competencies established by the national body and assessed using agreed assessment procedures. Any such courses conducted will be recognised if the criteria identified (See Table 7.14) by training providers were met. However, additional criteria such as: use of agreed syllabus, reputation of the training providers and use of established standards (See Table 7.15) would also count.

Under the national framework a PNG IT Council (PNG-ITC) with membership drawn from both the government and private sector would advise both the government and training providers. Among other functions identified by the training providers; the PNG-ITC would be responsible for: planning and researching, developing and administering national policies or guidelines for training providers, accessing information from various sources both locally and overseas and delivering them to the training providers or other interested parties, consult, and supervise the implementation of the computer curriculum (See Table 7.16).

Further, a National IT Curriculum (NITC) is envisaged under the proposed national framework (See Chapter 9). The individual computer courses would be researched and developed by the individual training provider in compliance with the guidelines established by the PNG-ITC. The aims of the NITC would be to set standards and guidelines on the computer curriculum (See Figure 7.12) for training providers to implement.

Although over 63% of the respondents were in favour of a National Computer Examination, they conceded that it was not practically possible to cover the wide ranging topics in different software application courses in such an exam. However, they suggested that if the courses were taught on a semester-basis, it would be possible to have examinations from semester to semester. The use of examinations would help training providers to build quality assurance mechanisms into their training program and incorporate established standards. Examination helps to determine the quality and effectiveness of training conducted and adds value to the certificate or qualification awarded.

#### **7.4.6 Current Level of Computer Development in PNG<sup>15</sup>**

To ascertain the current level of computer development in PNG, two questions were asked. The first one asked the training providers to describe the current level of Computer Development in PNG based on their own awareness and knowledge of computer related training activities carried out in the country. The second question was to determine which of the four levels of computer development (Initial, Basic, Operational and Advanced as classified by Lau (1981)) they believe PNG is in at this stage of its development.

Opinions expressed in response to the first questions were mixed. In general the respondents believed that PNG is entering the *user* level and although computer usage is at

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<sup>15</sup> *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part G: 1 & 5].



a *low* level compared to other developed countries, the demand for computer related training is high. For example, one training provider described current level of computer development in Government, Education and Home use as ‘low’ but ‘moderate’ in the private sector (business community). This low level of computer development is fast changing as more private sector employers demand graduates with some basic knowledge in both theory and application which in turn puts pressure on trainees/students to seek computer training at application user level. One training provider predicated that in 3 - 4 years time, ‘Developers’ will come out of PNG without elaborating further what she meant. These ‘developers’ are what this author believes would emerge from the ‘knowledge industries’ when IT is fully implemented in PNG ( See Chapter 9).

Unlike the responses to the first question, views expressed on the second question have all shown that respondents believed that the levels of computer development in PNG is at the *Basic level* as per Lau’s (1981) classification. One training provider stated that: ‘*PNG is at present on the basic level and it should look at improving more in terms of educating the population in computer awareness*’.<sup>16</sup> The provider further pointed out that general computer awareness courses should be provided nationally (preferably in schools) at the ‘base’ levels in order for people to progressively advance onto the ‘operational’ and ‘advanced’ levels by Lau’s classification.

#### **7.4.6.1 Where Computer Development in PNG is Heading?<sup>17</sup>**

One question was asked in order to determine the beliefs of the respondents about the future of private computer education and training and where the level of Computer Development in PNG is heading. This question asked which direction they think PNG is heading given the current status and level of Computer Development occurring in the country.

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<sup>16</sup> Comments extracted from a response made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

<sup>17</sup> *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part G:2].

Responses to the question showed a general agreement that PNG is heading into '*...the unknown future like the rest of the world*'; in the words of one training provider. That 'future' or 'direction' which PNG is heading towards is both good and bad. A training provider stated that: '*...PNG is heading into a direction which sees a lot of manual jobs being automated...*', while another wrote: '*PNG is heading in the right direction, but it has to do more so that most of our people should become more aware of the use of computers.*' However, a prominent training provider painted a gloomy picture saying: '*If I am only a 'Computerist' I would be very optimistic. But being an accountant [and] understanding the trend in the overall country's economy, my view is not that optimistic.*'

The responses were nicely summarised by a trainer from a popular and well established training organisation who stated that: '*The computer industry is taking off, as a result leaving a lot of its human users behind. Papua New Guineans who don't receive proper training leave gaps for expatriates to come in. Human Resource Development is very important.*'<sup>18</sup>

#### **7.4.6.2 Where Computer Development in PNG Should be Heading [Part G:3]**

In reference to the Lau (1981) classification of the Level of Computer Development, the respondents were asked to state which level they would prefer to see PNG work towards in the next decade or so. The responses indicate that PNG's level of Computer Development began at the 'Basic' level but is fast approaching the 'Operational' level and before long it will be in the 'Advanced' stage.

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<sup>18</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

One prominent training provider stated that PNG is at the 'Operational' level of computer development. He went on to say that: *'There will be a time later on for the Advanced level. PNG should take things one at a time since its just a developing country. There's no rush to get to Advanced [level] so quickly - the time will come.'*<sup>19</sup>

According to one training provider whose company has been involved in networking and communications and installation of electronic banking system for the major commercial banking network in the country (the PNG Banking Corporation), computer development in PNG is heading the internet or the networking way. The training provider stated that: *'The internet, networking and communications, ...we have debit cards with electronic banking, soon we will have the internet [to] make our travel bookings, [and] international banking transfers [will be] made easy'*.<sup>20</sup>

Another training provider would like to see internet use in PNG. The trainer sees the internet as an important educational tool for use by students. He would also like to see LAN to LAN communications via computer networks and more industry-based applications rather than business or office oriented training courses. Internet service has already been introduced since November 1997 (the questionnaire was completed almost a year earlier in July 1996).

#### **7.4.6.3 How should PNG achieve the preferred Level of Computer Development [Part G:4]**

Having commented on: a) the current level of computer development in PNG based on the training providers own knowledge and experience together with Lau's (1981) classification of levels of computer development; b) where PNG is at the current level of computer

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<sup>19</sup> Comments extracted from a response made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

<sup>20</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

development in the country; and c) where PNG should be heading in the next decade or so, the respondents were asked to state what PNG as a country should do now if it is to reach their preferred stage or level of computer development. Table 7.17 summarises the suggested areas and the necessary actions PNG should take now in order for it to reach the respondent’s preferred stage or level of computer development.

**Table 7.17                      Summary of areas and corresponding actions suggested in order for PNG to achieve the preferred level of Computer Development.**

Suggested Area	Suggested Actions
a) Human Resource Development or Education and Training	<ul style="list-style-type: none"> <li>• Introduce well-structured courses at various stages of the formal education system;</li> <li>• ‘Train-the-Nation’ computer awareness or public awareness campaign;</li> <li>• Understand and Recognise importance of Computer Education at all levels of the Education system.</li> </ul>
b) Support all Computer Trainers and Trainees	<ul style="list-style-type: none"> <li>• Declare tax-free operation for Computer trainers in PNG;</li> <li>• Less tax on computer hardware and software used in education and training;</li> <li>• Offer scholarships for PNG national to take up studies abroad.</li> </ul>
c) Physical Infrastructure	<ul style="list-style-type: none"> <li>• Computer Networks;</li> <li>• Telecommunications system;</li> </ul>
d) Developmental Approach	<ul style="list-style-type: none"> <li>• Progressively work towards developing software and manufacturing hardware</li> </ul>

**Source:** Data extracted from the responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part G:4].

**7.4.6.4 Brief Summary of this Particular Section (Section 7.4.6)**

The current level of computer development occurring in PNG is ‘low’ in government, education and home according to the private training providers. The demand for computer knowledge and skills is on the rise, hence the popularity of private commercially-run computer training organisations. However, the level of computer development in PNG using Lau’s (1981) classification is at ‘Basic’ level. At this level there is some understanding of computers in government and private decision centres, few computer

installations are found in the country, some nationals are involved in computer operations and software application user level, and some educational or training institutions conduct courses on computer technology. However, more public awareness at the base level of the workforce is essential if computer knowledge is to progress further.

At the current level of computer development, eg, user level or 'Basic' level by Lau's (1981) definition, many training providers are of the opinion that PNG's level of computer development is heading into an unknown future (for better or worse), without paying much attention to the bulk of the people who do not have any opportunity of acquiring computer skills but may be affected by computers in various forms. While computer development in PNG is progressing towards levels higher than 'Basic', the human users are left behind with little formal computer education and training opportunities. Computer training providers surveyed believed that PNG should do more to develop its human resources in IT areas if it is to reap the benefits of skilled computer personnel in the years to come.

The training providers while agreeing that computer development is progressing gradually from 'Basic' level to 'Advanced' level, the general growth trend is moving towards computer networks and communications, for example the internet. Already large commercial organisations in PNG such as banks, airlines and hotels are using computer communications. Banks are using electronic banking system for example, ATMs and EFTPOS facilities, while airlines, car hire companies and hotels are using computerised reservation systems just to name a few applications. Three Internet Service Providers (ISPs) began advertising in PNG to gauge the interest of the potential internet users in preparation for full internet service by the end of 1996 (*PNG Post Courier*, July 24, 1996). By November 1997, many organisations had access to internet service through one of the three ISPs, for example, Datec (PNG) Pty Ltd. The internet is quickly being harnessed by many organisations, for example, the College of Distance Education is to connect its more

than 20 provincial centres and sub-centres through CODENET which will be operational by commencement of the 1998 school year (*PNG Post Courier*, Nov 26, 1997). PNG's oldest stockbroker, the Kina Securities is also planning to launch its internet site 1998 to display all PNG listed stocks and buy and sell prices of stocks which will be updated daily as required (*The National*, Dec 16, 1997). Even some government information is now made available on the web for the information of the public which indicates that internet is growing rapidly in PNG (*The National*, Dec 18, 1997).

The training providers suggested that in order to facilitate and strengthen this trend in the level of computer development in PNG, the following areas must be attended to:

- Human Resource Development or Education and Training,
- Supporting computer training (which includes training programs, Trainers and Trainees),
- Physical Infrastructure development such as Telecommunications and networks,
- Developmental approach with the aim of working towards developing software and manufacturing or assembling hardware (See Table 7.17). Already one firm is involved in importing computer hardware components and assembling PNG's first computer system, NiuLogic Computers since 1995<sup>21</sup>.

#### **7.4.7 Future of Computer Training Courses in Papua New Guinea<sup>22</sup>**

This part of the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire, was aimed at obtaining the views of the training providers on the future of computer education and training in PNG given the level of computer development occurring in the country and the changing nature of computer technology not just in PNG but also the wider world.

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<sup>21</sup> See Daltron Electronic Pty Ltd Web site at URL: <http://daltron.com.pg/frames90.htm> [Accessed January 13, 1998].

<sup>22</sup> *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part F].

The specific questions asked are: a) what might happen to the computer training courses in PNG?; b) what necessary changes are required (for example in; private training organisations, computing curriculum, policy changes, and the government's role)?; and c) what would be the ideal environment under which computer training would be conducted? These questions are addressed in the following sections.

#### **7.4.7.1 What might happen to Private Computer Training in five to ten years time? [Part F:1]**

Nearly all the respondents agreed that private computer related training will continue to grow in popularity in response to the demands from people wishing to obtain computer skills and knowledge in order to gain employment. For example, one training provider stated that: *'There is a high demand for training which will mean that there will be a big expansion (ie. for existing firms) and probably more additions to the number of established firms. [And] as computer literacy increases, courses will have to cater for more advanced levels of training.'*<sup>23</sup> Another provider added that: *'More and more concept type courses and technical courses will surface as a result of the demands...'*<sup>24</sup> in the next few years.

Further more, a training provider stated that it is impractical to even contemplate where PNG will be heading in the next five to ten years because the *'... computer technology will be far more advanced than at present.'*<sup>25</sup> Those training providers who are not competitive enough will be either defunct or absorbed into those that are already competitive. The competitive providers will build from this competitive advantage over those that aren't

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<sup>23</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

<sup>24</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

<sup>25</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

competitive enough. Furthermore, only those trainees who can afford the course fees will have access to those competitive and costly training courses.

#### **7.4.7.2 What are the necessary changes? [Part F:2]**

Computing and information technology is a fast growing area and a changing or a dynamic subject. Therefore, computer education and training courses conducted in PNG like anywhere else are more than likely to change within the next five to ten years. The respondents were asked to:

- a) List some of the changes they as a training organisation are likely to make under such changing environment [Part F:2.1] (section 7.4.7.2.1);
- b) List the curriculum and structural changes other training organisations should make to their training courses [Part F:2.2] (section 7.4.7.2.2);
- c) Suggest policy changes regarding computer related education and training in PNG [Part F:2.3] (section 7.4.7.2.3); and
- d) Identify the roles they would like the government to play in order to enhance or promote computer related training in the private training organisations in PNG [Part F:2.4] (section 7.4.7.2.4).

These questions are respectively presented under the following sections.

##### **7.4.7.2.1 Planned areas of Change in the Private Training Organisations**

There are several changes the private training organisations are likely to make in the changing environment of computing and information technology in PNG. All the training providers indicated that they will change their training program in one way or another within their organisation. The thrust of all their responses point to the fact that there will definitely be changes. The changes identified (See Table 7.18) are categorised under four basic areas: Staff Development & Training, Expansion of Training Facilities, Training Program, and Monitoring of the general trend in the IT industry.



**Table 7.18      Planned areas of Change anticipated by Training Providers**

Planned Area of Change	Details
a) Staff Development & Training	<ul style="list-style-type: none"><li>• Upgrade knowledge/skills of trainers;</li><li>• Computer instructors to pursue further studies either in-county or abroad;</li><li>• Changes in technology requires immediate professional development of trainers in the subject.</li></ul>
b) Expansion of Training Facilities	<ul style="list-style-type: none"><li>• Establish and expand training organisations to other centres in PNG;</li><li>• Identify ‘target’ areas for training;</li><li>• Have newer, larger, and modern training facilities to cater for more people;</li><li>• Networked training room with relevant hardware, software, and courseware..</li></ul>
c) Training Program	<ul style="list-style-type: none"><li>• Update/Revise computer training curriculum, materials, and methods;</li><li>• Keep up with the pace of development by offering the latest and the most appropriate training;</li><li>• Liaise with actual consumers to develop systems with students;</li><li>• Develop more computer related courses;</li><li>• Open training doors to as many people as possible;</li></ul>
d) Monitor the Trend of Development	<ul style="list-style-type: none"><li>• Identify training ‘needs in the workplace’;</li><li>• Monitor hardware and software changes or developments,</li><li>• Identify developments taking place in computer training in PNG as well as other countries;</li><li>• Identify lessons learnt in other countries and incorporate them into PNG.</li></ul>

*Source:* Data summarised from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part F:2.1].

**7.4.7.2.2      Curriculum and Structural Changes to be made by other Private Training organisations**

Here the respondents were asked to list the Curriculum and Structural changes they would like to see made by other private computer related training organisations. Their responses fall into six basic areas which are summarised in Table 7.19.

**Table 7.19      Summary of Curriculum and Structural Changes to be made by Private Training Organisations**

Curriculum Changes Identified	Structural Changes Identified
<p>a) <b>STRUCTURED COURSE</b></p> <ul style="list-style-type: none"> <li>• Uniformity in course design and structure;</li> <li>• The course must lead on to the next level.</li> </ul>	<p>a) <b>NATIONAL TRAINING COUNCIL</b></p> <ul style="list-style-type: none"> <li>• All training organisation must register with the National Training Council;</li> </ul>
<p>b) <b>COMPUTER CURRICULUM</b></p> <ul style="list-style-type: none"> <li>• Be more practical and work related;</li> <li>• Students be engaged in job experience with private sector employers;</li> <li>• Must meet local skills needs and demand;</li> <li>• Use uniform Curriculum</li> <li>• Must be regularly updated to reflect the trend in the industry</li> </ul>	<p>b) <b>DECENT TRAINING FACILITIES</b></p> <ul style="list-style-type: none"> <li>• Training facilities must be conducive to maximising learning;</li> <li>• Provide sufficient resources to enable students to have hands-on practical activities;</li> <li>• Use of old and out-dated equipment must be discouraged;</li> <li>• Poor resources mean Poor quality training;</li> <li>•</li> </ul>
<p>c) <b>TRAINING MANUAL</b></p> <ul style="list-style-type: none"> <li>• High standard of training manual and other training materials;</li> <li>• Must be transparent enough for trainees and their sponsors to see what they are investing in;</li> <li>• Materials produced must reflect the workplace requirement.</li> </ul>	<p>c) <b>COOPERATE BETWEEN TRAINING PROVIDERS</b></p> <ul style="list-style-type: none"> <li>• Training providers should cooperate with each other rather than working in isolation;</li> <li>• Complement each others activities;</li> <li>• Liaise with other training providers.</li> </ul>

Source: Data summarised from the responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part F:2.2].

**7.4.7.2.3      Policy Changes in Computer Education and Training**

In order to accommodate the changing nature of computer technology especially in the area of computer related courses or computer education and training in PNG, several policy changes must be made. These policy changes, if developed and implemented in the country by the government, will enable computer training organisations to help improve the quality of computer education and training in the country.

The respondents were asked to identify some of the policy changes they think are needed in the area of private computer training. Their responses are summarised in Figure 7.14.

**Figure 7.14    Summary of some of the Policy Changes suggested by Private Training Providers**

<p><b>a) Introduce Computer Studies</b></p> <ul style="list-style-type: none"><li>• Introduce Computer Studies into the School curriculum (especially at Grade 9 and 10 level);</li><li>• Students should be familiar with the basics by the time they leave secondary schools;</li></ul> <p><b>b) Tax Incentives</b></p> <ul style="list-style-type: none"><li>• Provide tax-free business operations for all computer training providers;</li></ul> <p><b>c) Copyright Law:</b></p> <ul style="list-style-type: none"><li>• Encourage the adoption of Copyright law in PNG to protect the training provider’s literature and software development;</li><li>• Encourage individual initiatives and creativity through copyright protection;</li><li>• Protect individual creativity and invention.</li></ul> <p><b>d) Ensure expensive computer hardware are affordable</b></p> <ul style="list-style-type: none"><li>• Computer hardware are essential tools for business and education;</li><li>• Reduce tariff on computer hardware used for educational &amp; training purposes.</li></ul> <p><b>e) Make Computer Training available and affordable</b></p> <ul style="list-style-type: none"><li>• Government should sponsor students (its employees) to study computer subjects in the private training organisations;</li><li>• Government inject funding into the well organised computer training schools;</li><li>• Encourage private training organisation as ‘partners in training’.</li></ul>
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Source: Data summarised from the responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part F:2.3].

**7.4.7.2.4        What Roles should the Government play?**

What role should the government play in enhancing computer related training conducted in the Private Training Organisation? While there were many responses in favour of the many roles the government should play, only one provider is satisfied with the present arrangement with the National Training Council and does not wish to see it changed. The other responses suggesting possible roles the government should play are summarised and tabulated in Table 7.20.

**Table 7.20      Summary of the major Roles the Government should Play**

Major Roles	Details
<b>a) PROMOTE &amp; FACILITATE COMPUTER TRAINING</b>	<ul style="list-style-type: none"><li>• Provide scholarships for students to undertake computer studies in the Private Training Organisation;</li><li>• Promote training services in the country;</li><li>• Encourage the involvement of private training organisations in rural areas;</li><li>• Introduce government funded computer education centres;</li><li>• Computerise the government departments;</li><li>• Encourage their employees to attend computer studies course</li></ul>
<b>b) REGULATE COMPUTER TRAINING</b>	<ul style="list-style-type: none"><li>• Set control procedures in computer related courses to ensure no half-baked courses are offered just to make quick bucks;</li><li>• Regulate policies regarding tariff reduction on computer hardware/software for educational use;</li><li>• Structured courses are offered which satisfies the established standards.</li></ul>

**Source:** Data are summarised from the responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part F:2.4].

**7.4.7.3 Brief Summary of this Particular Section**

Given the changing nature of computer technology and the current level of computer development occurring in PNG, training providers were asked to speculate on what might happen to private computer training in PNG within the next five to ten years. They were asked to identify the following: a) the changes necessary to bring about the required improvement in private computer training, and b) the ideal environment under which computer training in the country would develop and prosper in both profitability and making positive contribution towards human resource development efforts in PNG.

The private computer training organisations will expand to include additional courses and establish additional training centres to cater for advanced levels of training requirements needed in the workplace as well as meeting the demands from others who need to obtain

computer skills. The training organisations will have to be competitive in the future and only those that are profitable and competitive will remain in the computer training business. Several changes were planned or identified by private computer training providers (See Table 7.18) to be incorporated into their training program. Most of these changes will be implemented into the training organisations in the next couple of years. The *Port Moresby Business Training Institute* announced its plan to review the current courses in order to adequately prepare its students to meet the challenges of the 21st century (*The National*, Dec 3, 1996). Other changes suggested by training providers were:

- Curriculum and Structural changes (See Table 7.19) to be made by individual training providers,
- Policy changes (See Figure 7.14) to be addressed by the government, and
- Supportive and Regulatory roles of the government in the context of private computer training in the country (See Table 7.20).

The Curriculum changes identified include: course structure, computer curriculum and training manuals while structural changes include: registration of training organisation which meet standards established by the National Training Council and cooperation between training providers (See Table 7.19). The suggested Policy changes (See Figure 7.14) pointed out areas that fall directly within the government's responsibilities and would need government action in order to help raise the standard of training conducted and support their operations with appropriate policies and regulations. For example, provide Tax incentives to computer training providers, reactivate the Copyright Act 1978, reduce tariffs on computer hardware components, and introduce computer studies subject into the public schools curriculum. In addition to these policy changes, the government's present passive roles regarding IT should change in order to actively regulate, promote and facilitate computer education and training in PNG (See Table 7.20).

7.4.8                    **The ideal environment under which to conduct Computer Training<sup>26</sup>**

What would be the ideal environment under which Private Computer related Training Organisation can operate efficiently and profitably? The respondents were asked to state the ideal conditions which in their view would help increase their profitability and efficiency.

Their understanding of an ideal environment varies as demonstrated in the views expressed by the respondents of the questionnaire. While some looked at it from the micro point of view or individual institutional level, others took the macro view or the national level. The summary of those views are tabulated in Table 7.21.

**Table 7.21      Summary of an Ideal environment under which to conduct Computer Training**

Micro level (Institutional Level)	Macro Level (National Level)
<ul style="list-style-type: none"><li>• Small student numbers in a training program;</li><li>• One person to a PC;</li><li>• Backup with good reference materials;</li><li>• After-training support for trainees;</li><li>• Need more technically trained and qualified trainers;</li><li>• Well-researched courses and well-equipped training facilities;</li><li>• Revise courses based on researched needs and conduct them according to established standards;</li></ul>	<ul style="list-style-type: none"><li>• Healthy vibrant economy;</li><li>• Tax-free and loan support for Training Organisations;</li><li>• Government to recognise Computer Training conducted in the private training organisation;</li><li>• Enable selected Private Training Organisations to be a ‘Partner in Training’;</li><li>• Government funding for selected training organisations to provide training for the Public Service.</li><li>• Appropriate legislation to support and enhance training conducted in the private sector.</li></ul>

Source: Data summarised from the responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part H:2].

<sup>26</sup> *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire [Part H].

**7.4.8.1 Brief Summary of this Particular Section**

The training providers identified what they considered as the ideal environment under which private computer training would prosper and grow (See Table 7.21). They identified two such environments, one at micro level and the other at macro level. The former is to be implemented at the institutional level by the individual training provider while the latter is to be implemented at the national level in cooperation with the government. Each will be performing different tasks but for the collective benefit of computer training in the future.

**7.4.9            General Comments/Suggestions [Part H:1]**

Respondents were asked to make any general comments or offer suggestions that might help either the present research or the future of Private Computer related Courses/Training in PNG.

With regard to the first part of the question, only one training provider supported the research being conducted with the following comments: *‘Computer is a fast growing technology and it also provides business opportunities. We are glad that at least a Papua New Guinean is carrying out a research in this regard so as to throw some light into how training could be carried out for the government’s consideration.’*<sup>27</sup>

However, the second part of the question generated many important points of view or suggestions from the private training providers. These points of view were considered by the training providers as important. It is not surprising that some of these points of view or suggestions have also been highlighted under other sections within this chapter because of the intertwining nature of the research undertaken. Their specific responses are summarised and tabulated in Table 7.22.

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<sup>27</sup> Comments extracted from responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire.

**Table 7.22      Summary of Suggestions or Comments made by Private Training Providers.**

Suggested Area	Main Features or Details
a) PROFESSIONAL ASSOCIATION OF COMPUTER TRAINERS	<ul style="list-style-type: none"><li>• A peak body which can speak with authority or be consulted;</li><li>• A voice to represent computer training providers;</li><li>• Membership drawn from training providers, trainers, practitioners, etc;</li><li>• Liaise between training providers and other parties.</li></ul>
b) COMPUTER AWARENESS/LITERACY	<ul style="list-style-type: none"><li>• Introduce computer awareness or computer literacy into grade school (Grade 9-10);</li><li>• High School computer studies course ought to be focussed and given direction towards a national goal.</li></ul>
c) COMPUTER RELATED COURSES	<ul style="list-style-type: none"><li>• Course aims must be realistic;</li><li>• ‘Courses should be standardised’;</li><li>• Training should be made relevant to local needs;</li><li>• Accessible and affordable to as many people as possible;</li><li>• Must be cost-effective.</li></ul>
d) TRAINING INSTITUTIONS & TRAINING FACILITIES	<ul style="list-style-type: none"><li>• Existing training institutions be encouraged &amp; supported;</li><li>• ‘University computer training should be upgraded’;</li><li>• Networks should be set up between PNG universities to share ideas of common interest;</li><li>• Training institutions must carry out their own research on market trends and devise their training courses accordingly;</li><li>• Extend training activities to other centres of PNG.</li></ul>
e) STANDARDISATION	<ul style="list-style-type: none"><li>• Standardise computer curriculum, and courses structured for each level of study;</li><li>• ‘Standardisation of software used in all government departments - both national and provincial’</li></ul>
f) GOVERNMENT SUPPORT	<ul style="list-style-type: none"><li>• Reduce import duty on computer equipment which at present stands at 11%;</li><li>• Support/encourage/‘recognise’ computer trainers in PNG and their contributions in HRD;</li><li>• Provide special loan scheme to enable computer training providers to secure funds for computer education and training in PNG;</li><li>• Cooperation between government and training providers- government provides and facilitates conducive environment for training providers to conduct training, hence help in HRD.</li></ul>

Source: Data summarised from the responses made in the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire. [Part H:1].

**7.4.9.1 Brief Summary of this Particular Section**

In an open-ended statement, private training providers (respondents) were asked to make any general comments or suggestions about either the research being conducted or the future of private computer training in the country. Only one training provider encouraged



and spoke positively of the contribution the research would make towards computer education and training in the country. The rest of the respondents made some important suggestions (See Table 7.22), as to how they would like the computer training organisations and computer training curriculum in the country developed (eg, introduction of computer awareness/literacy at school level), supported and strengthened (eg, set standards and draw up guidelines on computer curriculum). These areas were, suggested in view of the changing nature of computer technology globally and private computer training nationally. The suggested areas (See Table 7.22) will help to raise the profile or status of computer education and training conducted in the country, hence give the attention it deserves so that any training conducted complied with established standards and policy guidelines. This will help to improve the quality and standard of training conducted in the private training institutions.

## **7.5 Summary**

In Chapter 7, Research Questions One, Two, Three and Four were addressed in order to answer the respective questions.

### **7.5.1 Research Question One**

Research Question One was mainly aimed at identifying the different nature or aspects of computer skills training and development methods or schemes used by private computer training providers in PNG and whether these schemes complied with the guidelines of the National Training Policy.

There were similarities as well as differences, each of which reflected the diversity of trainers and training organisations involved in conducting computer related training. The similarity was in the fact that they were ‘conducting computer education and training’. The training was conducted as a commercial activity (under *PNG Companies Act* and the

*National Training Policy (White Paper)*). However, that is where the similarities end. There were major differences in the following aspects:

- Course content or the curriculum offered (See Chapter 6 and Appendix D);
- The mission statements (See Table 7.1);
- The nationalities, experiences and educational qualifications of the trainers (See Table 7.2);
- The delivery methods applied in the training process (See Figure 7.2); and
- The teaching facilities or resources with which computer training was conducted.

Given the diversity of training institutions and computer training programs, such diverse information is submitted to the National Training Council on a prescribed form. The information is submitted and presented in the individual Institutional Profiles in order for the National Training Council to assess and approve the respective training institutions to conduct computer related training. In essence, the institution is approved to conduct computer training. The institutions comply with the National Training Council guidelines (National Training Council, 1993a). Under this guideline, training institutions must satisfy six basic criteria or principles. These principles are:

- Provide recognised training;
- Engage qualified training staff;
- Have adequate training facilities and safer training environment;
- Be responsible and ethical in their conduct;
- Have in place financial safeguards against exploitation of trainees; and
- Build in quality control measures into their training program.

Only those training providers which satisfied the above six principles were registered to conduct computer related training in PNG (See Table 6.1 for list of training providers).

### **7.5.2 Research Question Two**

Research Question Two was designed to find out about the training providers attitudes towards the National Training Policy which affects private training providers. The questionnaire was specifically aimed at those conducting computer related training courses in PNG.

The Training Providers involved in computer skills training in PNG were generally in favour of the National Training Policy (NTP). The respondents showed a favourable attitudes towards the NTP goals and objectives, what it sets out do (eg, its expectations such as encourage and recognise private sector involvement in computer skills training and development). They saw the NTP as helping to maintain training standards which will control what is occurring in the training scene.

There was high agreement that all Training Providers should be registered with the NTC and that the NTC would periodically visit Training Providers, review their programs and maintain regular dialogue or contact in order to be kept informed of the developments in both sectors. They felt that the requirements of the NTC can be achieved within their organisation. They indicated, however, that NTC/NTCS should not monitor their training activities without giving any reasons.

There was uncertainty in the penalty of K1000 imposed by NTC for falsifying or failing to provide information, and whether they received any prompt response from NTC. They were also uncertain of whether they received any specific information on the training needs of computing personnel and whether all providers were given any specific guidelines as to the provision of computing skills training.

The Training Providers' attitudes regarding accreditation was neutral for both course and institutional accreditation from the NTC. They strongly believed that they have qualified trainers to conduct training in their organisation. They stated that the computing skills training conducted should have the potential to help trainees get jobs. They also saw that there was a need for computer skills training for PNG nationals. They felt too that the trainees should be covered against exploitation of all kinds. The courses they conducted were different from other training organisations in the country. That was why they conducted their program independently from other Training Providers in the country.

The Training Providers ranked training objectives related to improving and empowering the individual trainees and potential workers higher than those about Training Providers themselves or even those that fall within the government's responsibilities. For example, profitability and competition, localisation and equity issues (women's participation), and dependency were all ranked low compared with improving the skills, knowledge, productivity, and efficiency of individual trainees were highly ranked in the top 7 objectives.

The Training Providers suggested that an independent body be established which will be responsible for the following functions:

- a) Set standards and guidelines, monitor and evaluate its implementation in the context of computing skills training;
- b) Identify specific computing skills requirement in the workplace;
- c) Coordinate and screen all trainers and Training Providers;
- d) Coordinate with government, statutory bodies and private sector to develop a strategy that will use expertise and experience of all parties concerned for the common good of all.

The main weaknesses of NTP as perceived by the respondents indicated that it was too broad and does not address specifically the computer related education and training in the country.

Some of the main strengths of NTP are that it would help to: regulate and monitor training programs in PNG, enforce training standards, provide an opportunity for cooperation between Training Providers and the government, support and recognise the private sector involvement in training, and help ensure that the trainees are not unnecessarily disadvantaged.

So in order to address the specific needs of different training providers, persons with relevant expertise be drawn in from both the public and private sector and engage them to offer advice and consult on the different subjects. In this case persons with expertise in computers, education, and curriculum should be engaged from time to time to advise the NTC and NTCS on matters relating to computer education and training in the private sector. This body would influence training providers, act as a catalyst and an agent for change by breaking down barriers between the government systems such as public service, education, the Internal Revenue Commission, the National Training Council, the training providers, and coordinate between these entities.

Furthermore, the private computer skills training providers would be more actively involved in all stages of formulating policies that will affect them and their training activities. Computing related skills are a specialist in nature and therefore education and training should not be left to the whims of the so-called 'computer specialist' to conduct training in whatever manner they fancy. It must be given serious attention in order to ensure that Training Providers in this field do not capitalise on the ignorance of the authority and the loopholes (if any) in the system to further enhance their personal commercial interest at the

expense of ordinary Papua New Guineans. Many PNG nationals strive hard to make ends meet in their struggle to acquire a marketable and employable skill, upgrade their qualifications and knowledge, and catch up with technological tools of the workplace so as not to be left out of the competition from potential job-seekers now and in the future.

### **7.5.3 Research Question Three**

Research Question Three was aimed at analysing the existing government policy and legislative initiatives in order to determine whether such initiatives are effective and help to facilitate IT education and training in PNG. The following are the main points from that analysis:

7.5.3.1 The *National Training Policy* is too broad and does not specifically address IT education and training in the country.

7.5.3.2 The *Training Levy* concept has a potential to facilitate IT education and training. There must be a shift in emphasis from the general skills in non-computing fields to IT education and training in order to qualify for Training Levy in computer related courses or training programs.

7.5.3.3 The *PNG IT Policy for the Public Service* has the potential to facilitate IT education and training within the public service, for example, at the PNG Institute of Public Administration. However, this policy was intended for the public service and therefore is unlikely to be implemented in the private sector. Hence, the policy has limited potential to facilitate IT education and training in the private training organisations.

7.5.3.4 *PNG Science and Technology Council Act 1992* cannot be implemented and hence, IT education and training cannot be facilitated because of several reasons:

- a) The S&T Council has not been established yet;
- b) The private sector cannot implement S&T matters (eg, IT education and training) without a coordinating authority such as the S&T Council;
- c) The private sector does not have the authority to implement S&T under this Act even though it may be conducting IT related courses;
- d) S&T matter come under two separate entities and therefore no one entity is directly responsible for its implementation (*The PNG Times*, March 30, 1995; *The National*, July 30, 1997).

7.5.3.5 There appears to be two separate accreditation bodies - one for the higher education (public sector) and another for the private training providers. The National Training Council (NTC) is responsible for the latter. However, there was no evidence as to whether the individual courses currently on offer were 'accredited' by NTC, because the advertised course were said to be 'approved' for Training Levy purpose by the Internal Revenue Commission (IRC) (*The National*, July 31, 1996; *PNG Post Courier*, June 11, 1996).

The policy initiatives examined and briefly analysed have many inherent limitations even though there may be some potential to promote IT education. However, in general, the policies and legislation analysed are uncondusive to facilitating IT education and training in PNG. Therefore, it is necessary to take a national approach to formulating a National IT Policy and a National IT Curriculum to address IT education and training in the country.

7.5.3.6 As pointed out already, the existing policies and legislation, have been formulated on an ad hoc basis and in isolation from each other. Therefore, such policies contribute little to facilitate IT education and training in the country. While each ad hoc policy initiative has a potential to facilitate IT education and training, they are limited in more than one way.

For example, the *National Training Policy* and the *Training Levy* are found to be too general and does not specifically address IT education and training. Further, the *PNG IT Policy for the Public Service* and *Accreditation and higher Education in Papua New Guinea* were only intended to be implemented in the public sector. The private sector interest was to be taken care of by the National Training Council. The goals of *PNG Science and Technology (S&T) Council Act 1992* cannot even be implemented since the S&T Council has not been established by 1998.

The existing policies and legislation have their individual virtues and limitations which have been addressed. From the brief analysis conducted on the existing policies, it can be concluded that under the current ad hoc policy and legislation undertaken by the government, these initiatives are uncondusive to facilitating IT education and training in PNG.

#### **7.5.4 Research Question Four**

Research Question Four was aimed at identifying the characteristics of what training providers consider as an appropriate curriculum for computer skills training and development in PNG and determine how these characteristics could be incorporated into future government policies related to computer skills training and development.

The results of the *Private Computer Training in PNG: Current Practices and Future Policy Directions* Questionnaire are presented here under several sub-headings as given in sections 7.5.4.1 to 7.5.4.6.

7.5.4.1 Every training organisation was convinced it has both strengths and weaknesses in the training program it is conducting and its training organisation. The factors they



considered to be their strengths were mainly within their individual control (See Table 7.11). For example: the courses they offer, the training facilities they use, the calibre of trainers they engage in training process, the certificates awarded, the reputation of the institution, the usefulness of their courses, and the fact that their organisation was an approved training organisation, were all seen to be their major strengths.

The weaknesses however, were mostly those factors which were beyond their control (See Table 7.12). For example: inadequate capital, shortage of qualified trainers, low computer literacy level, high cost of computer hardware/software, high import tariff, high cost of course fees, absence of copyright law, unregulated training programs, and others were considered the major problems affecting private training providers and private computer training and development in PNG.

7.5.4.2 It was unanimously agreed that certain aspects (See Figure 7.9) of computer training should be regulated. These aspects are: individual course descriptions, course aims, assessment procedures, course content, list of certificates awarded, the training facilities used, and trainer's qualifications are all submitted to the National Training Council for assessment before granting registration to conduct training. This practise is considered to be acceptable to most training providers because it not only regulates but sets a standard for those involved in computer training to comply with (See Figures 7.10 and 7.11).

7.5.4.3 Under a proposed National Framework, four areas were perceived (See Table 7.13). An apex body or panel of experts drawn from the wider section of the community be set up to:

- a) Be responsible for setting and maintaining academic, professional or ethical standards;
- b) Ensure that a transparent computer curriculum is developed by the individual training organisations and endorsed by the authority such as the NTC; and

- c) Ensure the qualification awarded are given national ‘recognition’ upon stamping of the authority’s Common Seal, and Staff development and training in the subject.

Under this framework, there will be clear differentiation between the different levels of qualifications based on the courses undertaken (basic, intermediate, and advanced) and specific competencies expected at each level which will be uniform across all training providers. In addition, the computer courses conducted by other training providers can be ‘recognised’ if certain criteria (See Tables 7.14 and 7.15) were met.

It was also accepted by training providers that an independent authority, the PNG-ITC should be established to formulate guidelines for computer curriculum, set educational standards and certify recognised computer skills qualifications. The membership of this Council would be drawn from a wide section of the community in both the government and the private sector organisations. The main functions of PNG-ITC would be to:

- Coordinate and Plan IT related matters,
- Develop and Administer IT policy guidelines,
- Access relevant information and deliver them to individuals or organisations,
- Consult with both government and private sector, and
- Supervise or oversee computer curriculum and training (See Table 7.16).

This independent authority (PNG-ITC) would set guidelines which will help shape the National IT Curriculum (NITC) in the private training organisations. PNG-ITC would ensure that the guidelines it established were implemented because failure to do so may result in disendorsement of their proposed courses and non-registration of the training organisation. Important features of NITC among others (See Figure 7.13) would be to provide a formal structure under which computer skills related education and training are conducted in PNG.

While many training providers are in favour of a national computer skills exams, there is a reservation that it will be difficult to examine all aspects of the different courses. However, a semester-by-semester course if implemented will lend itself to a semester-based exam in computer skills training course. Such an examination adds credibility in both the course as well as the certificate awarded since the curriculum offered would have been endorsed by the PNG-ITC in accordance with its guidelines.

7.5.4.4 The current level of computer development in PNG was classified as 'low' and occurs at 'user' level according to the training providers' judgement based on their own experience in conducting computer skills training in the country. By using Lau's (1981) classification, the training providers agreed that PNG's level of computer development is at 'Basic' level. However, this level of development is gradually changing from 'Basic' and progressing towards the 'Operational' and 'Advanced' levels. Whilst this change in the level of computer development is acknowledged by training providers, appropriate training for human resource development in this subject have been ignored by consecutive governments for far too long.

The training providers involved in computer education and training saw that the current computer development in PNG was heading towards the networking (for example internet), computer to computer communication and remote data processing. If this trend is to continue and PNG is to achieve anything from it, certain actions are required in certain areas (See Table 7.17). For example, human resource development in computer related subjects will help to produce the workforce required to develop, use and maintain the telecommunications systems or the computer networks as well as computer related application.

7.5.4.5 The future of computer education and training in PNG is bright given that individual courses will be revised or modified to suit the changing technology as well as the changing workplace requirements. It is difficult to precisely predict what computer education and training will be in future because technology is changing and the computer skills required then would be different. Therefore, only those who continuously upgrade their courses and operate competitively will be able to operate profitably and efficiently.

In order to operate within this changing environment several important changes in both private training organisation and government is necessary. The changes planned by the individual private training providers are shown in Table 7.18. Other Curriculum and Structural changes deemed necessary are identified (See Table 7.19). The curriculum changes would be implemented by the training providers while the structural changes need the support of both the government and other training providers. The policy changes were seen as the responsibility of the government which if implemented will facilitate computer related education and training in PNG (See Figure 7.14). For example, many training organisations found high import tariff discouraging to provide modern computer training facilities while lack of tax incentives for computer training organisations further impede extending computer training courses to many individuals. Hence, only those who can afford the high course fees will have the opportunity of obtaining computer skills training.

This is where the government comes in with appropriate policy guidelines and regulations to regulate and facilitate computer education and training (See Table 7.20). Again an ideal environment under which computer training could flourish in PNG would occur at two levels (See Table 7.21). At the micro level the training providers make necessary changes in their individual training organisation and at macro level the government and other training providers make necessary changes in drawing up appropriate policy guidelines.

7.5.4.6 The general comments or suggestions made by private computer training providers about the future of private computer related courses or training fell into six general areas (See Table 7.2). The areas suggested are:

- a) Formation of a professional association of Computer Trainers which will consist of trainers and training providers drawn from wider sections of the community to speak with authority on matters concerning computer education and training.
- b) That Computer awareness/literacy be introduced into secondary schools (up to Grade 9-10), hence provide a basic computer literacy before they leave school.
- c) That Computer related courses must be realistic and made relevant to local needs. The courses should be standardised and made affordable to the bulk of the people who require such training.
- d) That Computer Training Institutions and their respective training facilities be approved and encouraged. These institutions should design and devise their courses according to their market research and current trends. Existing training institutions should cooperate with each other and share information of common interest.
- e) That Computer Curriculum designed by individual training providers be endorsed by authorities concerned for use in the private training organisation. The curriculum designed must be structured and should comply with standards and guidelines established by the authority.
- f) That support of the government and other organisations is essential if computer training and development efforts in PNG are to be strengthened and allowed to prosper. For example, the government could help reduce import duty on computer equipment which

are solely intended for educational purposes, or support training activities in the form of laying down regulations and policy guidelines to facilitate computer education and training.

# Chapter 8

## Recommendations

### 8.0 Introduction

This chapter makes recommendations (in section 8.1) based on: a) the revelation from the literature (ie. Chapter 2); and b) the findings of the research as presented in Chapter 7. The recommendations are grouped under 6 categories according to the six authorities which is thought to have the best chance of implementing the recommendations. Four of the authorities are already in existence, namely; The Government of PNG (presented in sections 8.1.1.1 to 8.1.1.19 with 19 recommendations), the National Training Council (presented in sections 8.1.3.1 to 8.1.3.10 with 10 specific recommendations), the Internal Revenue Commission (presented in section 8.1.4.1 with 1 recommendation) and the Private Computer Training Organisations (presented in sections 8.1.5.1 to 8.1.5.6 with 6 recommendations). A new entity, the PNG Information Technology Council (PNG-ITC) has been recommended as the fifth category (presented in sections 8.1.2.1 to 8.1.2.4 with 4 specific recommendations) while the sixth category consists of both the existing and the proposed authorities (presented in sections 8.1.6.1 to 8.1.6.7 with 7 recommendations).

Each major recommendation is supported with additional comments (wherever appropriate) in order to highlight its significance as well as justify these recommendations by citing relevant information sources. Further, reference to

supporting arguments and research data is made to specific sections of the thesis where the related discussion points are presented to support the recommendations made.

## **8.1 List of Recommendations**

### **8.1.1 For Implementation by the Government of PNG**

The following recommendations fall within the purview of the Government of PNG:

#### **8.1.1.1 That the government should adopt a visionary approach to:**

- a) Establish formal structures such as a Ministry or Commission;
- b) Develop a national Information Technology Policy;
- c) Invest in relevant IT infrastructure development;
- d) Establish an interdepartmental and inter-sectoral body to develop guidelines on IT human resource priorities and gauge IT human resource projections<sup>1</sup>;
- e) Provide and promote IT human resources development; and
- f) Implement the many recommendations made within its powers.

[Refer also to sections 2.5; 7.2.9.1; 7.2.10; 7.4.7.2.4 and Table 7.20].

#### **8.1.1.2 That the Government through the Ministry of Education should introduce:**

- a) computer studies curriculum into upper secondary schools as part of the formal curriculum; and
- b) computer awareness opportunities and programmes into the various levels of the public school system in order to raise the general computer literacy level in the country.

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<sup>1</sup> This particular concept has been proposed (See Peril (1996).



**Comments or Supporting Arguments:**

The students should be made aware of the potential uses and the social impacts of computers and information technology prior to entering the higher education institutions and the workplace. This awareness campaign would help raise the level of computer development from what it is now commonly believed by training providers as ‘basic’ to ‘operational’ or ‘advanced’ level. Several schools have already begun introducing computer studies as ‘extracurricula’ subject (eg Bugandi, Busu, Bumayong, Fatima, Sogeri, Kabiufa) within their respective resource constraints while one provincial authority like the Western Highlands Provincial Government has already made a huge commitment to introduce computer studies into its schools beginning in 1996/97 under its Ten Year Education Plan. This is an indication of a positive development inspired from within the country to provide computer education at school level. Such initiatives should therefore be encouraged and supported with appropriate government funding, resources, strategies and policy guidelines. [Refer also to sections 1.3; 7.4.7.2.3 and Figure 7.14].

**8.1.1.3** That the Government should take positive steps to establish the Papua New Guinea IT Council (PNG-ITC) (or such other appropriate name). The PNG-ITC would advise the Government agencies like the Commission for Higher Education and the National Training Council on all matters concerned with the provision of IT education and training in PNG. The membership of PNG-ITC should be drawn from both the government and the private sector with professional or academic qualifications,

experiences and involvement in: computer education and training, research and development, and business and commercial interest in information technology industry within the country.

The brief or the functions of PNG-ITC would include (inter alia):

- Establish guidelines and formulate policies to regulate IT education and training curriculum in the private training organisation;
- Ensure the implementation of policy guidelines and standards established;
- Consult and cooperate with both the private and the public sector educational institutions;
- Assess, Accredite and Endorse computer related training programs developed by private training organisations;
- Set professional examinations for trainees wishing to obtain professionally recognised qualifications;
- Validate all individual training programs developed by the private training organisations before it is taught and its certificates 'accredited';
- Conduct research to aid policy making and decision making regarding Information Technology;
- Develop a qualification framework under which certification by private training organisations is given meaning, value, status and credibility;
- Develop and implement the IT Policy through appropriate membership and leadership;
- Produce guidelines to ensure it is relevant and appropriate to all those concerned;

- Ensure that an appropriate education and training program is provided to produce not just IT professionals but also people sufficiently qualified to serve in all levels of government and the private sector;
- Establish a system to determine and prioritise appropriate application of IT strategies;
- Ensure that adequate arrangements were made to effectively implement IT, eg, procurement of hardware and software;
- Establish an apex body or a panel of experts drawn from the wider community to set and maintain academic, professional, technical, educational and ethical standards in IT education and training;
- Maintain a transparent computer syllabus or curriculum independently developed by individual training organisations but endorsed by the panel of experts in accordance with the guidelines and standards established;
- Develop mechanisms for training and education in IT related courses;
- Investigate and establish formal links with institutional, regional and international organisations to further promote and share information of mutual benefit;
- Endorse and recognise private computer training conducted within the country;
- Direct attention and effort towards staff development and training of academically able students to undertake advanced and highly technical computer training either in-country or abroad in order to meet the human resource needs of the country;
- Plan, develop and administer the IT policies or guidelines;
- Access and deliver relevant information to appropriate bodies or individuals; and
- Play supervisory and consultative roles for the private training organisations.

[Refer also to sections 7.2.9.1; 7.4.4.2; 7.4.4.3; 7.4.5.1; 7.4.5.4. to 7.4.5.4.2; 7.4.5.5 to 7.4.5.6; 7.5.2; 7.5.3.5].

### **Comments or Supporting Arguments:**

Establishment of the proposed PNG-ITC is in line with current trends in other developing countries which initially introduced computer or IT education and training. Examples of such establishments are: The Bangladesh Computer Council, The Government Computer Bureau in Botswana, Computers and Information Technology Council (CINTEC) of Sri Lanka, and The Pakistani Computer Bureau to name a few. Establishing formal bodies such as these through an Act of Parliament would be a driving force to address the issue of improving management efficiencies and productivity, and develop the human resources with necessary Information Technology related education and training in the socio-economic development of PNG.

A similar organisation have been proposed for Business, Management & Accounting Education in PNG (Macpherson, 1994), and the necessary drafting instructions for publication in the National Gazette to take immediate effect have also been prepared by the Commission for Higher Education (CHE) (1995b).<sup>2</sup>

Selected policies analysed in Chapter 5 (section 5.4) and Chapter 7 (sections 7.3.3 to 7.3.4) revealed there were several impediments to facilitating IT education and training in PNG. For details of these impediments, refer to the following sections:

- sections 7.2.9.2 and 7.3.3.1 for impediments in the National Training Policy;
- section 7.3.3.2 for impediments in the Training Levy;

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<sup>2</sup> Commission for Higher Education (1995b). **Drafting Instruction: National Council for Business, Management & Accounting Education Regulation**. A confidential Document obtained from the Commission for Higher Education which was initially prepared for the Minister responsible for Higher Education.

- section 7.3.3.3 for impediments in the PNG IT Policy for the Public Service;
- section 7.3.3.4 for impediments in the PNG Science and Technology Council Act 1992; and
- section 7.3.3.5 for impediment in the Accreditation Policy.

**8.1.1.4** That the Government should immediately re-introduce and re-activate the *Copyright Act 1978* with specific clauses inserted in order to encourage as well as protect local creativity or intellectual property.

**Comments or Supporting Arguments:**

The *Copyright Act 1978* has not been brought into force in PNG because of various reasons and arguments (Laurent, 1978; Nonggorr, 1990). Nonggorr (1995), pointed out that the cost to education of children in PNG whose teachers depend on foreign materials to heavily supplement their teaching as one of the reasons. Further, Nonggorr called for cost/benefit analysis of adopting a copyright law before re-introducing it. He claimed also that the number of persons producing materials who would benefit from a copyright law was small and growing. However, this author is among many PNG authors who have published outside of the country with copyright laws to protect their works. Other professionals met by this author have expressed similar concerns after their works have been plagiarised. For example, one of this author's articles written for one newspaper was copied word-for-word and published in another by another 'author' and he is now more cautious of publishing future articles in the country. [Refer also to sections 7.4.3.3 and 7.4.3.4].

**8.1.1.5** That the Government (through PNG Information Technology Council) should develop appropriate policies and guidelines in order to regulate the ‘unregulated’ private computer training industry in the country and to promote computer education and training so that trainees are protected from undue exploitation by ‘profiteers’. [Refer also to sections 7.4.7.3, 7.4.5.4 and 7.4.5.4.2]. See also Recommendation 8.1.1.3.

**8.1.1.6** That the Government (in consultation with the commercial banks) should endeavour to establish concessionary loan schemes for duly registered and genuine computer training organisations to obtain loans to purchase latest computer equipment and modernise their computer laboratories for education and training purposes.

**Comments or Supporting Arguments:**

This would enable many private computer training organisations to provide more hands-on opportunities for trainees on a computer while on training and provide more access to computer training facilities. Some of the training organisations had ‘qualified’ staff and were committed to contribute towards the human resource development for computer related profession or jobs but encountered difficulties to maintain high rentals for the lease of training rooms and/or offices. It was also difficult for them to keep up to date with the latest computer hardware and software due to high tariffs on computer equipment. [Refer also to sections 7.4.3.3, 7.4.8 and 7.4.9].

**8.1.1.7** That tax concessions or tax holidays be given to those private training organisations with genuine training programs aimed specifically at training and developing ‘computer professionals’ other than software applications users which was

widespread in many organisations. (The list of ‘computer professionals’ required in the workforce would have been drawn up by the government’s own National Planning Office). [Refer also to sections 7.4.3.2, 7.4.3.3 and 7.4.6.3].

**8.1.1.8** That the Government should immediately liberalise its Taxation policy by reducing the tariff on computer hardware and software purchased by registered training organisations which are solely intended for educational and training purposes. Further, that trainers or individual training organisations should also be entitled to tariff reduction on computer hardware and software for educational use.

**Comments or Supporting Arguments:**

High tariffs on computer hardware and software were passed onto the trainees in PNG private training organisations. It was revealed by one training provider (personal communication, 1996), that computer vendors in PNG have not been honouring the educationally priced edition of software nor do they have any such specials for purchase by educational institutions or training organisations. The reduction in import tariff would also result in lowering course fees. Many ‘advanced’ developing countries reduce tariffs on computer hardware to facilitate training or education and encourage IT application in their respective countries.

The PNG government announced changes to the taxation laws in the 1997 budget in a bid to encourage private sector growth (Yadi, 1996). Unfortunately, such reduction in tariff had not been extended to computer hardware and software imports which the

training organisations rely on and desperately need to impart knowledge and skills to PNG nationals.

However, a recent agreement in Asia Pacific Economic Cooperation (APEC) to reduce to zero tariffs on IT products by the year 2000 is encouraging. According to a recent newspaper report (Iorere, 1997), the Commissioner for Taxation, stated that PNG as a member of APEC and World Trade Organisation is required to reduce import tariffs substantially. PNG as a member of such an international trading organisation should no longer view importation of information technologies as business equipment but rather as intellectual tools. As one IT professional recently said: '*...information, publication, and the tools needed to process them, including computers should not be hindered by government taxation and regulation. That at least is the thinking of many (IT professionals)*'.<sup>3</sup> [Refer also to sections 7.4.6.3 and 7.4.7.2.3].

**8.1.1.9** That the Government should take necessary steps to encourage the development of physical infrastructure such as telecommunications system and computer products.

**Comments or Supporting Arguments:**

The PNG government has given approval for establishing PNG's multi-million Kina national satellite project to commence soon and would immensely improve communications both nationally and internationally (*The Independent*, Jan 17, 1997, p. 7). It was expected that the satellite project would also enhance the country's exploitation of IT in various sectors of the community.

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<sup>3</sup> Roche, M. (1996, November 27). IFIP WG 9.4 Electronic Discussion, Available e-mail: [eroche@stern.nyu.edu](mailto:eroche@stern.nyu.edu)



On the telecommunications front, the system used in PNG is among the most modern systems used anywhere. With regard to computer hardware, one company (eg, Daltron Electronic Pty Ltd) began sourcing computer hardware components from different manufacturers and assembled them in PNG<sup>4</sup> while another communications company was in the process of establishing an Internet Service. These are signs of positive development initiated by the private sector taking the risk to make commitments in a developing country like PNG and should therefore be encouraged and supported by the government. One way of encouraging such developments is to give tax-relief to the company concerned and encourage schools and training organisations to purchase from locally assembled computer hardware units. Tariffs have to be reduced under APEC anyway. [Refer also to sections 7.4.6.3 and 7.4.6.4].

**8.1.1.10** That the Government (through PNG-ITC) should encourage, support and guide through aggressive policies and well-structured guidelines for private computer training providers to make necessary changes to areas of their training organisation which are vital in the changing computer and information technology environment.

#### **Comments or Supporting Arguments:**

In order to improve and change the current level of computer development (from ‘Basic’) to achieve the next levels of computer development (‘operational’ and ‘advanced’), the following specific changes have been suggested by training providers as urgently requiring cooperation and collaboration with the government.

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<sup>4</sup> See Daltron Electronic Pty Ltd web page. URL: <http://daltron.com.pg/frames90.htm> [Accessed December 18, 1997].

1) The policy areas suggested for review and changes were:

- a) Human resource development or education and training in IT;
- b) Initiate support and encouragement for all trainers and trainees;
- c) Develop and establish physical infrastructure such as telecommunication system and research and development organisations; and
- d) Develop programs and strategies to gradually incorporate computer related subjects into the educational institutions.

[Refer also to section 7.4.7.2.3].

2) Training providers suggested that Government support was essential. The area of government support could take the following forms:

- a) Establish guidelines for computer or IT curriculum;
- b) Enact enabling legislation such as Copyright law or tariff reduction (tax liberalisation);
- c) Establish a loan scheme to help trainers or training organisations procure computer equipment for computer related training; and
- d) Cooperate with training providers with the view to further enhancing computer education and training in PNG.

[Refer also to sections 7.4.7.2.2 and 7.4.7.2.4]

**8.1.1.11** That the Government (through the policies and guidelines established by PNG-ITC) should encourage private training providers to pursue Curriculum Changes.

**Comments or Supporting Arguments:**

- 1) The areas requiring curriculum changes are:
  - a) Design structured training courses so that each successive one builds on from the previous one (a modular approach);
  - b) Design up to date and appropriate computer curriculum to meet the requirements of the workplace; and
  - c) Produce high quality training manuals for each of the approved courses to reflect workplace requirements.
  
- 2) The administrative areas identified by training providers as requiring serious attention by training providers were:
  - a) Investment in staff development and training;
  - b) Improvement of existing training facilities;
  - c) Development of training courses/programs; and
  - d) Monitoring of the general trends in the computer industry in order to design appropriate or work related computer skills courses.

[Refer also to sections 7.4.7.2.1 and 7.4.7.2.2].

**8.1.1.12** That the Government (through the policies and guidelines established by PNG-ITC) should cooperate with private training providers and legislate with relevant policies and guidelines.

**Comments or Supporting Arguments:**

Such policies and guidelines would ensure that Training:

- a) Organisations are registered with the National Training Council (as is the case now);
- b) Organisations conduct computer training programs in an educationally conducive environment to maximise the trainees' learning opportunities;
- c) Providers cooperate and complement each other's training programs for the common good of the country.

[ Refer also to sections 7.4.7.2.3 and 7.4.7.2.4].

**8.1.1.13** That the Government should work in partnership with private training organisations for example, by sponsoring students or its employees to undertake computer studies at reputable private training organisations in the country.

**Comments or Supporting Arguments:**

That would make training available to school leavers as well as the general public to undertake computer studies within PNG. Private computer training institutions need: direction, support and encouragement to conduct their training programs, and extend them to other provincial centres. There should also be cooperation between all existing training organisations to strive towards achieving common national goals. [Refer also to sections 7.4.7.2.2 and 7.4.7.2.4].

**8.1.1.14** That the Government should immediately begin to formulate policies and enact appropriate legislation to facilitate and encourage computer (or IT) education and training in PNG.

**Comments or Supporting Arguments:**

Several policy changes were identified by training providers as essential ingredients to ensure that the Government plays its role to encourage and support computer education and training. Without these policy changes, computer education and training in the country would be further hampered and put in disarray. [Refer also to sections 7.4.3.3, 7.4.5, 7.4.7.2.3 and 7.4.8].

The policy changes suggested by training providers to be attended to by the government include:

- a) Introduction of computer studies into secondary school;
- b) Provision of tax incentives to those genuinely involved in computer education or training;
- c) Enactment of necessary legislation such as Copyright law to protect local ‘intellectual property’;
- d) Ensure computer hardware are affordable through tariff reductions for individuals to purchase for educational and training purposes; and
- e) Ensure that computer education and training opportunities are both available and affordable to as many people as possible.

**8.1.1.15** That the Government should play an active role (eg, provide funds for scholarships, introduce computer studies into schools, establish computer education centres, and computerise government departments) to promote and facilitate computer education and training in PNG.

**Comments or Supporting Arguments:**

The lessons from other ‘advanced’ developing countries such as India, Singapore, Brazil and Malaysia showed that the respective governments played active roles by initiating and developing Computer and Information Technology policies. They not only formulated policies but were actively involved in: developing the necessary infrastructure, developing programs and strategies, making necessary investment in information technology systems, establishing administrative structures, and providing the necessary facilities to bring about the desired outcomes.

Two major roles have been identified by training providers which the Government should perform in order to enhance existing computer training in the country. These roles were to ‘promote’ or ‘facilitate’ computer training in the private training organisations and to ‘regulate’ by making necessary regulations or policies to ensure computer related training in PNG were conducted in an orderly manner.

This would ensure that the government’s overall goals of human resource development in computer related fields were also pursued by private sector training organisations. In this way the government would not be the sole producer of human resources required in the country but the private training organisations would also be entrusted with the

opportunity to contribute meaningfully towards the computer skills requirement of the country. Hence, the government and private sector would become partners in training of the workforce required. [Refer also to sections 7.4.7.2.3 and 7.4.7.2.4].

**8.1.1.16** That the Government should play an active regulatory role by, developing a national computer (or IT) policy to regulate, monitor, promote and plan computer education and training, and research and development in PNG.

**Comments or Supporting Arguments:**

The proposal for the development of a National Computer or IT Policy is in line with the general trends in other developing countries which have developed such a policy through the establishment of formal structures (ie. a Ministry, a Council, a Commission, a Bureau or a Centre) committed to excellence in computer or Information Technology education and training as one of its functions. Papua New Guinea's *Information Technology Policy for the Public Service* is too narrow in that it addresses the IT usage in the Public Service and therefore a broader computer policy to encompass the wider application and implementation of computers and IT related issues in PNG is essential. Many of the existing policy and legislation are also uncondusive to IT education and training in PNG. Developing countries which excel in this area have aggressive IT policies which enable them to be competitive in the global economy. Examples of such countries are India, Singapore and Brazil. [Refer also to sections 2.5, 7.4.7.2.3 and 7.4.7.2.4]. See also Recommendation 8.1.1.14.

**8.1.1.17** That the Government should play a very active part to recognise, fund, support, legislate, coordinate and plan computer education and training in PNG. That without active Government participation, computer training will always remain unorganised and unregulated to the disadvantage of many Papua New Guineans.

**Comments or Supporting Arguments:**

None of the training providers directly expressed any weaknesses in their computer skills curriculum. This is understandable because each considers its training courses as unique and advantageous over other organisations in many respects. Further more, all training organisations were convinced that they have employed qualified trainers to conduct or deliver computer related courses in their organisation. There is no system in place to tell them otherwise. However, the many factors identified by training organisations as their ‘weaknesses’ and which contributed to the ‘unregulated’ computer training environment were mostly external to the individual training organisation.

The factors identified include:

- a) Inadequate initial capital,
- b) Shortage of qualified trainers (or an inadequate pool to recruit from),
- c) Low level of computer literacy among initial trainees,
- d) High cost of computer servicing or maintenance,
- e) Absence of a copyright law to protect individual creativity,
- f) The country’s financial instability and exchange rate fluctuation,
- g) High import tariffs,
- h) Limited access to computers for trainees,



- i) Unregulated training activities, training programs, training organisations, and
- j) High cost of course fees.

[Refer also to sections 7.1.4.3, 7.4.7.2.3, 7.4.7.2.4, 7.4.8 and 7.4.9].

**8.1.1.18** That the Government (through the PNG-ITC and NTC) should immediately establish an independent authority whose tasks among others would be to mediate and arbitrate on complaints and disputes lodged by those who felt they have been unjustly dealt with.

**Comments or Supporting Arguments:**

For example, one student who had attended a training organisation, paid the required fees and six months down the track received no piece of paper (or certificate) to state that the trainee had attended and completed a course of program. In another case, a course material (Booklet) produced by one training provider was used by another and charging a higher fee hence deprived the first training organisation of any profits and under cut its training program. [Refer also to sections 7.4.3.2 and 7.4.5].

**8.1.1.19** That the Government should seriously consider establishing a Science and Technology Ministry which would be responsible for science and technology matters in the country. This ministry would be responsible for Computer and Information Technology areas as one of its functions. The PNG-ITC would come under this Ministry once established. It would also be responsible for both the Public Service and the private sector with regard to research and development in information systems

design and implementation, and establish policy guidelines for IT education and training.

### **Comments or Supporting Arguments:**

While this chapter was being written, the PNG Government announced through its National Executive Council (NEC) that it has approved the creation of the new Ministry for Energy and Science which would research and develop appropriate policies for planning and development of science and energy needs of the country (*The National*, April 28, 1997). The NEC also announced approval of the creation of the National Centre for Information Technology which would coordinate the implementation of government policies related to the use of computers and information systems in the public sector (*The National*, April 30, 1997).

Alternatively, the establishment of a semi-government organisation such as a Commission, Council, Bureau or Office as recommended for PNG-ITC (See Recommendation 8.1.1.4) to initially come under an existing ministry such as the recently created Energy and Science Ministry but gradually to be instituted under an appropriate ministry such as the recommended Science and Technology Ministry. Either way, there is a formal structure established by the government to ensure that serious attention is paid to Information Technology. Many commentators on science and technology have called on the government to give priority to Science and Technology, for example establishing Science and Technology Ministry (Singh, 1994, 1997a & 1997b; Waminan, 1997; Sinebare, 1997b; Bossi, 1997). [Refer also to sections 7.4.5.4 (7.4.5.4.1 - 7.4.5.4.2), and 7.4.5.5 (7.4.5.5.1 - 7.4.5.5.2)].

### **8.1.2 For Implementation by the PNG Information Technology Council (PNG-ITC)**

The implementation of the following recommendations are contingent upon the establishment of the PNG-ITC by the Government as recommended in sections 8.1.1.4. Hence a formal structure such as PNG-ITC cannot exist without the Government taking the initial step to legislate and mandate it to address the wider computer and information technology issues which includes education, training, research and development in the country. The following recommendations are intended for the proposed PNG-ITC to implement.

**8.1.2.1** That PNG-ITC and NTC should collaborate and clearly define what specific competencies a trainee should achieve at each stage of certificate courses (ie. Basic, Intermediate, Advanced). They should also determine in general what specific competencies the certificate holder should be able to achieve at each stage.

#### **Comments or Supporting Arguments:**

Since qualifications tell other people what a person has attained from a training program, it is essential that: the name of the qualification, the level at which it was awarded and the content of the work covered in the program must be made known. A good example would be to adopt standards similar to the Australian Qualification Framework (AQF), more specifically at Certificate level. The qualifications at post-certificate levels for example, Diploma and Degrees are well known and well defined by various tertiary institutions in PNG. But for 'certificates' there is no such definition made in the private computer training context in the accreditation policy adopted in

PNG (See Commission for Higher Education, 1995a). The AQF clearly defined the different categories or level beginning at *Certificate I* to *Certificate IV*. The AQF identified the learning outcomes which clearly stated what standards the trainees were expected to achieve at each of the four certificate levels (*Training and Development in Australia*, 1995b; The Australian Training Information Network, 1996<sup>5</sup>).

If no such framework is defined, then as one political scientist from PNG commented recently, ‘*The certificates awarded will only have a **sentimental value** to boost the ego of the holder but have **no functional value** in PNG’s changing workplace.*’ (Ketan, 1997<sup>6</sup>). (emphasis added). [Refer also to sections 7.4.5.1; 7.3.3.5 and 7.4.5.2].

**8.1.2.2** That PNG-ITC should draw up a:

- a) National IT Curriculum based on the National IT Policies for implementation by both private and public sectors; and
- b) Clear guidelines concerning: design or development of individual computer curriculum (described by the National IT Curriculum), teaching of the courses developed, its assessment and evaluation, recruitment of trainers or teaching staff, provision of teaching facilities or resources, and certification of the courses.

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<sup>5</sup> (a) Relevant information also extracted from World Wide Web page for Australian Qualification Framework maintained by Kristen Morgan (kristenm@tafe.sa.edu.au) [Accessed in July 4, 1997].

(a) The Australian Training Information Network (1996). The Australian Qualifications Framework. [Online] Available URL: <http://www.opennet.net.au/partners/bvet/train/tra1123.html> [Accessed 7 June, 1996].

<sup>6</sup> Personal communication with Mr. Joseph Ketan, a doctoral student at the Politics and History Department, University of Wollongong, Australia, December 16, 1997.

### **Comments or Supporting Arguments:**

Recommendations to develop computer curriculum for the schools is not new. The need for the development of a national computer or IT curriculum/syllabus for use at secondary/tertiary was explicitly expressed by the delegates from the Pacific Island Countries (which included PNG) who attended an IT workshop in Western Samoa in June 1990 (Schmidt & Mesina, 1990). The delegates obviously saw an urgent need to develop or formulate an IT training Syllabus within their respective countries in the region.

The call for computing curriculum here is to further reinforce what has been expressed at other venues by organisations and individuals, for example, *The PNG Times* (1986) and Sinebare (1987). Past conferences and forums in PNG have also strongly called for a national computer curriculum or computer syllabus for schools. For example;

(a) the South Pacific Conference on Mathematics and Mathematics Education held at the University of Papua New Guinea in Port Moresby in 1992 recommended that computers be provided at high school level and they be incorporated in the teaching of mathematics (Department of Mathematics, 1992);

(b) a conference on computing innovations in PNG high schools held at Lae in 1994 recommended that:

‘... the Department of Education take the initiative in creating a national computer syllabus committee to be responsible for the compilation of a curriculum to which school, college and university users can refer... Computers will arrive as a formal curriculum topic and it would seem to be desirable to have terms of reference so that any institution intending to create a computer course will have a ready-made structure to which to refer. ’ (PNG University of Technology, 1994, p.13);

[Refer also to sections 7.3.4; 7.4.5.1; 7.4.5.4; 7.4.5.4.2 and 9.6 to 9.6.1)].

**8.1.2.3** That PNG-ITC should develop and administer a ‘professional’ computer examination for trainees from private computer training organisations to voluntarily sit for this examination in order to obtain a ‘professional qualification’ endorsed by PNG-ITC in the subject.

**Comments or Supporting Arguments:**

This examination will be similar to the “European Computer Driving Licence” concept initiated in Finland in which the holder of the licence (certificate) must pass practical exams that shows that they have acquired basic skills in IT needed in today’s information society and multifunctional work using IT skills (Dolan, 1996). The Licence certifies that the holder demonstrates the ability to perform certain tasks competently using a computer. The student is required to pass seven elements in this examination, six of which are practically oriented. The practical modules consist of competent use of hardware and data management, application software (ie word processing, spreadsheets, databases, presentation and graphics), use of telecommunication networks such as access to e-mail and World Wide Web pages. The one theoretical module verifies that the student has a good grasp of the overall concept of IT and its significance, the understanding of the information systems in the society, and the significance to the individual, the organisation, and the society as a whole.

Those with ‘purely’ academic degrees would be exempted from sitting for such professional examination. In addition to the NTC scrutiny of private computer training

courses/programs, a nationally developed and endorsed professional examination would ensure that courses offered were subjected to such public scrutiny.

A 'professional' type examination developed by PNG-ITC could be sat by those trainees wishing to obtain formal recognition from the PNG-ITC in the different levels (eg, Basic, intermediate, and Advanced) of computer related curriculum. Similar professional examinations designed by the national authority in association with many professional organisations and societies are used in many countries for example, India, Sri Lanka and Pakistan. [Refer also to section 7.4.5.5.2 and Tables 7.15 and 7.16].

**8.1.2.4** That the individual differences between the private computer training organisations be recognised as their particular strengths and that PNG-ITC should establish guidelines in which each training organisation would be responsible for improving and correcting its own perceived weaknesses according to the established national guidelines.

**Comments or Supporting Arguments:**

Among the features which differed between training providers were the:

- a) Course duration,
- b) Amount of money levied as course fees,
- c) Differences in the certification and accreditation awarded,
- d) Depth of the course content covered,
- e) Level of expertise or qualifications of the trainers, and
- f) Different assessment and evaluation procedures used.

Further, the identified differences should be monitored to ensure that they conform to established guidelines because unlimited freedom as seen at present is doing more harm than good for not only IT education and training in the country but also in other subjects. [Refer also to sections 7.1.4.1 to 7.1.5 and 7.4.3.2].

### **8.1.3 For Implementation by the National Training Council**

The National Training Council (NTC) was established under the *National Training Council Act 1991* (Independent State of PNG, 1991). This Act empowered the National Training Council and its Secretariat to implement, supervise and manage the *National Training Policy (White Paper)* (Independent State of PNG, 1989). The *National Training Policy* contains goals and objectives, strategies and actions required to plan, conduct and evaluate training in the country in order that such training would improve the quality of life and therefore promote the national goals of integral human development.

The National Training Council has been performing its functions in conjunction with other relevant authorities such as the Internal Revenue Commission and the Ministry of Labour and Employment. The NTC is dealing with private training organisations in general. However, there is much yet to be done especially in the 'Private Computer Training Organisations' and their training programs.



The following recommendations are made on the basis of the findings from the two Questionnaires<sup>7</sup>. Their implementation will significantly improve the quality of private computer training in the country as well as ensure that a high standard of training is designed and delivered. Such training would be conducted in accordance with the guidelines laid down by the government in the proposed Computer or Information Technology Policy and Curriculum guidelines.

**8.1.3.1** That the NTC should continue to:

- a) Be responsible for granting registration as a training organisation as is the case now;
- b) Determine if the private training conducted is eligible for exemption of Training Levy based on the private training organisation's compliance with its guidelines. Only then should NTC recommend to the IRC those training organisations duly registered under the National Training Council and whose training program assessed to be of genuine training activity under the established policy guidelines of PNG-ITC. [Refer also to section 6.6].
- c) Screen all private computer training providers and training organisations through its Screening And Accreditation Committee (SAAC) as is currently the case. [Refer also to section 7.2.5.2]; and
- d) Accredite all private computer training programs under the NTC criteria for accreditation of courses established by it (National Training Council, 1993a).

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<sup>7</sup> (a) *Private Computer Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy*, and (b) *Private Computer Training in PNG: Current Practices and Future Policy Directions*

## **Comments or Supporting Arguments**

The above may be done as a condition for:

- Conducting approved private computer training in Papua New Guinea;
- Qualifying for Training Levy purposes;
- Claiming recognition for certificates awarded (accreditation status); and
- Operating as a business or commercial training enterprise.

**8.1.3.2** That SAAC should consult with other international and national agencies such as UNESCO from time to time to adopt and incorporate accreditation criteria, standards and procedures (See Commission for Higher Education, 1995a) as deemed appropriate or relevant within the private training organisation.

## **Comments or Supporting Arguments:**

Adopting International quality control standards such as ISO 9000 would help to maintain international competitiveness and where possible parity with other similar private training organisations elsewhere which implement the same standards in their training programs.

**8.1.3.3** That the NTC in liaison with PNG-ITC should ensure that computer training programs developed by private training organisations have the potential to enhance the trainee's chances of obtaining a job.

**Comments or Supporting Arguments:**

Approval to conduct such training should be given based on the projections made by the government's human resource development and planning office for each IT related position before such courses or programs are delivered. Computer related courses be designed with realistic goals which are relevant to local needs. The courses must comply with (the yet to be established) national guidelines and be both accessible and affordable to as many people as possible. [Refer also to section 7.2.9.1].

**8.1.3.4** The NTC and IRC should be more stringent in applying the current procedures for approving computer related courses by consulting with experts/specialists through PNG-ITC. They should ensure that the courses developed and presented for 'approval' must indicate evidence of the courses being well-researched, relevant, appropriate and meeting the human resource projections in IT related positions in PNG. [Refer also to section 5.4.3.3].

**8.1.3.5** That NTC should take into account national projections on human resource requirement of the country in the various computer professions when new applications from private training institutions are processed. That would help to reduce duplication of existing courses or programs and encourage development of training courses in areas of expertise identified to be in high demand in the country.

**Comments or Supporting Arguments:**

While diversity and private ownership and enterprises are encouraged, PNG should be mindful of avoiding duplication of the same type of training programs by encouraging investment and development in creativity (such as IT knowledge creation industries).

Empowerment of the individual with relevant job skills to perform various tasks in order to participate meaningfully in the workforce and improve the productivity of the employer as well as the trainee's individual quality of life were identified by training providers as the most important training objectives by many training organisations. [Refer also to section 7.2.8].

**8.1.3.6** That the NTC should maintain a regular contact with all registered training providers in either supervisory or advisory capacity. Maintaining regular contact would help to implement the guidelines and enforce the standards established so that commercialism, profiteering or exploitation are discouraged and minimised.

**Comments or Supporting Arguments:**

Further, this contact would serve as an avenue to make known the government's (or the NTC's) official views on computer training related issues to trainers from time to time while at the same time take into account training provider's views or experiences in policy reviews or policy formulation. [Refer also to section 7.2.10].

**8.1.3.7** That the NTC should support and encourage the adoption of all the positive attributes of private training organisations identified and listed under recommendation 8.1.3.9. [Refer also to sections 6.5.1 to 6.5.10].

**8.1.3.8** That the NTC should further place emphasis on the following criteria for accreditation of courses which were on the original NTC list.

These attributes include:

- a) Testing and Evaluation of the courses conducted;
- b) Examination and Grading of trainees enrolling in the course;
- c) Evaluation feedback from trainees on the course attended; and
- d) Specifications for teaching facilities such as classrooms and laboratories.

**Comments or Supporting Arguments:**

The guidelines be drawn up by the National Training Council (NTC). The guidelines should prescribe the specifications for the training facilities or classroom environment that would help maximise teaching and learning activities and minimise both physical risks and health related hazards to trainees and staff.

Necessary provisions were already in place, for example, the NTC (National Training Council, 1993a), to ensure that all private training is conducted in an adequate and safe environment. The NTC applied these provisions to assess the suitability and quality of the training environment. Many training organisations are well endowed with educational resources, modern training facilities and may therefore be exempted from these concerns. However, few training providers still operate as registered training

organisations in dilapidated and cramped training rooms/buildings with outdated training equipment in potentially dangerous or hazardous environment. [Refer also to sections 7.1.4.6 and 7.2.9.1(e)].

**8.1.3.9** That the NTC should revise and include in its current list of criteria for accreditation of courses, the additional attributes identified by training providers which were not on the original NTC list.

These attributes include:

- a) A comprehensive and detailed Course Description;
- b) Course Booklet detailing the topics and skills covered in the course;
- c) Course Handbook containing all the information about the institution and the courses;
- d) Integrated or structured Training Program;
- e) Workshop or Tutorial sessions conducted for students to discuss problems and issues concerning the course in an informal situation; and
- f) Work or Job Experience component of the training which enables trainees to put theory into practice. [Refer also to sections 6.5.1 to 6.5.10 and 7.4.5.3].

**8.1.3.10** That the NTC should liaise with the PNG-ITC (once established) for advice on all matters regarding computer IT related education and training in order to perform its functions in a professional manner using the latest available information researched and provided by the PNG-ITC. [Refer also to section 7.4.5.1].

#### **8.1.4 For Implementation by the Internal Revenue Commission**

The Internal Revenue Commission (IRC) is responsible for collecting revenue for the government. In this particular context, the IRC has the task of enforcing the government's Training Levy requirement which was designed to encourage employers/companies to provide more training for their staff. The idea behind the Training Levy was that it was an additional tax on employers who do not spend sufficient money on actual training and was assessed at 2% of the company's payroll.

Private Training Organisations have sprung up to cash in on the opportunity by first registering with IRC thus obtaining 'recognition' for their courses. Approved private training courses including computer courses were likely to induce more employers to encourage their employees to attend as they were likely to select courses that would qualify for Training Levy benefits. However, a senior official from IRC indicated that the persons handling the private training applications have any experience in neither the private computer training nor education or training in general. According to the interview notes, *'The IRC has been in discussion with NTC for about a year looking at ways to pass the approval of business training courses to NTC. It was agreed that they*

*(NTC) should be better placed to decide on the value and quality of training offered'* (McKie, 1996).<sup>8</sup> With this view in mind, it is strongly recommended:

**8.1.4.1** That the Internal Revenue Commission should be responsible for granting registration as a company to operate as a business activity in the country. This registration would enable collection of company tax and assessment for Training Levy purpose. Education and training matters in the private training organisations should be the sole responsibility of the National Training Council. [See also Recommendation 8.1.3.12].

#### **Comments or Supporting Arguments:**

Private computer raining providers were found to be in two camps - those approved by the Internal Revenue Commission (IRC) under *PNG Companies Act* and those approved by the National Training Council (NTC) as well as IRC. Officials from both NTC and IRC have confirmed that there were loopholes under the present policies, administrative, and organisational arrangements. One of the loopholes or questions to be decided on is which organisation should be responsible for what particular function with regard to private training organisations.<sup>9</sup> [Refer also to sections 5.3.7, 6.6, 6.7.3 and 6.7.9].

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<sup>8</sup> Interview notes and written statement obtained from Mr Ron McKie, Assistant Commissioner, Revenue Assessment, Internal Revenue Commission in Port Moresby - PNG on 4/7/96.

<sup>9</sup> Two attempts in the form of letters respectively dated 21 May, 1997 and 12 September, 1997 addressed to the attention of the Director of the National Training Council to obtain further information on the 'loopholes' in the policies and organisations were unsuccessful.



### **8.1.5 For Implementation by the Private Training Organisations**

Private Training Organisations are entrepreneurial. They have initiatives and motivation to take risks by engaging in activities of a commercial nature which interest them. Such was the case in PNG where the government failed or ignored the prevalence of computers in the workplace and related industry (especially the training and education sector). The private training organisations have (under their own resource constraints) endeavoured to provide computer skills training to those people who need such skills in the workplace.

There have been successes in which regulation of such training would enable IT education and training to advance and prosper while the difficulties experienced serve as a good lesson to devise a policy or plan and improve on the initiatives undertaken. Private training organisations should have some responsibility to implement some of the recommendations put forward so that computer training programs were conducted in such a way that benefits the government, private training organisations, trainees, public and private employers, and other organisations. It is envisaged that the following recommendations will be implemented by the private training organisations.

#### **8.1.5.1 That all training organisations should have:**

- a) A provision for trainees to be assessed using an assessment system or procedure which would help to measure the attainment of the skills and competencies set out in the training course or program; and

- b) A grading and assessment system which is published for the purpose of maintaining a transparent assessment system for example; a system of examinations, the work load required to satisfactorily complete the course, a grading system used, and other essential information on the certificate awarded to show the level of achievement the trainee has attained in comparison with the rest of the cohort group.

**Comments or Supporting Arguments:**

Building an assessment system into a teaching program was one of the criteria for training organisations and their training programs in order to be given accreditation by the National Training Council, but not many training providers implement them (National Training Council, 1993a).

There was little evidence to show that a formal assessment and evaluation system was employed by private training providers. It was evident however, that only a few training organisations used some form of assessment such as examination or tests at the end of the course especially in cases where the training program conducted was ‘accredited’ by external institutions. Most training providers do not test or examine their trainees in their training programs. [Refer also to sections 6.4.8, 6.4.9 and 74.5.5.2]. See also Recommendation 8.1.5.1.

**8.1.5.2** That private computer training organisations should revise their courses by adopting competency-based training programs instead of the present time-based programs. The training organisations should place strong emphasis on trainees to demonstrate their ability to perform specific skills in a course of program. Further, the

attainment of these specific competencies should also be acknowledged in the different levels of certificates awarded by training providers.

**Comments or Supporting Arguments:**

A time frame may only be used as a guide to enable the training provider to deliver training within the available time. However, achievement of competency skills should not be sacrificed at the expense of strictly ‘time-based’ training programs. A balance should be worked out between performance and attendance.

Most of the training providers conducted a time-based training program where advertised courses were conducted for a specified period of time. Whether or not the content planned (or published) were adequately covered was immaterial as no mechanisms of scrutiny such as inspection or examination system were used to ensure the delivery of published course content. [Refer also to section 6.4.5].

**8.1.5.3** That private computer training organisations should develop and conduct more concept type or technical type course. Those training providers conducting concept type courses (for Managers, Systems Administrators, Systems Analysts, Systems Support, and Developer/Programmer, and so on) with hardware-specific training be accorded with special concessions such as tax relief in order to help increase their output.

**Comments or Supporting Arguments:**

More such concept type courses were needed in PNG because at present it is relying heavily on overseas expertise at great expense for IT professionals (See Table 5.1).

Encouraging technical type training programs with special incentives would help raise the level of computer development in PNG from 'Basic' to 'operational' and 'advanced' levels in Lau's (1981) classification of levels of computer development.

Most of the computer related courses were based on software application courses which were geared to service the workplace. These types of courses were described as satisfying *Vocational Rationales* for introducing computers (Hawkridge *et al*, 1990), because they were relevant to vocational needs of many trainees in the workplace. The courses were designed to enable trainees to apply the computer skills learnt in the workplace. The computer courses include: word processing, spreadsheet, database, dedicated software, programming languages, operating systems, integrated software, desktop publishing, graphics and presentation software (described in detail in Chapter 6 and Appendix D).

**8.1.5.4** That the individual Private Training Organisation should endeavour to create a training environment that would provide trainees with appropriate computer knowledge and skills. Further, the courses designed should be well-researched, developed and delivered in accordance with established guidelines.

**8.1.5.5** That all computer courses or programs in Private Training Organisations approved by the NTC and complying with PNG-ITC guidelines should be publicised in the print media for the information of the public such as trainees, trainers, employers or sponsors.

**Comments or Supporting Argument:**

The following details should also be published:

- a) Name of the Course;
- b) Course Duration;
- c) Registration Number;
- d) Name of Registered Training Institution; and
- e) The name of the Award or Certificate.

In that way the public is aware of investing in courses that would return some benefit. For example, sponsors can claim Training Levy benefit from the Internal Revenue Commission while trainees can be assured of the quality control processes instituted in the course. [Refer also to sections 5.4.2 and 7.5.4.6].

**8.1.5.6** That a professional organisation of computer users, traders, trainers and educators be formed with membership open to all professionals incorporated into computers and information technology industry.

**Comments or Supporting Arguments:**

This professional organisation would be a non-profit organisation and administered by committed individuals to represent the members' interest in the industry and provide information towards formulating relevant policies. This could also serve as a clearing house for acquiring and disseminating information about computers and information technology periodically to its members and other individuals.

PNG at one stage had a similar group of professionals known as PNG Computer Users Association. This group (now defunct) initially started only as a small group of computer users in Port Moresby in the late 1980's.<sup>10</sup> Many computer training organisations spoken to by the author indicated their support for such an association and were willing to support the establishment of such a body. The private training organisations themselves are in a good position to take the initiative to consult each other and formally establish such a body to serve their interests. [Refer also to Table 7.22].

#### **8.1.6 For Implementation by PNG-ITC, NTC and CHE**

The following recommendations require more than one government agency to implement. It is felt that where more than one agency is required, such recommendations be categorised under this section for the concerned authorities to consult each other and implement the recommendations accordingly.

**8.1.6.1** That (NTC, IRC and the Government) should take immediate steps to identify the loopholes in the existing legislation administered by the National Training Council (NTC) and the Internal Revenue Commission (IRC) and amend the appropriate sections of their respective policies to make it compatible and consistent for private training organisations.

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<sup>10</sup> PNG Professional Computer users' Club Inc. (1993). August 1993 Newsletter (Limited Edition issued to Financial members).

### **Comments or Supporting Arguments:**

Amendments to the policies should be done in such a way as to empower the relevant authorities to execute their duties and perform their functions effectively. This would ensure that all training organisations would conduct training activities within the legal framework established in a professional and ethical manner.

The NTC and IRC representatives have highlighted the fact that loopholes existed in the instruments governing their functions regarding private training organisations. It was revealed to the author that the concerned authorities were working towards correcting the loopholes in both the National Training Policy and other legal, policy, and organisational matters<sup>11</sup>. Hopefully such efforts would identify the loopholes and correct the situation. A *Memorandum of Agreement*<sup>12</sup> was signed by all those concerned in order to address the existing loopholes or discrepancies in the various policies and regulations under which private training organisations and their training programs operate (Bayagau, 1997). [Refer also to section 6.6].

#### **8.1.6.2 That PNG-ITC, NTC and CHE should:**

- a) Ensure that training programs designed by private training providers must allow for trainees to progress (or transfer) from one organisation to the next with minimum difficulty. [Refer also to sections 7.4.5.2, 8.1.2.1 and Table 7.13]; and

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<sup>11</sup> Interview notes between the researcher and Mr. Wesley Tauwaole of the National Training Council Secretariat, in Port Moresby - PNG on 2/7/96.

<sup>12</sup> A letter dated 21 May, 1997 sent to the Director, National Training Council requesting further information such as the wording of the *Memorandum of Agreement* remain unanswered.

- b) Devise a training path in which trainees could progress from one point to the next thus accumulating ‘credits’ or recognition for past training programs or qualifications which is recognised by the other organisations. Such training paths should enable a trainee to go through the different public and private institutions and obtain the different levels of qualifications if he/she so desires with minimum difficulty. [Refer also to section 7.4.5.5 and Figure 7.12].

**8.1.6.3** That NTC and PNG-ITC should honour and recognise the independence of private computer training organisations with regard to: design of computer courses/curriculum, delivery of the course, assessment and evaluation, recruitment of qualified trainers, provision of teaching facilities or resources, and certification of the courses taught.

**Comments or Supporting Arguments:**

The above mentioned functions should be formalised in order to enforce standard practices and maintain some form of standards in an unregulated computer training environment.

Additional factors identified by training providers as the strengths of their computer skills curriculum were:

- a) Computer education and training courses conducted;
- b) Personalised training offered;
- c) Appropriateness and usefulness of the course;
- d) Standard of training facilities or resources available;



- e) The content of the computer related courses offered;
- f) The educational qualifications and experience of the trainers involved;
- g) The status or reputation of the training institutions;
- h) Conducting NTC-approved computer courses; and
- i) The different certificates awarded at the end of the course or training.

[Refer also to sections 7.1.3; 7.1.4; 7.1.5 and 7.4.3.1 and Recommendation 8.1.2.2].

**8.1.6.4** That NTC and PNG-ITC (through the formulation of appropriate policies or guidelines for conducting computer education and training) should endeavour to establish standards in the following areas: the computer curriculum, the training or teaching facilities, the minimum educational qualifications of trainers, and define the different levels of qualifications for the courses taught. [Refer also to section 7.4.5.4.2 and Table 7.22].

**8.1.6.5** That PNG-ITC and NTC should determine and establish the acceptable minimum educational or professional qualifications a computer trainer must possess. This will ensure that computer trainers were adequately qualified in the subject before they are allowed to practice their knowledge and skills. [Refer also to section 7.4.7.2.4].

**8.1.6.6** That NTC and PNG-ITC should maintain regular contact with the private training organisations to ensure that computer training organisations comply with the standards and guidelines established regarding computer training program and associated issues such as standard of the training facilities used. [Refer also to section 7.2.9.1].

**8.1.6.7** That NTC and PNG-ITC should ensure that compliance with the standards and guidelines established by PNG-ITC be among the conditions for recognition of training organisation, training programs, and certificates awarded by other training organisations.

**Comments or Supporting Arguments:**

Several criteria were identified by training providers as important conditions for recognising computer courses conducted by private training organisations in PNG. The first four criteria identified were the:

- a) Aims and objectives of the courses;
- b) Quality of the training provided;
- c) Reputation of the individual training provider; and
- d) Quality of the individual courses offered.

Further, two additional criteria have also been identified which would help to recognise past knowledge, skills and qualifications obtained from a private training provider. The criteria were: following or using an approved computer curriculum or syllabus, and whether or not the training organisation implemented the approved standards in the training process by authorities such as NTC and PNG-ITC. [Refer also to sections 7.2.9.1 and 7.4.5.3].

## **8.2            Summary**

Recommendations have been made in this chapter based on the research findings. The findings revealed that private training organisations have been conducting computer skills training in an ad hoc manner. Each training organisation conducted computer

skills education and training in its own unique ways depending on its own strengths and capabilities, resource constraints, clientele, and goals and objectives. All these were permitted under the current policy framework.

Under the current policy framework, the training conducted was non-standard and followed an ad hoc and unstructured training programs. It further meant that trainees were not able to continue their training from one training provider to the next with ease because there were no policies or guidelines to ensure that training programs conducted follow common curriculum guidelines and professional or ethical standards. The private training organisations designed or developed their own curriculum, methods of delivery, assessment and evaluation system, and certification and accreditation. Individual training organisations had their own ‘training business’ to conduct as they pleased. Hence, an urgent need arises for a common national policy governing computer or IT education and training in the private sector. Such a policy would not only cover education and training but the wider Information Technology matters throughout the country.

The recommendations have been categorised under respective authorities which were perceived to be the appropriate bodies to implement them. If these recommendations are implemented by the various bodies, certain outcomes are anticipated (See Chapter 9).

Generally it is recommended here that the government should immediately establish a national framework such as the PNG Information Technology Council (PNG-ITC) as

well as formulate a national Information Technology Policy with wide coverage to include; Computing Curriculum, Tax Liberalisation, Research and Development, Telecommunications infrastructure development, and Establishing standards. Further, it is recommended that if PNG-ITC or a similar body established would be given the task of formulating the relevant policies and guidelines.

The National Training Council would be required to carry out its functions effectively by: screening, endorsing and registering private training organisations and trainers, assessing courses or curriculum developed, enforcing national standards or guidelines, implementing national goals of HRD in computer related professions, and encouraging the adoption and implementation of the positive attributes identified. These may be performed in consultation with other government agencies both nationally and internationally and revising its own policy, the *National Training Policy* after incorporating the many changes recommended.

It is also recommended that the Internal Revenue Commission (IRC) should only be required to register the training organisation as a business or commercial venture specifically for collection of company tax and assessment for Training Levy benefits. Training and education matters should be left entirely up to the National Training Council to screen, assess, monitor, regulate and register the training organisation and implement standards or guidelines.

For the Private Training Organisations, it is recommended that they:

- a) Use a transparent assessment system or procedure to measure the trainees competency or attainment;
- b) Award certificates containing such information as the assessment procedure used, work load required in the course, grading system used and other information to show the level of attainment and standards reached by the trainee;
- c) Revise existing courses by adopting a competency-based training instead of time-based which will require trainees to perform specific skills to demonstrate their abilities;
- d) Develop and conduct more concept-type (technically advanced) courses;
- e) Develop and conduct well-researched courses in an educationally supportive environment;
- f) Conduct courses approved by PNG-ITC and NTC;
- g) Apply the standards, guidelines and policies established; and
- h) Form a professional association of computer users, traders, trainers and educators to represent their collective voice in matters affecting their activities.

The Private Training Organisations, the National Training Council, the PNG Information Technology Council, the Internal Revenue Commission and the Commission for Higher Education collectively have been recommended to:

- a) Identify the loopholes in existing policies or regulations and revise or amend them accordingly;

- b) Ensure training programs conducted allow for recognition of prior learning through a recognition system such as a National Qualification Framework and a National Accreditation Policy;
- c) Design a training path which recognises prior learning and allows for future interest and direction chosen by the trainee;
- d) Honour and recognise the independence of training providers in the design of courses, course delivery, assessment and evaluation, recruitment of trainers, provision of training facilities or resources and certification; and
- e) Establish standards or guidelines for training providers to comply with in their training activities.

Finally, but not the least, further research is required in the following areas in order to provide additional information and insight to policy-makers in PNG. These areas include:

- a) Effectiveness of private training programs to meet workplace IT skills requirements in PNG;
- b) Employers attitudes towards private training organisations and their training programs;
- c) How public institutions such as universities and colleges can cooperate with private training institutions to develop human resources in IT; and
- d) How PNG's Information Technology Policy, PNG Science and Technology Policy, and the National Training Policy could be combined to address wider IT issues in PNG.

## **Chapter 9**

# **Implications for IT Policy & IT Curriculum**

### **9.0 Introduction**

The proposed effects of implementing the recommendations made in Chapter 8 by the respective authorities are presented in this chapter (section 9.1). It also presents what is likely to occur in PNG if the current practices in computer education and training or the status quo is maintained (section 9.2). Further, the perceived role of the national IT Policy and IT strategies adopted in other developing countries is highlighted. Additionally, some of the possible actions (to be taken by PNG) as experienced in other developing countries which successfully implement a National IT policy are described before presenting the possible implications for a National IT Policy and IT Curriculum within Papua New Guinea.

### **9.1 Effects of the Recommendations**

The Government, the Private Training Organisations, the National Training Council, the Commission for Higher Education, and the Internal Revenue Commission each have a part to play. Recommendations pertinent to each authority or body have been made (in section 8.3) as a result of the research undertaken. What follows in this section is an abbreviated discussion on: (a) the net effect of the recommendations made if they were to be implemented by the different authorities in PNG, and, (b) the consequences if the status quo prevails without any positive intervention from the government.

### **9.1.1 Effects of the Recommendations if Implemented**

In this section we speculate on the effects of the major recommendations if they are implemented by the relevant authorities in PNG (identified in chapter 8). Several effects are anticipated if the recommendations were implemented by the various bodies and especially if the government established a formal structure (ie, a Ministry, a Commission, a Council or a Board) to oversee Science and Technology matters including Information Technology.

### **9.1.2 Effects of the Recommendations if Implemented by the Government**

The government has a responsibility to establish formal structures such as a Ministry which would be responsible for all Science and Technology matters in the country. The creation of the proposed PNG-ITC would advise the government on all IT-related matters. The PNG-ITC would have a broad focus and would cover IT applications and implementation in all sectors of the country and not just the Public Service. Under the present inactive or dormant and narrowly-focussed Public Service IT Board, IT application outside the Public Service is ignored. The following effects are anticipated if the recommendations made for the government (presented in sections 8.1.1.1 - 8.1.1.19) are implemented:

- a) By establishing a formal structure which is responsible for Science and Technology development, there would be a boost to Information Technology application, development and implementation in the country. This would enable the government to use IT as the engine for driving social, political, and economic development activities and to formally address IT-related issues with the seriousness and prominence it deserves.
- b) The establishment of PNG-ITC would result in the development of a specific action-oriented policy with goals to be achieved through the creation of infrastructure and human resource development in a planned manner over specific time periods. The



action-oriented policy will allow training organisations to plan ahead and develop their training programs according to their resources, the needs of the trainees, and the demands exerted from the workplace as well as to develop human resources needed in the IT profession.

c) Through the formulation of a national IT policy, standards may be established on many aspects of Information Technology. The standards anticipated among others include:

- Computer hardware, software, communications protocol and equipment;
- Corporate information and data security;
- Human resources development at both public and private institutions;
- Research and Development in IT related industries;
- The Curriculum Content and Methods in the private training organisations;
- A Qualification Framework to enable mobility of trainees within the training industry and those seeking employment in the job market;
- Ethical and professional standards for practitioners and users of IT in both the public and private sector;
- Planning and coordination of IT activities such as physical infrastructure development, procurement and acquisition of hardware and software;
- Structural changes in the form of amendments to existing laws or policies, practices and systems. For example, firstly; if the government reactivates the *Copyright Act 1978*, it would encourage individual creativity, and respect for other people's intellectual property; and secondly, liberalisation of the taxation policy would enable training organisations to procure IT equipment (which have to be imported) more easily for educational usage. The trainees would immensely benefit from such policy changes;
- An action-oriented national IT policy would enable training organisations to provide or conduct computer related training in accordance with the standards established. Hence computer education and training in the country would be planned,

coordinated, and delivered according to the standards set out by the authorities concerned; and

- Introduction of computer studies into the secondary schools will help to prepare Papua New Guineans to be aware of the computer's potential impacts on their lives and gradually create a computer literate society. Potential uses of computers in education especially at school level will increase as more and more people would become aware of it or even use it before entering the school.

Evidence (in chapter 2) from *advanced* developing countries such as Bangladesh (section 2.4.2.1), India (section 2.4.2.3), Malaysia (section 2.4.2.5), Pakistan (section 2.4.2.6) and Singapore (section 2.4.2.7) where the respective governments took an active interest in IT showed that, those countries have prospered in information technology developments. For those developing countries with no or little government action and initiatives (ie. *laissez-faire* developing countries), IT had not taken off compared with those countries with action-oriented policies and strategies or the *advanced* developing countries (see section 2.5).

### **9.1.3 Effects of the Recommendations if Implemented by the PNG-ITC**

The following effects are anticipated if the recommendations made for PNG-ITC are implemented:

- a) By defining specific competency skills at various levels of the courses offered (eg, Basic, Intermediate, and Advanced), a goal-oriented standard is established. Training organisations would design and develop their curriculum around a competency-based curriculum with both short and long term goals. The short term goals would be aimed at mastering certain sub-skills and the long term goals would be on the overall competency as set out for the various levels of courses for the different categories of the IT profession. The trainees would have a better idea of what specific skills or competencies they are expected to achieve at the completion of the course. This would help trainees and their sponsors to plan ahead for the next level of training. A well-

defined competency-based training program would enable mobility of trainees both within and between the training organisations.

b) There would also be clear guidelines on the following aspects of private computer training organisations:

- The design of computer skills curriculum;
- Pedagogical processes;
- Assessment system or evaluation methods;
- Minimum educational qualifications of trainers;
- Specifications for teaching facilities or resources; and
- Certification methods and standards.

The guidelines would help private training providers to: revise their courses, regulate their training activities, and conduct various training programs to bring about some form of ‘order’ in the private computer education and training industry.

In that way the employers would be fully aware of the fact that the skills and knowledge acquired by the trainees have met the national standards and guidelines. The trainees would be cognisant of the fact that the training they are undertaking had been designed and delivered in compliance with official guidelines and standards. Trainers would be aware of their obligation to comply with the set guidelines and conduct their training in the manner acceptable to the relevant authorities. Failure to adhere to the guidelines may have dire and severe consequences for the offending organisations, for example, deregistration or even imposition of fines.

c) Development and administration of a ‘professional examination’ would ensure that training organisations complied with the guidelines set which thus acts as a motivation for training providers to design their individual curriculum with the goal of enabling their trainees to pass the examination. Successful performance at this examination by

trainees would add credibility to the institution and promote its external and public image as a high profile institution. Trainees would be accorded certificates which state that they have passed the examination based on their performance in the curriculum formulated under specific guidelines established.

d) Individual institutions (public and private) would design their IT curriculum to complement each other in accordance with the national IT Policy and IT Curriculum guidelines.

e) Individual institutions (public and private) would design an IT curriculum to develop a particular IT professional or user according to the national IT human resource requirements within their individual resource constraints.

f) Individual institutions would be aware of their specific roles so as not to overstep into the other training providers' 'domain' while at the same time be aware of what the other is doing.

g) All institutions would as much as possible avoid duplicating each other's activity in the same geographical location, such as producing the same type and level of IT users. For example, it is not good if a university-sponsored private training conducts word processing course just like other independent private computer training organisations in the same region. Specialisation on training or education of different IT professionals by different training institutions should be investigated and implemented.

h) Trainees or students should be able to freely move in and out of both private and public institutions (if academic requirements have been met) to pick and choose from the smorgasbord of IT related courses. For example, credit points may be accrued towards a degree at the university if all institutions (public and private) complemented

each other (Alaung, 1997).<sup>1</sup> Universities alone cannot produce all the people with computer related skills required for the IT related profession in the country and neither can private training organisations. But each can educate/train some personnel which collectively make up the pool of IT personnel required in the country. This is more likely to materialise under the system proposed in this thesis.

i) IT related training conducted by other ministries and statutory organisations would also be coordinated so that no one operates outside of the national framework. This would avoid duplication but at the same time divert the much needed resources to develop human resources in areas of most urgent need as well as maintaining standards across the private sector-public sector continuum. This would also help immensely in the overall human resource development and planning in IT within the country's resource constraints.

#### **9.1.4 Effects of the Recommendations if Implemented by NTC**

The NTC has already begun making sure that the private training organisations conduct their training activities within the existing legal and policy framework such as the *National Training Council Act 1991*<sup>2</sup> and the *National Training Policy (White Paper 1989)*<sup>3</sup>. Such a Policy is too broad and does not account specifically for computer or IT related training in the country. Computer or IT related training has a particular function in that it makes a special contribution towards the country's IT requirement particularly in education and training in view of the IT application trends both nationally and internationally.

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<sup>1</sup> Moves were already under way or at least awareness was raised to establish a formal and unified system as reported by Alaung, M. (1997). 'Move to set up unified higher education system', *The National*, Thursday April 3. [Online] Available URL: <http://www.wr.com.au/national/06home.html> [Accessed 3 April, 1997.]

<sup>2</sup> Independent State of Papua New Guinea (1991). *National Training Council Act 1991*, Port Moresby - PNG.

<sup>3</sup> Independent State of Papua New Guinea (1989). *National Training Policy (White Paper)*, Port Moresby - PNG.

By implementing the recommendations, the NTC would further ensure that private computer training organisations review their own training programs and conduct high standard and high quality computer training. Listed below are some of the likely outcomes of implementing the recommendations:

- a) All private computer training organisations would be screened and registered before being allowed to conduct any training activities as it is at present;
- b) The computer related training programs (IT Curriculum) developed would be scrutinised and endorsed by the relevant authority such as the NTC prior to its implementation;
- c) The individual IT courses would be developed according to established guidelines or standards and would have a potential for enhancing job prospects for trainees or applicable in a workplace for those already on the job;
- d) The training programs would be developed to meet specific human resource requirements of the country (in accordance with national IT human resource personnel projections). In that way duplication of training programs would be either avoided or minimised, and energies and resources would be directed towards training and education of personnel in areas of the IT profession which are constantly growing and in high demand (as evident in the number of IT related job advertisements placed in PNG newspapers daily<sup>4</sup>);
- e) Regular contacts and direct communication between private training organisations and the NTC would be maintained to ensure that information relevant to those concerned would flow freely between them for their common good;

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<sup>4</sup> An average of nearly 25% of all Positions Vacant advertisements daily in the *PNG Post Courier* in 1997 refer to IT or computer related positions.

- f) Individual training providers have demonstrated certain positive characteristics. Those characteristics would be further strengthened so that: trainees receive quality training, the potential employees have high calibre trainers (and training institutions) to select from, the country has a pool of qualified people who would in turn contribute meaningfully to the country's development as well as improve their individual standard of living;
- g) Additional features would be built into the existing criteria to further strengthen the accreditation processes and add credibility, meaning, and value to the certificates awarded by private training providers;
- h) 'Conflicts' between authorities such as the IRC and the NTC would be reduced with specific roles and functions defined for them through the revision of existing policies governing their respective roles and functions in regard to private training organisation; and
- i) Private computer training would be given the necessary attention and recognition it deserves because of the growing demand for such training and the pervasiveness of computer technology and the skilled or educated IT personnel required in the country's workplace.

#### **9.1.5 Effects of the Recommendations if Implemented by Private Training Organisations**

Following are some of the effects of the recommendations if implemented by Private Training Organisations:

- a) The training process in the private training organisations would be coordinated and regulated in the following ways: establish specific criteria, improve training facilities or resources, conduct quality training programs, recruit and employ academically and professionally qualified trainers, improve or enhance the merit and status of the certificates awarded, conduct approved training courses, and gain recognition for the training activities conducted;
- b) As well as gaining recognition for the computer training conducted the training programs would be formally delivered by academically qualified trainers, who employ proven teaching methods and procedures and apply standard assessment and evaluation procedures. The trainees would be graded according to their demonstrated performance in tests or examinations and achievements at the prescribed level of competencies;
- c) By maintaining a transparent training program, the trainees would know exactly what they are gaining from the private training program, and the employers could decide on the type of trainees they would like to recruit. The employers could also find the necessary information about the training program for example, the skills and competencies emphasised in the training, and the content of the materials covered which would be accessible and freely available for those who wish to examine it;
- d) The certificates awarded convey all the relevant background information (ie., system of examination used, workload required to pass the course, the grading system used, the standard and level of competencies achieved by the trainee) required by those concerned such as: other trainers, the trainees themselves, the employers, and the general public;
- e) Training providers would gradually move away from conducting applications software training and conduct more concept type (or technical) courses as more



incentives such as tax relief are introduced as an inducement to venture into this type of training. There is already a huge demand for these types of courses and therefore more such training programs are needed. With the provision of application software training programs, the skill level or the level of computer development in PNG is described as either 'low' or 'Basic'. In order to provide concept type courses, it is essential that there must be aggressive computer awareness programs within the public sector educational institutions (especially at school level). This would lay the foundation for computer literacy beginning with students who would over time join the masses or the general public. This would eventually have a ripple-effect and greatly improve the country's level of computer development towards 'Operational' or 'Advanced' level.

- f) Computer related courses have to be well-researched, developed, and taught in an educationally conducive environment which would maximise teaching and learning, transmit job-specific computer skills and knowledge, and open up more opportunities to advance in further training. Trainees may be able to continue their training in another institution without being subjected to specific institutional demands such as the requirement to sit for a pre-test to determine a trainee's level of prior IT knowledge.
- g) A professional organisation such as an association for computer users, vendors, trainers and educators would bring together like minded people to work towards achieving their individual goals while at the same time help to develop and strengthen their activities. Already other professional organisations have been formed in PNG. For example; PNG Institute of Accountants, PNG Institute of Engineers, PNG Law Society, and PNG Institute of Architects. These professional organisations are respectively governed by their individual Acts and promote their interests according to their respective codes of ethics. They are contributing significantly to PNG's development in their separate disciplines.

### **9.1.6                Effects of Recommendation if implemented by PNG-ITC, NTC and CHE**

The following effects are envisaged if the recommendations are implemented by the various agencies such as PNG-ITC, NTC and CHE through a combined effort.

- a) Each individual agency would be fully aware of its own functions and roles. Each of them would also be aware of any deficiencies in their system. Through cooperation with other agencies there would be a better chance of discussing their inherent individual strengths and weaknesses, avoid the pitfalls of loopholes in their respective policies, and further consolidate their individual strengths.
- b) By cooperating and working together, the PNG-ITC, NTC and CHE would come together with their different expertise to draw up career and training paths which extend from one training program and link with other programs which recognise a trainee's past knowledge, experience, skills and qualifications. These paths would give trainees both vertical and horizontal mobility to advance in their career as well as allow them to seek alternative routes to further their training opportunities or upgrade their qualifications.
- c) Regardless of level, focus and type of training program, private training in PNG should ensure that vertical mobility is created and vocational qualifications need to provide access to higher education (See Young, 1996). However, a system (or a training path) which enables a trainee to progress from one level in one institution to another level or institution should be established to allow for greater mobility for trainees.
- d) For these agencies (PNG-ITC, NTC, CHE) to honour and recognise the independence and freedom enjoyed by private training organisations means the

training organisations would continue to research and develop their own courses, teach the courses designed, and assess and evaluate the course the way they have been practising for many years. However, such independence would be granted to training organisations to conduct their affairs within the guidelines established by the relevant authorities. These guidelines would state clearly the parameters within which the curriculum is to be developed, how it should be delivered, how it should be assessed, under what conditions and environment the courses should be taught, the level of experience and qualifications of trainers needed to teach the course, and whether the courses taught meets the standard established or attains the quality required.

- e) The standard and the guidelines established would cover various aspects of the training process. Without such guidelines private training organisations would still be conducting their training programs and their virtues (qualities, standard, content) of the training program would only be recognised by themselves and their clients. However, there are some aspects which training providers considered as their major strengths, such as the educational qualifications of their trainers, the training or teaching facilities and their individual courses. Recognising these strengths could promote amicable working relationship with training providers and hence further promote the computer education and training initiatives in the country.

## **9.2 Future Development if Current Practices were allowed to Continue**

It has been revealed in the earlier chapters (eg, chapters 5 and 6) that private computer education and training programs in PNG have been haphazardly conducted and uncoordinated at the national level. This was mainly due to the absence of national IT policy and curriculum guidelines which allowed private training organisations to

develop their own computer related courses and deliver them according to their own needs and resources.

In order to foresee and speculate on the possible future developments in private computer education and training in PNG, some of the most significant current practices as revealed from the questionnaire, document and/or policy analyses, interviews and personal communications with those involved in the training industry as well as those who derived benefits from the training organisations in one way or another (eg employers, trainees, parents or guardians) must be borne in mind.

The following are some examples of the current practices:

- Computer studies at school level are treated as ‘extra-curricula’ activity;
- Computer related courses are conducted by private training organisations as a commercial activity;
- The private training organisations conduct general software application courses;
- Training organisations are conducting such courses independently from each other with very little scrutiny from any authority;
- Each course is conducted differently by the various training organisations;
- There is no government policy prescribing IT curriculum and IT policy; and
- Private computer training is neither formalised nor standardised;

Such circumstances are open to abuse by those involved in the private training activities.

If these practices were allowed to continue in PNG, the result would not only be catastrophic in the long-term period but also chaotic. Many of the effects from allowing these practices to persist have been highlighted in the previous chapter in their appropriate contexts.

Following are some of the likely developments which could result if the current ad hoc and non-standard training practices are allowed to continue (See also Chapter 10):

- a) Shortage of personnel with IT knowledge and expertise has been identified as a common problem experienced by many developing countries (Bhatnagar, 1992a). This shortage has been the major impediment to effective exploitation and implementation of IT in the developing countries.
- b) PNG's IT human resource skills shortage would be further worsened because, despite the acute shortage, little or no effort was made at the highest level (political or otherwise) to plan, develop and chart the course the country should take to address the shortage of IT professionals in the next century. This would further mean that PNG like the rest of the *laissez-faire* DCs without formal structures, would tackle IT issues and their implementation by continued dependence on foreign expertise as a consumer of IT.
- c) Since there is no formal national action taken to educate IT and computer professionals within the public sector institutions, allowing current ad hoc practices of private computer training to prevail would leave computer education and training activities in the private training organisations to be dictated by profit-driven entrepreneurs. Furthermore, only the very basic category of skills, ie. application software users would be provided for. Therefore, training in high level computer professionals would be deliberately ignored because of the training organisations' own limitations. This would further create dependency on foreign expertise to provide the skills and expertise needed in the country. Experience from *advanced* developing countries such as India, Pakistan and Singapore suggest that government action is essential and paramount in addressing a shortage of IT professionals in well-planned and well-executed policy strategies. Often bold decisions have to be

made in order to benefit from IT implementation because passiveness in the IT area isn't going to be of help to any country.

- d) While it may be a good idea to allow market forces to dictate the type of courses and programs in the private training organisations, it must be remembered that the private sector training market in PNG is small at this stage with immense potential to grow in numbers and complexity in the future. This growth potential needs to be nurtured and guided by well-thought out government policies and guidelines. Without such a policy, the trainees will be blindly accumulating certificates which leads to a *cul-de-sac*, limiting further training opportunities as well as job opportunities instead of opening up new challenges.
- e) At present private training organisations award certificates to their trainees at the completion of a training course. Without a state-validated certification system, the certification process in the private training organisations would continue to be grossly obscure, meaningless, and unreliable by making it impossible for: (i) trainees to make rational decisions to invest in training program leading to a certificate, and (ii), for employers and the public at large to determine and comprehend the kind of information the certificate is conveying them. In Austria for example, no one is allowed to issue documents which could be confused with official certificates or diplomas (Aigner, 1996).

### **9.3 The Role of the National Information Technology Policy**

A policy in general is developed from a series of specific decision, for example, deciding that there is a problem, deciding to do something about the problem identified, deciding how best to solve it, and deciding to legislate (Hogwood & Gunn, 1984). A policy expresses the broad purposes of government actions in a field and prescribes what must be done within a system, how it must be done, and what is likely to be achieved if implemented properly.

What role should the national IT policy play in PNG? What does PNG intend to achieve in the Information Technology scene? How can such a policy help PNG to achieve its socio-economic development goals and objectives? These are fundamental questions the policy-makers must address when formulating a national IT policy.

### **9.3.1 IT Policy Initiatives in Developing Countries**

In order to answer the above questions, IT policy initiatives undertaken by other developing countries need to be examined. As revealed in section 2.5, the IT policy initiatives undertaken in many developing countries can be classified into three generic categories; non-existent, implicit, and explicit policies (Okot-Uma, 1990).

#### **9.3.1.1 Non-existent Policy**

There were few developing countries with non-existent IT policies. Given international trade and commerce between countries, it makes sense to invest in and acquire technology in general and IT in particular. Even though there may not be implicit or explicit IT policies in place, it is rare to find developing countries remaining isolated from the rest of the world. Hence, developing countries in this category are aware of the need for such a policy. However, individual countries in this category described in chapter 2 have yet to formulate their national IT policies.

#### **9.3.1.2 Implicit Policy**

Many developing countries were actively participating through a *reactive intervention* approach in IT strategies but almost always work under the auspices of an informal organisation sanctioned by the government and established specifically to coordinate and implement the IT strategies planned. Such developing countries do not necessarily have any formal policies. They merely *react* to the market forces to make IT's presence felt in the country.

### 9.3.1.3 Explicit Policy

In *advanced* developing countries, the respective governments play an active role by using a *proactive intervention* approach in adopting IT and establishing formal government structures and institutions to formulate necessary IT policy, develop strategies for encouraging and implementing the policy, and set up programs for IT popularisation and assimilation within the country in both the public and the private sector. Such countries have explicit IT policies to pursue certain economic and social goals.

### 9.3.2 IT Policy Strategies applied in Developing Countries

Three broad goals of IT policy strategies used within the Commonwealth developing countries were revealed by Okot-Uma (1990, p.82):

- a) *Application-Related IT Strategies*, which incorporated those countries whose IT policy (implicit or explicit) mostly focussed on *Using IT* in applied areas, or application-oriented strategies to popularise or create IT awareness at the user level. That situation was common in many developing countries, for example; those located within the Pacific Island region and several African countries (see chapter 2). Many such countries have yet to translate their policies into developing their human resources in the IT area.
- b) *Domestic-Market Related Strategies*, which meant that the governments concerned incorporated advanced IT strategies to establish local industries in order to produce IT products to specifically service the need of the domestic market sector. India is a classical case in which its first and foremost goal was to encourage local patents and licences on processes, products and services in science and technology including information technology.



- c) *International Export Market related IT Strategies*, which involved more advanced strategies to manufacture IT equipment and systems that were of high enough standards to be able to enter into international export markets.

*Application-Related Strategies* were predominantly seen in the majority of developing countries, especially the Commonwealth developing countries. The same also was true even for those countries with *non-existent IT policy* where procurement of IT hardware was ad hoc and implementation of IT concentrated at the user-level or application-oriented (as is the case now in Papua New Guinea).

*Domestic-Market Related Strategies* were successfully implemented in countries like India where its long-term plan helped to stimulate IT production to service the domestic market sector, promote or protect local capacity and prevent external competition from large multinational corporations. India's protectionist approach gave rise to high-technology content exports originating from India to compete at the international market. In such circumstances, policy guidelines were drawn up in order to facilitate transfer of IT and allowed unrestricted development of high content knowledge and skills deployment of its human resources both within the country and elsewhere.

India's strategies have always been to give preference to local IT products, processes or services and limit technology import, foreign content of products, processes or services and consequently increase the number of local patents and licences on processes, products and services in Science and Technology (Okot-Uma, 1990). For example, India's software industry was growing rapidly according to a report in the *Financial Times* (Nicholson, 1997), which quoted a recent study by the National Association of Software and Service Companies (See also Bhatnagar, 1996; Petrazzini & Harindranath, 1997).

The *International Export Market Strategies* enabled countries to take this track to face the fierce international competition with products locally assembled, designed, and manufactured or produced. Often this strategy was adopted under special conditions and arrangements. For example, Malaysia either entered into Licensing Agreements with well-known companies or transnationals from the industrialised countries or entered into Joint-Venture Partnerships with well-known companies supported by the creation of Free Trade Zones within the different parts of the country where companies could operate under a very generous incentive scheme to develop and promote local IT products (Okot-Uma, 1990).

#### **9.4 What Actions should PNG Take?**

Papua New Guinea can be described as taking a *passive* or *no intervention* approach with no IT policy (either implicit or explicit) even though there is a Public Service IT Policy which is too narrow (exclusively intended for the public service). Critics have pointed out that this policy has failed to address wider IT issues in PNG. For example, Sinebare (1993), pointed out the following areas of the Public Service IT Policy as being ignored and further raised the relevant questions about each individual points. The critical questions raised included; has the necessary telecommunications systems and infrastructure developed, how would IT standards within the public service be enforced, have the right information systems skills and information technology skills been identified, whether the coverage of the IT policy was wide enough, would the Public Service IT policy change the organisational culture, and to what extent the policy is to be implemented? These were some of the important considerations the government should address among its other social and economic goals.

PNG has yet to formulate a national IT policy to address issues such as those identified above but more importantly take into account the following considerations (inter alia):

- a) A self-contained policy which reflects the economic and social situations within the PNG context;
- b) Stresses the significance of IT education and training of its human resources;
- c) Establish a formal or professional structure to provide leadership, authority and vision for practitioners,
- d) Set and maintain standards, share technical knowledge with others, and work towards achieving national goals and objectives;
- e) Provide an enabling environment (legislation, guidelines, infrastructure) for IT research and collaboration between university-industry, and government-private enterprise initiatives;
- f) Attract foreign investment with generous inducements such as tax incentives and tariff reduction;
- g) Identify the areas where use of IT is likely to help make most needed information available to help make management and policy decisions. For example, maintain a distributed database system located throughout the districts to record demographic information such as births and deaths so that growth of populations in each district, province or region and the country as a whole may be kept up to date and hence planning and projections of social services could be greatly enhanced;
- h) Synthesise critical IT issues such as regulation and processes, the structures and perspective the country is likely to take;
- i) Serve as an instrument by which the government and its agencies would identify and define the pressing social and economic problems encountered and set goals and directions which PNG should pursue;
- j) Serve as an instrument with which relevant government agencies would be given the task to monitor the acquisition, usage, standards, and human resource development and local applications in IT industry and services;
- k) Provide a mechanism within the policy to encourage and promote closer cooperation between the government, the private sector or industries, academia, and

non-government professional bodies to obtain relevant information from each other for efficient operations;

- l) Create and maintain links with the various agencies, government departments, aid agencies, professional and technical consultancy services, IT equipment vendors, trade associations, research bodies, user bodies, tertiary institutions such as universities and colleges; and
- m) Encourage local participation in various aspects of IT with incentives to further strengthen local initiatives such as the *NiuLogic* Computer where parts or components have been procured from external sources and assembled by *Daltron Electronic Pty Ltd.*, in Port Moresby for the local market since 1995.<sup>5</sup>

These and other considerations were also highlighted by Bogod (1990). Such a policy should be designed to meet PNG's needs and circumstances and should also allow for effective revision when the needs and circumstances dictate in the future. A useful general criterion is to create a policy which will endeavour to:

- Exploit the potential of national or indigenous skills, knowledge or expertise;
- Maximise the benefit or the return for the resources (financial, human and capital) invested in the infrastructure;
- Improve overall efficiency and productivity within the government bureaucracy; and
- Give the greatest value-added return on the initiatives undertaken (Robertson, 1990).

Given the level of IT usage, high demand for people with IT skills, the level of computer development, absence of formal computing curriculum in the schools, and the ad hoc manner in which IT education and training has been conducted in PNG, there is an urgent need for an appropriate national IT policy. How such a policy should be developed/formulated and effectively implemented rests with the government. The government has to draw up this policy because it is in a better position to know how

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<sup>5</sup> See Daltron Electronics World Wide Web Page at <http://daltron.com.com.pg/frames90.html>. [Accessed January 9, 1998].

best to create an environment to achieve national goals and objectives. The purpose of an IT policy would be to create an environment in which:

- a) Economic and social benefits of government services could be achieved with minimum inconvenience and hassle;
- b) Utilisation of physical and natural resources may be optimised through planned and orderly execution of the overall policy;
- c) Import substitution may be created for local initiatives and export opportunities opened up for local products, processes, and services to compete internationally;
- d) Procurement decisions could be taken in an appropriate manner to ensure that the technology adopted is not obsolete and the investment made is economically viable; and
- e) Information systems would be managed and where appropriate coordination of the provision of information could be achieved and maintained within the resource limitations of the government and technical capabilities of the technology adopted (Robertson, 1990, p.113).

With these considerations, PNG should decide on a particular strategy to undertake. That is, whether to follow the line of: Application Related Strategy, Domestic Market Related Strategy, or International Export Market Related Strategy as described earlier. The Policy so formulated should be promoted, encouraged, supported, monitored, and reviewed by a National Body such as the proposed PNG IT Council (or a Ministry of Science and Technology) as suggested in chapter 8.

## **9.5 Implications of the National Information Technology Policy**

Experience and evidence from developing countries which developed appropriate IT policies (implicit or explicit) showed that education and training in IT have always been given priority in order to raise the level of awareness as well as promote local expertise. Promotion and awareness of IT expertise, knowledge and skills in educational establishments such as universities and colleges could encourage cooperation with

private training institutions and other agencies such as research institutions to develop an appropriate skill base to effectively use IT at all levels of the economy.

Human resource training especially in the area of management of information systems, technical know-how regarding the use and operation of hardware, software, and the 'peopleware' with necessary computer and IT skills who would make optimal use of the available information system is essential. The effective use of these would enhance the performance of the decision-making bodies within the public sector. As Mitchell (1990) stated, IT can be applied as a 'leverage technology' to develop educational standards and apply IT in selected areas of the national economy.

When we talk about IT, many decision-makers (eg. politicians and the bureaucrats in PNG) take it to mean computers being manufactured by large corporations with large capital outlays, bought by specialists, sold by specialists, used by specialists, maintained by specialists and intended for specific purposes (Petrazzini & Harindranath, 1997). These notions often create a phobia among the decision-makers who themselves had limited exposure or awareness and further contribute towards the limited computerisation within the government and administration, let alone in schools or education in general. Computers used in the domain of specialists is just part of the bigger picture which is misunderstood because of the decision-makers' own lack or limited IT knowledge and background. This is the context in which people mostly dealt with IT related activities (such as manufacturing of tangible IT products) or as Mitchell called it *Doing IT*.

However, IT's particular characteristics as an 'intellectual leverage' is of significance in this argument. Intellectual leverage, for example; aids the decision-maker to make informed decisions based on timely information. It therefore, promotes and creates knowledge-intensive industries in areas such as management, education, academic research, and R&D to mention a few which Mitchell called *Using IT*, where the focus

changes from 'technology centred' to 'user centred' or from 'product-centred' to 'knowledge-centred'. By using Information Technology everything is turned into something for sale or 'commodification', according to Hawkrige (1996). Hawkrige sees the potential in educational technologists who will be designing, testing and making knowledge products and services in future. (See also Table 9.1).

It is suggested here that PNG through its IT Policy should endeavour to take a user-centred approach (or Using IT) to build the intellectual capacity of its people to service the public service as well as the private sector. By using IT, human capital in PNG can be developed to service various levels and categories of IT professions, which in turn will impact on IT exploitation and utilisation in all areas of the economy (social, political, economic, organisational and management systems).

**Table 9.1      ‘Doing IT’ versus ‘Using IT’**

	<b>‘Doing IT’</b>	<b>‘Using IT’</b>
<b>Relative Cost</b>	high & rising	low and reducing
<b>Relative Complexity</b>	mainly high	straightforward (for proven applications)
<b>Relative Difficulty</b>	very high, competitive	fairly low
<b>Skills Requirement</b>	scarce, high demand	understood, trainable
<b>Degree of Risk</b>	high	low (for proven applications)
<b>Major Focus</b>	technology-focus (technology oriented)	user-focus (application oriented)
<b>End-product</b>	tangible (eg a product)	intangible (eg knowledge)

**Source:** Adapted from Mitchell, H. (1990). ‘Understanding, Selecting and Obtaining the Economic and Social Benefits of IT’, In **Information Technology Policies, [A Report of the Information Technology Policy Workshop, 12-16 Nov, Beaumont College]**, pp. 135 - 163, London: Commonwealth Secretariat.

The reasons why ‘Using IT’ was emphasised over ‘Doing IT’ were because of the following reasons:

- The relative cost is low;
- It is straight forward (low in relative difficulty);
- Skills requirement can be developed within the country’s capacity and resource limitations;
- A fairly low risk venture;
- The focus is on the user rather than the technology, and
- The end-product is not the tangible (concrete object) but the intangible (abstract knowledge) in its various forms. For example, as Porat stated: ‘...every human endeavour involves some measure of information processing and cognition; intellectual content is present in every task no matter how mundane.’ Porat (1976, p.167).

As Bates (1995), Forrester (1985), and Naisbitt & Aburdene (1990) pointed out; education, industry and commerce, and the whole range of other socio-economic activities would be changed when an IT-centred approach is employed. (See Table 9.2).



**Table 9.2 IT-centred Approach to Socio-Economic Activities**

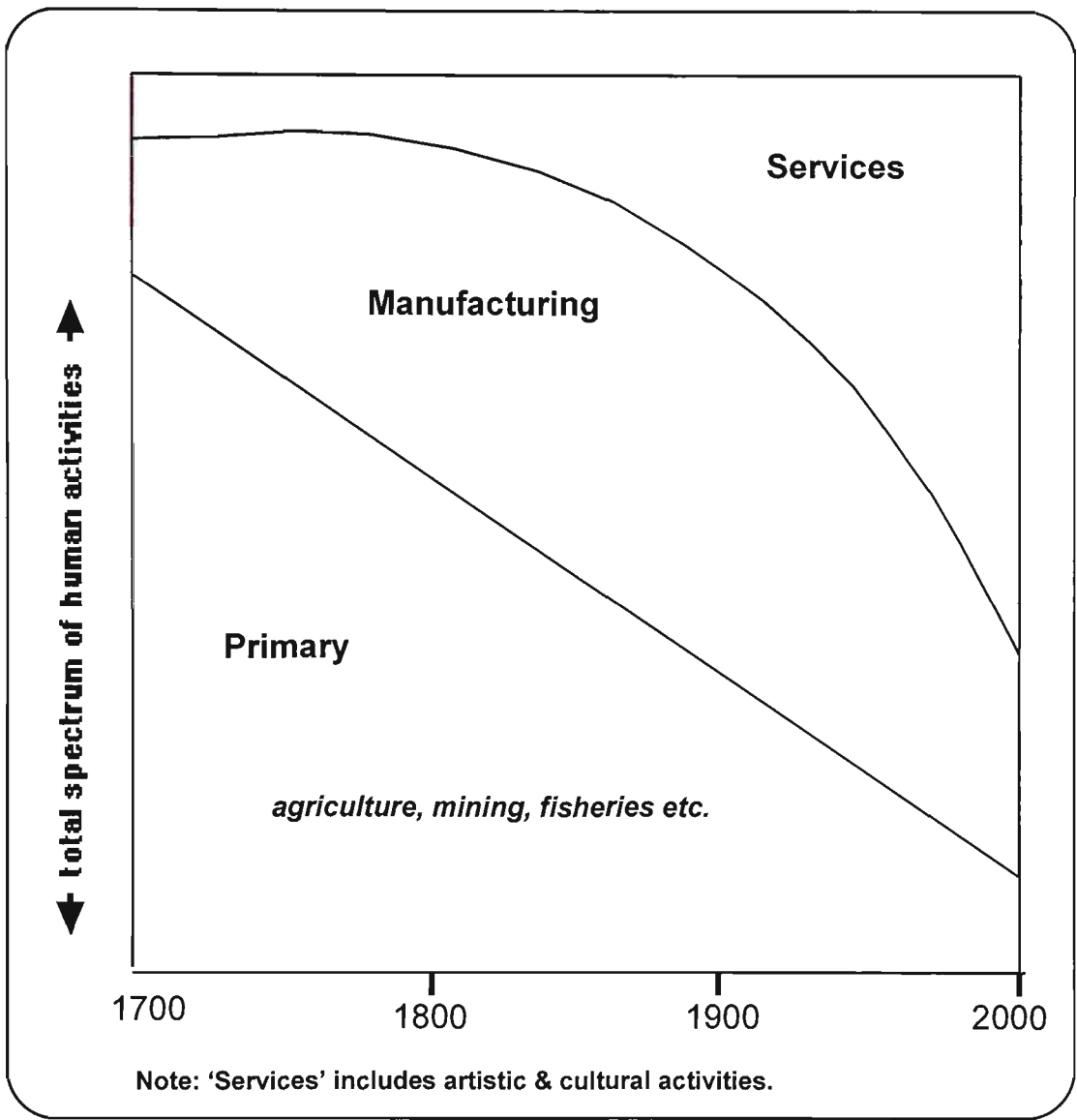
Change From	Change To
Resource-based	Knowledge-based
Large Companies	Small Companies
Low, Specific Skills-level	Generic, High-Skills Level
Brawns (physical strength)	Brains (intellectual work)
Factory/Office work	Home/Transit (Telecommuting)
Centralisation	Decentralised eg Distance Education
Rigid Practices	Flexible Practices
Hierarchical/ Individualised	Networking/Cooperative
Local Economy	Global Economy
Short Term	Long Term
Full time	Part time (leisure)

**Source:** Adapted from:

- (a) Bates, A.W.(Tony) (1995). **Technology, Open Learning and Distance Education**. London: Routledge.
- (b) Forrester, T. (1985). **Information Technology Revolution**. Oxford: Basil Blackwell Ltd.
- (c) Naisbitt, J. & Aburdene, P. (1990). **Megatrends 2000**. New York: William Morrow & Co.

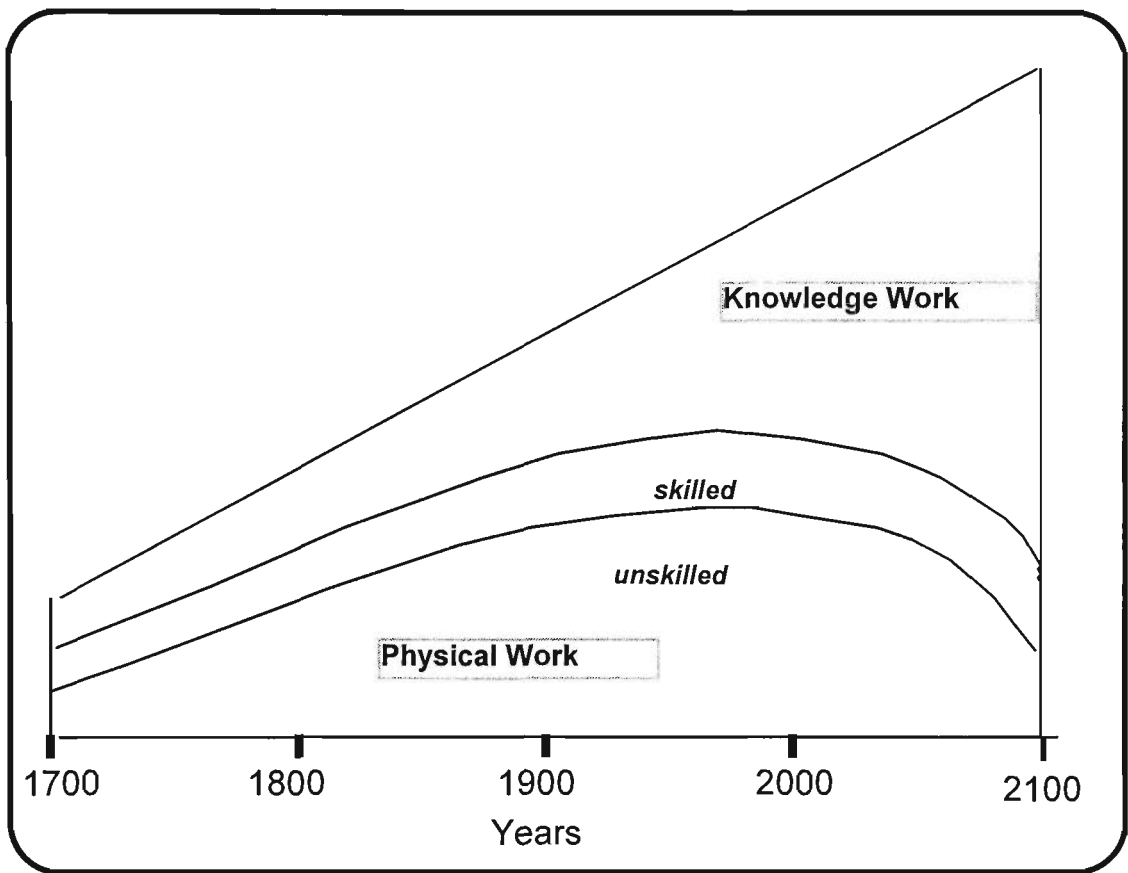
Priorities on PNG’s IT policy should be placed on successful use of IT rather than physical production or manufacturing and R&D even though it incorporates some degree of IT usage at various stages of *Doing IT*. Intellectual use of IT begins with education and that is where PNG and many other developing countries at a similar level of computer or IT development and level of use should give serious consideration. IT and information related services and industries are undoubtedly the growth area and it has been predicted there will be an even higher growth in IT in the next century especially in the area of education and communication (Mitchell, 1990). For example, human economic activities over the last two centuries have evolved from Primary industries (eg extracting raw materials) to Manufacturing (processing raw materials) and is further evolving into Service industries (using and producing information, eg Education in the wider context) [See Figure 9.1], where there is corresponding growth and increase from Physical work (requiring both unskilled and skilled labor) to Knowledge-related work (requiring high knowledge-intensive skills such as Software engineering) [See Figure 9.2].

Figure 9.1 The evolving pattern of human activities



Source: Adapted from Mitchell, H. (1990). Understanding Selecting and Obtaining the Economic and Social Benefits of IT. In *Information Technology Policies*, [A Report of the Information Technology Policy Workshop, 12-16 Nov, Beaumont College], page 152, London: Commonwealth Secretariat.

**Figure 9.2 The rapid growth of knowledge-based and knowledge-intensive work**



Source: Adapted from Mitchell, H. (1990). Understanding Selecting and Obtaining the Economic and Social Benefits of IT. In *Information Technology Policies, [A Report of the Information Technology Policy Workshop, 12-16 Nov, Beaumont College]*, page 153, London: Commonwealth Secretariat.

Others like Blagovest (1986) interpreted or likened *Using IT* to a 'Third Wave' where computers will be used to perform knowledge processing, for example; with applications in Artificial Intelligence. In the 'First Wave', computers were used as a tool (learning with computers) to facilitate the classroom pedagogy while in the 'Second Wave' computers were studied as a subject of study (learning about computers), for example, Computer Science. Mitchell (1990, p.146) further pointed out that:

...**knowledge work** is now the mainspring of economic activity, it (therefore) follows that know-how of human competence (human intellect) is becoming the most critical economic resource. The one resource of which developing countries tend to have an abundant supply is people; developing that resource and enabling it to acquire the right skills and know-how for the information age is surely the most important single investment area for any nation-state. (emphasis added)

Knowledge or service industries are the predicted areas of growth in the next century. Many developing countries are charting their countries' course to achieve this potential growth area by formulating appropriate IT policies, developing specific strategies and instituting appropriate programs to implement their policies. Such a policy forms an integral part of all other government policies, strategies and initiatives.

PNG stands to gain a great deal from IT education and training because essential infrastructure such as telecommunication system are being modernised with latest satellite telecommunication technology (*The Independent*, Jan 17, 1997). A contract worth K12.45m (or US\$9.3m) was reported to be awarded to Scientific Atlanta Inc. to upgrade and expand PNG's existing network (Investment Promotion Authority, 1996). Skilled IT personnel are undoubtedly in high demand within the country (eg, Salt, 1988; Martin, 1994; Capell J., 1994), but IT education and training in PNG is lagging behind many developing countries with *Explicit IT* policies. Successful IT education and training have been reported in other developing countries such as Bangladesh (eg, Rahman M, 1990; Alam & Mondal, 1992), India (eg, Pawar, 1992; Roy, 1992; Bhatnagar, 1992c), Nigeria (eg, Ojo, 1992b), Malaysia (eg, Nordin, 1992), Sri Lanka (eg, Samaranayake, 1992), and Singapore (eg, Raman, 1990; Cheong, 1992a) to name a few cases. Most of these developing countries have adopted *Explicit IT Policies* and strategies to implement IT in both the private and public sector.

Such cases from developing countries provided useful lessons from which the individual cases could be studied, modified or revised, adapted and incorporated into the overall IT Policy to suit PNG's particular requirements and circumstances. With a well-thought out user-centred (*Using IT* or 'intellectual leverage') policy, PNG and other developing countries in a similar stage of socio-economic development and level of computer development could enhance their potential to participate in the global economy by also

becoming an ‘information producer’ rather than being dependent as ‘information consumer’ (Sinebare, 1997a).

Not only that but also bilateral relations could be established between developing countries which have attained varying degrees of successes in IT exploitation at various levels in their respective countries. For example, India is willing to share its technological experience and expertise with PNG according to its High Commissioner to Papua New Guinea, Mr. V.S. Verma (*The National*, Jan 29, 1997). Such opportunities must be exploited and harnessed if deemed beneficial.

The Education Department in Papua New Guinea, which is responsible for the provision of general education in the country, has several views or concerns about computer education or computer studies in PNG schools (summarised in Table 9.3). Those views can provide an initial basis from which to formulate Computer Education Policy and a Computer Studies Curriculum which respectively could be formulated under the overall National Information Technology Policy and Information Technology Curriculum. Similar actions could be adopted by other government departments and statutory bodies as well as private sector training organisations. The First Secretary from the Department of Education, Damien Rapese (1994, pp. 10-12) pointed out many important points regarding his Department’s stand on computers in school. These points are summarised in Table 9.3.

**Table 9.3 Education Department's View on Computers in School**

The Department is aware that:	The Department's Current View
a) Computers are important in all walks of life and that PNG is not immune to the impact of computers;	a) Provide <i>basic education</i> to all students at the Primary level and would not support for narrow specialisation such as computer education for few interest group;
b) Many schools <i>desired</i> to use computers in school administration but are hampered by financial, curriculum and human resources;	b) Would like to see schools with computers to make sure students have some knowledge of computer's applications and limitations in different subjects;
c) Few fortunate schools are actually <i>using</i> computers in school administration;	c) Encourage computer studies in schools as an 'extra-curricula' subject but has no intention to introduce computers into secondary schools;
d) Teacher computer-enthusiast played key roles in using computers, creating and promoting its awareness, develop confidence and serve as resource persons in schools;	d) Department can not allocate financial, physical and human resources to develop computer studies curriculum in the school;
e) When a computer-enthusiast teacher left school the computer laid idle for many years;	e) See computer studies as the responsibility of colleges, universities and private training organisations;
f) Many schools acquired up-market computers with many attractive features but they are under utilised in the classroom; and	f) Prefer to see computers (if available) be kept in a neutral location and not categorised under 'Maths' or 'Science' departments; and
g) Certain computers purchased by schools have become obsolete.	g) Encourage schools to purchase computers out of their own resources or explore other avenues.

Source: Rapese, D. (1994). Workshop on Computing Innovations in PNG High Schools. In **Computing Innovations in Papua New Guinea Schools**, pp. 10-12, [Proceedings of the 1st Workshop in Computing Innovations in PNG High Schools, Aug 29-Sept, 1994], Lae: PNG University of Technology.

These concerns and views were in fact ingrained in a 'quasi-policy' which was not written in any formal policy document. Such a quasi-policy has been occasionally updated when circumstances dictate.<sup>6</sup> With such attitudes as displayed by the Ministry or the officialdom, the Department of Education would like to be **informed** and **advised**. According to Rapese who presented the Department's view on computer education stated that:

...in order to make the right decisions about the place of computer education in schools, we at the Department of Education must see that we are as **informed** as possible on developments in Computer Education, and we welcome **advice** from anyone who is in a position to give useful advice (Rapese, 1994, p.10). (emphasis added)

<sup>6</sup> See Department of Education (1985). Secretary's Circular No. 17/85, File No. CM2-4-2, 7 June 1985; and Department of Education (1993). Secretary's Circular No. 18/93, File No. CM2-4-2, 10 May 1993.

The findings from the research investigated and the recommendations made in this thesis in some significant or constructive way, should *inform* and *advise* the Education Department (ie, Curriculum Development Division) as well as the National Planning Office on Computer Education or IT education and training initiatives in PNG. Further, many other developing countries whose practices and experiences provide adequate information may also be taken into consideration by PNG.

The reactions to Rapese's presentation by the 1994 Lae workshop participants suggested that:

- a) The Education Department's stance on Computer Education as outlined earlier be changed in view of the globalisation and the changing trends in information technology;
- b) The Education Department design a teaching syllabus and trial the materials in the schools with computers;
- c) Computer awareness and popularisation be undertaken across all subjects instead of the being compartmentalised into 'Maths' or 'Science' departments only; and
- d) Computers be progressively phased into the schools initially as an extra-curricula computer awareness course, software application in the various schools subjects, and application of information technology in general (PNG University of Technology, 1994, pp. 13-14).

Further, Professor J.E. Pythian (1994) suggested a select group of educators should determine a computer education syllabus which is regularly updated to accommodate changing circumstances for different schools. He also suggested the use of *PNG Journal of Mathematics, Computing & Education* as a vehicle to popularise and promote information technology and computer education among the schools.

There was an overwhelming consensus among the 1994 Lae workshop participants (PNG University of Technology, 1994, p.225) who would like to see computer

awareness introduced into the secondary schools in PNG. Further, they would also like to see a formal computer syllabus drawn up to set a guideline within which to conduct computer studies courses at school level and monitor what is happening in the schools. The schools in turn would have a 'guide' or a 'framework' under which to conduct computer studies if their resources permitted it and the students in the participating schools would be provided with additional knowledge and skills to enter into the world of work. Various inservice and preservice training modes have also been suggested for training of teachers or instructors which should also assist policy formulators (PNG University of Technology, 1994, p.13).

Sinebare (1987 & 1991) also suggested a 'Cascading' form of inservice training of teachers. This process educates other teachers to become computer educators in their respective schools after initial introduction and training at regional or provincial levels and subsequently cascade downwards towards individual school level thus distributing and sharing the materials covered to other teachers. There is sufficient motivation among practising teachers to become involved in computer education in PNG schools. Teachers have never been this motivated to educate or better themselves in any of the regular school subjects. They now even go to the extent of paying out of their own pockets and use their leisure (mostly after school hours) just to attend computer related skills courses conducted by the private training organisations (Sinebare, 1990). The author also came across (during the 1994 and 1996 fieldwork) some of the more adventurous teachers who, after obtaining sufficient background knowledge and interest in the subject, quit teaching in high school in order to take up teaching positions in the private training organisations which they claim remunerated them well and also opened up new challenges to keep their professional motivation high.

The major thrusts of the 1994 Lae workshop recommended the Ministry of Education to be responsible for determining the scope and content of the computer studies curriculum for the schools, determining suitable hardware and software, as well as other related



issues. The recommendation for developing computer studies syllabus was reported at the subsequent workshop as being endorsed by the Secretary for Education (Bridger, 1995). Sadly, nothing has occurred which translated the recommendations and issues raised into any concrete policies and actions at the time of finalising this thesis (January 1998). The proposed National Information Technology Policy could take into account such expressed needs and define the parameters necessary for a syllabus or curriculum to be implemented throughout the country. It is only through such a national approach that IT education and training would gain official recognition as well as widespread acceptance and implementation by both private and public sectors.

## **9.6 Implications of the National Information Technology Curriculum**

Conceptualising the term ‘curriculum’ is not easy. It is also not easy to design a curriculum because what curriculum planners plan are not necessarily what the teachers will be teaching (Mogina, 1996). This is because many different societal, political and economical demands, not forgetting personal inclinations of curriculum implementors cannot all be included in a curriculum. Different curriculum exists for different subjects for different groups of people with different curriculum conceptions or views. For example, whether it is prescriptive (rational model) or descriptive (naturalistic) curriculum (Taylor & Richards, 1985). The design of a curriculum is a complex matter too as it involves many factors which, among others includes; ideological, technical, epistemological, psychological and cultural.

Curriculum means all the activities or learning experiences *planned* for the students by the school or institution (Taylor & Richards, 1985). Curriculum encompasses a broad array of definitions which include the content of education, course of study, educational experience, subject matter, subjects to be studied and educational activities both formal and informal. There are equally many and varied curriculum models from which curriculum developers can select the characteristics and specifics which is most appropriate and adapt them to suit a particular requirements and circumstances.

In the context of this thesis, curriculum is taken in the broadest sense which includes the arrangements of the objectives or goals, the subject matter (or content), necessary actions required to deliver the planned content (explicit or implicit), teaching methodology, the relevant materials to aid the pedagogic process, the length of time needed to adequately cover the areas identified as the significant component of the subject, appropriate activities (either individually or in groups), and a system of assessment and evaluation to ascertain if the overall goals and objectives including the main content were planned and delivered as originally intended. It is basically a written statement containing general goals, the essential activities necessary to achieve the goals set (based on what is considered as valuable knowledge and skills), and some form of measurements to check if the intended goals were achieved (See also Stenhouse (1975)).

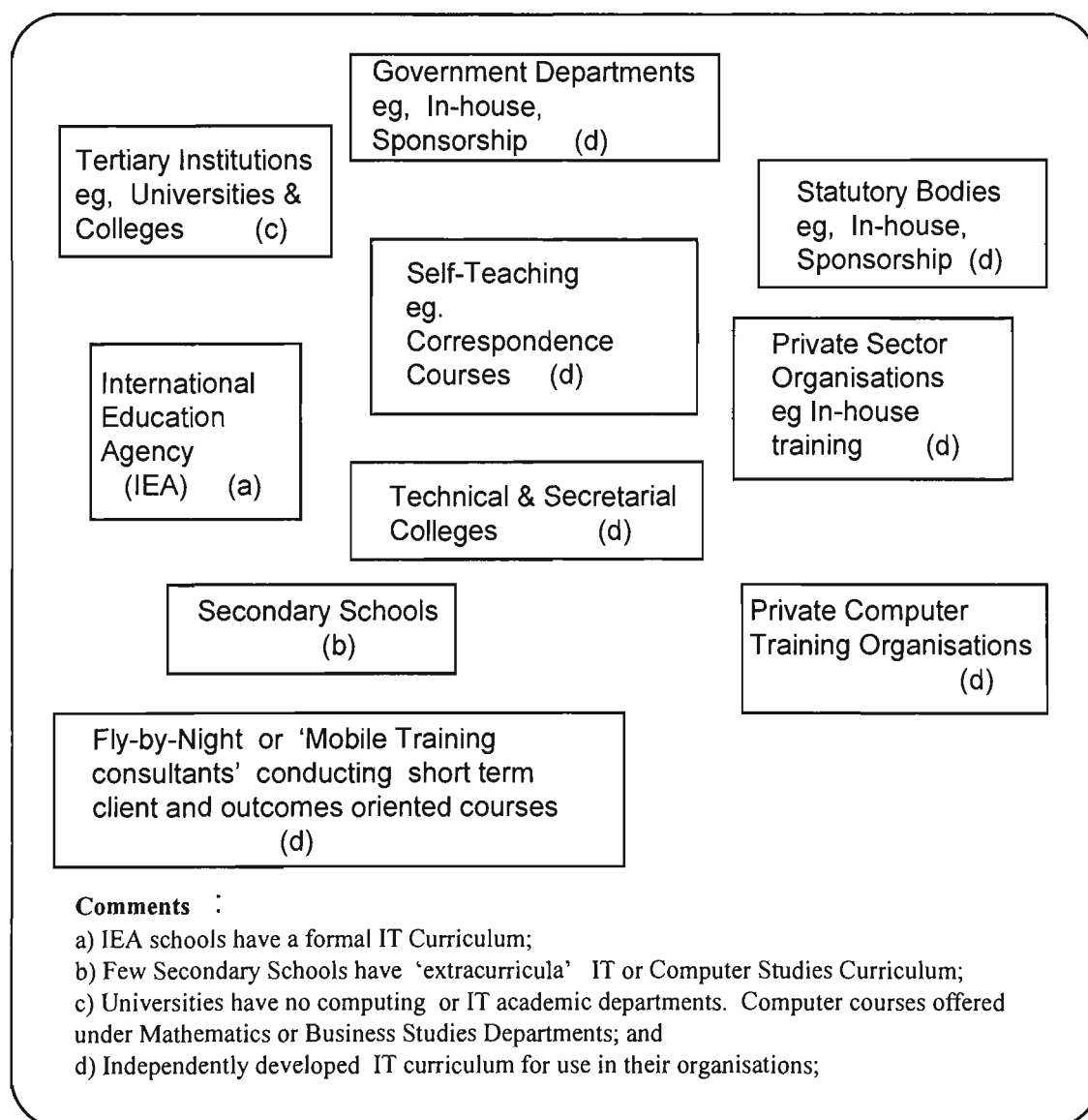
A curriculum is defined as:

- a) ...a written document depicting the scope and arrangement of the projected educational program for a school;... (which contains the following features) -
- b) a **statement of intention** for use of the document as a guide in planning instructional strategies;
- c) **statements outlining the goals** for the school (or any institution) for which the curriculum was designed;
- d) a body of culture **content** that has the potential for the realization of the goals; and
- e) a statement of an **evaluation scheme** for determining the worth and effectiveness of the curriculum and the curriculum system ... (Beachamp, 1981, p. 7). (emphasis added)

The above-mentioned four (4) characteristics may be applied to any subject at any level (Primary, Secondary, Tertiary ) in a formal education system. Under PNG's present system, the curriculum for Primary and Secondary schools is centrally planned or developed, while at the Tertiary level, each individual institution is responsible for curriculum development, planning and delivery. The curricula at the post-compulsory level, particularly, within the Private Training Organisation in PNG are also independently developed and delivered. The curricula in the private training

organisations are vocationally oriented and students (i.e. school leavers and non-school leavers alike) are naturally attracted towards it. Job-oriented or work-related computer training is conducted by the private training organisations. Those who are gainfully employed as well as those who wish to change their present jobs continue to enrol in private computer training programs to acquire specific job skills and knowledge which were not generally available to them within the public school system<sup>7</sup>.

**Figure 9.3 Present Scenario of IT Curriculum in Papua New Guinea**



Under the present scenario in PNG (See Figure 9.3), there is no formal computing or IT Policy and IT curriculum. Every training provider in both the public and private sector

<sup>7</sup> Personal communication with: (a) trainees in the private training organisations and, (b) parents/guardians whose children/dependents enrol in the private training organisations.

is responsible for its own computing curriculum development and delivery. Further, computer studies curriculum in schools is seen as falling directly under the purview of institutions other than Primary and Secondary schools, for example, Rapese (1994, p.12) stated that:

The Department of Education will not be including computer studies curriculum for provincial high schools... (and) The Department of Education does not see that it has the role of training students in work related skills such as computer training... Computer training is the responsibility of other institutions such as technical colleges, universities and specialist training centres.

Even under such situations, many secondary schools (eg Bugandi, Bumayong, Kabiufa, Lae, and Sogeri) have taken up their individual initiatives to provide computer awareness and computer literacy courses as an extra-curricula activity (See Capell E., 1994; Copeland, 1994; Fova, 1994; Goodwin, 1994; Jayawickrama, 1994).

Since computer studies curriculum was not formally offered within the public sector educational institutions for example, at schools (there was no indication that this scenario would change in the foreseeable future). The fact that such a curriculum was left entirely up to the 'specialist institutions' such as technical colleges and universities, the work related computer skills knowledge or the IT knowledge in general had to be obtained from other avenues. In PNG such avenues predominantly includes the private computer training organisations.

The universities given their academic independence or status and the generous government funding allocation enjoyed until recently have developed and offered computer related courses. The University of Papua New Guinea for example offered semester-long Computer Science subjects as part of Mathematics Course (UPNG, 1994a), while the PNG University of Technology offered Business Systems and Computer Science subjects from Accounting & Business Studies and Mathematics &

Computer Science Departments respectively (Salt, 1988; PNG University of Technology, 1994).

The different government departments and statutory bodies have either recruited graduates from the above-mentioned institutions or overseas. Others have their own organisation-specific in-house training program for their employees who needed such training. However, there were numerous others who may not have acquired any such computer knowledge either from universities or even from schools and may still require basic application skills and knowledge. Educational opportunities for such training were being provided by the private training organisations which has been discussed at length in chapters 5 and 6.

The government departments and statutory bodies have benefited from aid funding allocated towards educating and developing IT staff requirements in their organisation. The private sector employers have done little on this front until the imposition of the Training Levy for companies to spend 2% of the annual payroll on training of national staff. The private sector firms and organisations have their own IT staff development and training program for both in-house training as well as sponsorship to either institutions in PNG or overseas. Immediately after the imposition of the Training Levy, many private training firms and organisations surfaced to provide training opportunities for both trainees (including employees and school leavers) as well as benefiting from any spin-offs arising from the imposition of the 2% training levy (*The National*, Nov 26, 1993).<sup>8</sup> With many and varied private training organisations, there were equally many and varied computer skills curriculums with their individual strengths and weaknesses. These advantages (strengths) and disadvantages (weaknesses) have been highlighted in sections 6.5 (6.5.1 to 6.5.10), 6.6 (6.6.1 to 6.6.6), 7.1.3 (7.1.3.1 to 7.1.3.4) and 7.1.4 (7.1.4.1 to 7.1.4.6), hence the recommendation for a National IT Curriculum to be

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<sup>8</sup> Mr. Aphmeledy Joel, Labour & Employment Secretary's remark quoted in *The National*, November 26, 1993.

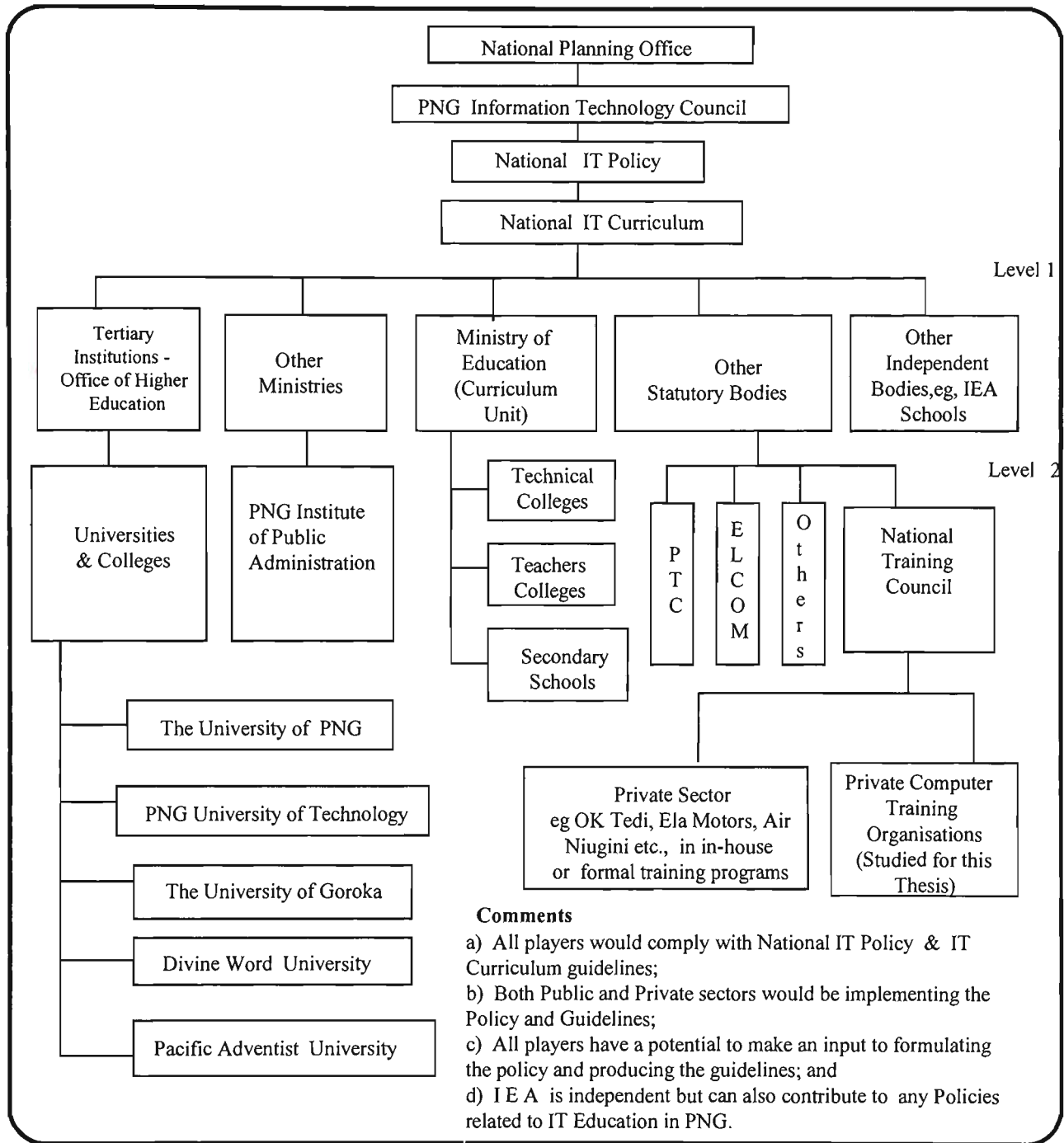
developed from the proposed National IT Policy. (See Recommendations 8.1.1.5; 8.1.1.10; 8.1.1.14; 8.1.1.16 and 8.1.2.2).

Instead of each government department and statutory body taking the following approach: (a) take narrow view to conducting computer related courses in their individual training program (eg, the ‘extra-curricula’ status of computer studies in secondary schools, in-house training in most government departments and private sector organisations), and (b) leave IT education and training in the hands of the private computer training organisations, it is strongly recommended here that a nationally planned and ‘described’ IT Curriculum be developed in response to the overall spirit of the national IT Policy<sup>9</sup>. Among other things, this IT Policy would encompass all sectors of the economy (ie, both public and private sector). Computer skills training in particular and IT education and training in general should be nationally planned and implemented by the various agencies, each striving to meet its specific needs but at the same time contributing towards helping the nation to achieve its overall national goals in other policies (eg; social services, employment, education, industry, communications, trading, and economic policies to name a few).

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<sup>9</sup> See paragraph 9.6.1 for an explanation on a *Descriptive* model of IT Curriculum as opposed to *Prescriptive* one.

Figure 9.4 Proposed National IT Policy & Curriculum Framework



The national IT Policy will have defined appropriate IT skills for different IT professions in accordance with PNG’s human resource requirements (Recommendation 8.1.3.5). Under the proposed framework (Figure 9.4), an overall IT Policy which encompassed all sectors of the economy could be implemented and administered by a centrally established body such as the proposed PNG-ITC whose major functions among others would be to: formulate IT policy, liaise, coordinate, and cooperate with relevant authorities (for example, government departments and statutory bodies and private sector organisations) to make an input towards formulating a national IT Curriculum

(Recommendation 8.1.1.3). Under the proposed framework, all those involved in IT education and training activities in both public and private organisations would be able to make a contribution towards the overall national IT Curriculum with each pursuing individual goals as well as the national goals. As can be seen from Figure 9.4, the private institutions are brought into the proposed overall national framework as they are also making a significant contribution towards the IT related education and training in PNG. The nationally developed IT Curriculum would determine the curriculum framework or guidelines for the various bodies for implementation at their individual institutions or organisations. (see also Recommendations 8.1.1.11; 8.1.5.1 to 8.1.5.6).

In that way, duplication of courses would be minimised or avoided, standards will be established for all to comply, training would be aimed at specific clientele, energies and resources would be marshalled towards areas of the IT professions which are in highest demand in the country, every training organisation would complement the other rather than stringently pursuing individual goals, trainees would obtain recognition for their certificates or courses, IT courses and institutions offering the courses would have little difficulty gaining accreditation from the appropriate authorities, and allow for easy coordination and planning between various government bodies and private sector organisations.

#### **9.6.1 Prescriptive and Descriptive Curriculum Models**

*Prescriptive* models of curriculum as the term implies require rigid set of activities and instructions to follow. The prescriptive curriculum model states precisely what must be covered in the curriculum (content matter), how it is to be delivered (methods and procedures), what must be achieved (goals or objectives), and under what conditions achievements are to be measured (testing and evaluation procedures). It is therefore very high in prescription (contains prescribed instructions and activities) and tells the curriculum developer what *should* be done in the curriculum development process (Print, 1993). The curriculum developer in this model has to follow the prescribed



activities and instructions. This model is rational because it is logical, sequential, and outcome-based which must be rigidly pursued.

In a *Descriptive* curriculum model (which is low in prescription), there is more flexibility and freedom for the curriculum developer to use his/her professional judgement and ingenuity to determine what *does* occur in the curriculum development process. In other words, the descriptive curriculum is less rigid but allows for high level of dynamic interaction between the curriculum developers. It is therefore recommended that the proposed National IT Curriculum in PNG should adopt the descriptive approach. The PNG-ITC would describe the computing curriculum based on the human resource requirement of the country identified for the different IT professions.

The National IT Curriculum would describe the various IT professions or the types of computer specialist required in the country (eg, Information Systems programmers, Applications programmers, Information Systems specialists or systems analysts, Computer Operations personnel, Data Processing managers, and computer scientists and researchers). In addition, the specific job descriptions of each of the identified IT profession is identified so that training providers could design individual (modular type) courses that would enable the trainees to perform according to the job descriptions specified. The courses developed would be modular in nature so that a trainee could pick and choose the relevant combinations of the modules from any training provider in order to pursue a specialisation in a particular IT profession. This approach will be in line with the concept of training path pointed out in sections 7.4.5.5 and 8.1.6.2(b).

It is hereby suggested that a modular curriculum approach (See UNESCO IFIP, 1994) be taken where specific courses are developed for a particular computer profession. For example, Data Processing Curriculum for Data Processing Operator, Information Systems Curriculum for Information Systems Analyst, and so on. Each curriculum would consist of specific courses based on a specific body of knowledge or concepts to

be taught. Each module would contain the following features: objectives, outline of the module (list of possible topics to be covered), the content (subject matter intended), practical or theoretical work required, the estimated course duration, whether subjective or objective assessment should be used, and a list of bibliographic references for additional information.

The National IT Curriculum (NITC) would serve as a guideline or as a *descriptive curriculum* rather than a *prescriptive* one. Hence, such a descriptive curriculum would be subject to a periodic review process whereby the policy-makers, IT curriculum specialists, IT professionals, academics, private sector representatives, trainers representatives, concerned ministries and statutory organisations would all contribute towards a nationally defined curriculum within the national IT Policy framework (See Figure 9.4). The Curriculum would be updated as often as necessary according to changing needs and circumstances. Each of the recipient department or organisation would formulate its own organisation-specific IT curriculum for planning and implementation. This notion may be likened to a jig-saw puzzle where every single piece has equal significance towards the successful completion of the overall puzzle. Hence, every agency implementing the national IT curriculum would be conducting organisation-specific or work-related training but in the process help to develop a pool of human resources required to perform specific roles and functions in contributing towards a specific aspect of the economy, hence aiming towards completing the overall IT picture as perceived by the national IT Policy. The IT picture in this case is to develop human resources not just to apply IT in the workplace but more importantly to enable PNG to become information producer as well as becoming an information consumer in the information age. There is nothing wrong with being an information consumer and neither is it wrong or even impossible to be an information producer. There is a great potential for countries like PNG to contribute in knowledge-intensive industries, for example in education and communications.

Some of the perceived aims of the NITC have been identified by training providers in section 7.4.5.5. Further, the *overall goals* of the NITC would be to ensure that:

- a) A National approach is taken in IT human resource development efforts;
- b) All agencies (government departments, statutory bodies, private sector, and non-government organisations) play a part in complying with the national curriculum guidelines;
- c) Necessary IT standards and guidelines are established for individual agencies to comply and implement;
- d) The goals of the national IT Policy (especially on human resource development) are striven for by all concerned agencies; and
- e) An overall framework is established under which all agencies are to operate, comply with the same standards, aim to achieve individual aims as well as the national IT goals.

Again, the National IT Curriculum is not intended to be *Prescriptive*. Rather, it is intended to be *Descriptive* in which individual agencies concerned are at liberty to develop individual modular-type courses for a particular IT profession or user. The more Prescriptive (high in description) the curriculum, the more rigid the set of activities involved, and the less prescriptive (low in description) the curriculum, the more flexible approach it is for curriculum implementers to design according to their individual goals (Print, 1993). Such a descriptive (less prescriptive) curriculum is to be developed under the guidelines set by the proposed PNG-ITC (sections 7.4.5 (7.4.5.1 to 7.4.5.6)). As mentioned earlier, the NITC would describe the specific human resources required to service both the public and private sector. The NITC description of each IT professional required in the work force, for example, programmer or systems analyst, would serve as a guideline for training organisations to determine the individual outcomes necessary for each professional to perform its respective functions. The private training providers would still be responsible for the following features (most of which are currently in use within the private computer training organisations):

- a) design the curriculum described in the NITC;
- b) determine the teaching staff required to adequately teach the courses;
- c) decide on how best to deliver the course design;
- d) establish how trainees are to be assessed;
- e) determine the necessary resources required to teach effectively; and
- f) establish the sequence or order in which to offer the courses;

Since IT in general and computers in particular are constantly changing, any curriculum developed should also be subject to periodic revision and change in accordance with the international trends and developments in Information Technology. In other words, the agencies concerned (individual Departments, Statutory bodies, and private computer training organisations) would be responsible for designing their own individual curriculum. In that way any changes in the IT scene either nationally or internationally and the workplace would then be taken into account by revising the individual curriculum. However, such updating would be dictated by the changes in the National IT Curriculum which would also be periodically updated by incorporating the latest developments occurring in the IT scene as well as keeping the national IT goals and objectives in perspective.

Since IT is expected to drive socio-economic developments in many developing countries in the next millennium (Rahman M, 1990; Mitchell, 1990; and Naisbitt & Aburdene, 1990), and more specifically in the area of the 'service sector' or 'tertiary industry' otherwise known as knowledge industries such as Education (Kobayashi, 1988), PNG should consciously develop its National IT Policy in a way that education and training in the IT profession is given priority and prominence (in its National IT Curriculum). Such professionals would act as catalysts to stimulate the growth of information-related industries in the information technology scene in the next century (Zimmermann, 1990). Already there have been ad hoc attempts in both the public and private sector within PNG to develop computer or IT professionals, for example, the

efforts and activities of the private training organisations (which constitute the major component of this thesis), and the individual initiatives undertaken by some secondary schools in PNG (section 5.1.2).

As has been pointed out, such individual efforts in developing their own curriculum has its share of the multitude of problems discussed in chapter 7 as well as the advantages which have been highlighted under various recommendations in chapter 8.

### **9.7 Phases of Curriculum Development and Curriculum Conceptions**

Curriculum development in PNG had always been evolving since the days of missionary and colonial administration of PNG. PNG has gone through various phases of curriculum development, especially within the Ministry of Education. In 1971, the last non-citizen Director of Education in PNG and formerly Vice Chancellor of University of Wollongong, Professor Ken McKinnon identified five stages which PNG was passing through then (McKinnon, 1976). The five stages identified by McKinnon were:

#### **a) *Imitative stage***

Prior to the 1950s missions and colonial administration brought in teachers mainly from Australia to teach in newly established mission and administration schools. Because there was no local curriculum, such teachers merely *imitated* their home state curriculum which they were familiar with.

#### **b) *Derivative stage***

Between 1950s and 1960s, the school curriculum drawn up was largely based on the syllabus used in Queensland where all administration schools in the then territory (of Papua and New Guinea) followed the syllabus *derived* from Queensland syllabus.

c) *Venturesome local stage*

From the 1960s the colonial policies changed in order to prepare the locals for independence in order that they would take up positions in the government or public service. Hence a need arose then to *venture* into developing a curriculum that would help achieve this goal. (Historically the **Foot Report** provided an external impetus to bring about drastic changes, such as establishing institutions of higher learning (Commission for Higher Education, 1986)). The content of all the subjects was related to local Papua and New Guinean environment or situation.

d) *Modern local stage: developed by subjects*

By about the mid 1960s, large scale centralised curriculum projects in different subjects for example, Social Science with the intention of developing a modern curriculum truly intended for PNG students together with relevant materials such as teacher's guides and student support materials were developed (Pollock, 1978).

e) *Integrated modern stage*

As a result of adopting syllabuses from elsewhere, the adopted curriculums were blamed for containing materials which were too foreign and too difficult for PNG contexts (Crossley, 1994). It was necessary to have subjects integrated with local materials, concepts, situations, and geared to PNG community and society. An example of such integrated curriculum was the Secondary Schools Community Extension Project (See Vulliamy, 1981). Despite the increased integration in all school curriculum in both primary and secondary schools, '*... none of them demonstrated ... high quality integrated teaching and learning - although localized success are evident, the rhetoric of integration remains in Ministry policy and efforts continue to be made to support integrated curriculum development.*' (Crossley, 1994, p.46)

At the national level, the Curriculum Unit of the Ministry of Education is probably the most active in curriculum development in the country because of the important function it plays in the national education system. The Curriculum Unit has been responsible for developing an integrated school curriculum for all subjects offered from primary to secondary schools. The Matane Report, *A Philosophy of Education for Papua New Guinea* - a Ministerial Committee Report strongly called for integration of knowledge, skills and attitudes within subjects and between subjects to make education more relevant to PNG situations and contexts (Matane, 1986). Much of the orientation or the main conceptions in such curriculum development were oriented towards an 'eclectic conception' in which two or more conception of curriculum played a part in (eg, PNG's) curriculum development (Print, 1993).

In an 'eclectic conception' a combination of curriculum conceptions, such as; academic rationalist conception (emphasis on developing the individual's intellectual abilities), cognitive process conception (emphasis on content matter), humanistic conception (emphasis on personal development), social reconstructionist conception (social reform to make life better), instrumentalism (stresses the responsiveness of education to the demands of the current socio-economic order) and technological conception (main emphasis placed on using technology) come into play (See McNeil, 1985; Print, 1993; Tay & Richards). It is fair to state that no one particular conception was dominant as there was presence for the characteristics of all these conceptions in the curriculum developed and used in PNG by the Curriculum Unit.

However, the four (4) broad objectives of Education in PNG as highlighted in section 5.1.1, the general school curriculum could be classified as 'eclectic' with a range of curriculum conceptions employed. This 'eclectic' conception was employed to design a curriculum which will aim at meeting the needs of PNG and its people in their respective communities in this fast changing world.

The curriculum conception dominant in the courses developed by the Private Computer Training Organisations may also be generally described as pursuing instrumentalism (with a focus to meeting the requirements of the current socio-economic order). The reason for this was that nearly all the private computer training organisations whose mission statements observed in Table 7.1, have either explicitly or implicitly mentioned features of *social adaptation*, *instrumentalism*, *social reconstructionist*, and *futuristic curriculum* perspective in their official mission statements. Each individual training organisation take an instrumental approach to adapt and use the best of other curriculum conceptions to achieve their individual goals and objectives.

On close examination, the various computer training organisations have also demonstrated the presence of the different phases of curriculum development described by McKinnon (1976), for example, *imitative* (imitate other training organisations or trainer's own educational background), *derivative* (derive or modify the courses from sources within the country and abroad), *venturesome local stage* (with the intention of preparing nationals to understudy and take over the reign from non-citizen counterpart after the expiry of their contract), *modern local stage* (develop training programs specifically for PNG nationals to operate within PNG context), and *integrated modern stage* (integrated training program in business applications such as spreadsheet in bookkeeping and database in office procedures).

The suggestion for the creation of PNG-ITC to develop a national IT Curriculum derived from the national IT policy and in consultation with other agencies with interest in developing IT professionals as well as users was to further enhance the existing curriculum conception; the 'instrumental approach' but with an additional dimension added. The additional dimension advanced here is the *technological leverage conception* or *cognito-technological leverage* (or simply 'intellectual leverage') whose curriculum aims to *use IT* to develop a nation's intellectual capacity especially in the various Information Technology profession and knowledge. Note here that



‘technological leverage conception’ is not necessarily the same as ‘technological conception’ as coined by McNeil (1985), which includes programmed learning such as Computer Assisted Instruction or CAI, programmed materials, instructional games, ie to use technology as a medium to teach other disciplines. ‘Technological leverage conception’ advanced here is a curriculum conception which is geared to educating personnel for the various IT professions and especially to develop the intellectual capacity in the field of Information Technology, who will in turn apply, implement, disseminate, conduct research, and develop IT related knowledge and systems to further encourage IT applications in the country.

The focus on a ‘technological leverage’ perspective was to use information technology (generally meaning hardware, software, peopleware, and systems) to develop human resources who in turn apply IT knowledge and skills ranging from simple application to complex uses as well as developing knowledge-intensive industries. The wide range of knowledge-intensive industries alluded here are unlimited. The creation, distribution and economic significance of knowledge in the USA for example has been well documented, analysed and described by Porat (1976), Machlup (1984) and others. A curriculum designed from the technological leverage conception or perspective would be geared to developing an IT curriculum which may be adapted to suit the individual needs and aspirations of the concerned agencies (eg. government departments, statutory bodies, private sector organisations) but they in turn also contribute towards achieving the overall national goals as expressed in the national IT Policy.

Creation of knowledge-intensive industries for example in education and training has the potential for high growth in the service sector according to Uttamchandani (1990) and Bhatnagar (1990). With this potential in mind, developing nations like PNG must adopt relevant policies and create a national framework which would promote interest and disseminate knowledge necessary to create a conducive environment to draw on new technologies (Su, 1988).

## 9.8 Summary

Firstly, a list of some of the effects of implementing the different recommendations as put forward in chapter 8 have been highlighted. For example, what are some of the likely effects if the recommendations made are respectively implemented by the government and the different bodies such as; PNG-ITC, NTC, CHE, and the private computer training organisations, both individually as well as in cooperation with others? Many positive effects were foreseen if the individual bodies implemented the recommendations so that IT education and training in the country is regulated and the curriculum is planned and delivered to achieve the overall national IT goals and objectives.

Secondly, a brief discussion on what is likely to occur if the current practices (the ad-hoc, unregulated, individually developed computing curriculums, varying degrees of certification and accreditation systems used), especially in the private computer related training organisations is allowed to continue without any positive intervention by the government. In other words, what if the recommendations were not implemented by the different bodies by allowing the status quo to prevail? It is predicted here that IT education and training in PNG would continue to be chaotic because of the ad hoc manner in which IT education and training has been conducted in the private computer training organisations. (This idea is expanded further in Chapter 10).

Thirdly, the role of a national IT policy is emphasised in view of the various IT policy initiatives undertaken in other developing countries where there were: *non-existent IT policy*, an *implicit IT policy*, and an *explicit IT policy*. The IT policy strategies undertaken by developing countries in which the different strategies, for example; Application Oriented, Domestic Market Oriented, and International Market Oriented strategies are implemented were highlighted. These strategies were implemented by

different countries to achieve specific economic objectives such as application use, domestic market purpose, and international export market purposes respectively.

Fourthly, some of the possible actions PNG should take as a country were pointed out. These included: formulating a national IT policy, and developing appropriate strategies and programmes, eg National IT Curriculum to ensure that it is successfully implemented in all sector of the country. Such a policy and curriculum should meet PNG's needs and serve the purpose for which it is intended.

Fifthly, the implications for a National IT Policy in PNG were emphasised. What effect the national IT policy would have on human resource development if it is implemented in the country. It is suggested here that PNG should develop its IT policy in order to pursue the *Using IT* approach rather than *Doing IT* because of the many reasons given (See Table 9.1). For example, the predicted growth in knowledge-intensive industries, which PNG and many other countries in a similar situation could also benefit from 'intellectual leverage' of IT is neither country-specific nor ingrained in a particular social or political system. The 'intellectual leverage' of IT has an immense potential for any developing country which is prepared to make sacrifices by developing its human resources and establish the necessary infrastructure and formulate appropriate policies. It is not the machines (the tangibles) but the human resources (human knowledge, skills and intelligence (ie the intangibles)) that are essential to achieve intellectual leverage or control over IT and to apply it to many other contexts in the country.

The Education Department's current stance on computer studies is highlighted in some depth, together with concerns and views expressed by participants at the Lae Computer Innovations in Schools Workshop in 1994 to further strengthen the case for introducing computer studies curriculum in schools. The concerns from the participants were a reflection of many concerned educators and participants who viewed IT and its impacts in PNG as warranting immediate government attention before the opportunity falls

through without any large scale benefits or impacts on PNG. This also provided the background information necessary to warrant a national approach to formulate a national IT Policy and national IT Curriculum.

Sixthly, the implications for the proposed National IT Curriculum were discussed against the backdrop of: what curriculum means in general, the Education Department's attitude of distancing itself from computer studies curriculum in schools by letting the individual schools decide for themselves, the uncoordinated and ad hoc nature of private computer training organisations, the individual efforts to educate IT personnel by both government departments (including statutory bodies), and private sector organisations.

It is proposed that the National IT Curriculum (eg, Recommendation 8.1.2.2) be developed in accordance with the National IT Policy (eg, Recommendation 8.1.1.16) to develop human resource requirements of the country to become a catalyst and to help achieve national IT goals and objectives. Further, it is proposed that the national IT Curriculum would only be used as a guide (ie, *descriptive* curriculum model) by individual training organisations (eg., government department, statutory bodies, and private sector organisations including private computer training organisations) to develop and design their own curriculum and to achieve their individual objectives but in so doing enable the national IT objectives to be achieved. The overall goals of the National IT Curriculum were also highlighted. They were intended to be descriptive allowing for more flexibility for training organisations to design courses and conduct their training programs. For example, a modular curriculum approach was suggested for the IT or computer curriculum in the individual training organisations (in both public and private institutions).

The proposed National IT Policy would address many other issues such as infrastructure development but only human resource development aspect was given prominence in the Curriculum discussion because of the growth potential predicted in the development of

knowledge-intensive industries in the next century which no doubt require human resource to utilise and exploit IT to great benefits. The importance of the predicted growth in knowledge industries was mentioned in order that serious consideration would be given to this area and to further encourage development of necessary strategies and programs to prepare for the onslaught of the challenges of the new century.

Finally, a brief overview of the various phases of Curriculum Development especially within the Ministry of Education has been described. These were further discussed in the context of major curriculum conceptions which were evident in the present curriculum conception in both the Ministry of Education and the private computer training organisations. It was evident that while the overall curriculum conception (in both Ministry of Education and Private Sector Training Organisations) displayed evidence of many major curriculum conceptions, the most dominant one being the ‘social reconstructionist conception’ which was aimed at making social adaptations, social reconstruction and preparing for the future in the curriculum design and development.

It is suggested here that the proposed National IT Policy and National IT Curriculum development should take the ‘instrumental approach’ with the ‘technological leverage’ concept incorporated into both the IT Policy and IT Curriculum to develop human resources or the intellectual capacity of the people who would then be responsible for creating or developing knowledge-intensive industries in social, political, economic, educational, industrial, organisational and management aspects of the country.

## Chapter 10

# Theorising: The Ripple-Effect Theory

### 10.0 Introduction

As the heading of this chapter indicates and as pointed out in chapter 3, this chapter will theorise or formulate a theory which explains the current computer education and training programs conducted in the private computer training organisations in Papua New Guinea under existing legal and policy framework. The research design (theoretical perspective and research methodology) adopted in this research has been specifically aimed at constructing a plausible theory. Further, the theory put forward here is aimed at informing and advising policy makers, educational planners and curriculum developers in Information Technology (in PNG). Such information would assist policy makers and curriculum developers to formulate an IT Policy and design an IT Curriculum as presented in chapter 9. The curriculum and the policy so formulated would facilitate IT education and training in PNG as the proposed ‘ripple-effect theory model’ illustrates so that the preferred IT policy and IT curriculum environment would be created which would then regulate and set necessary standards and guidelines to implement Information Technology education and training in Papua New Guinea.

### 10.1 Chaotic IT Education and Training Environment

As has been pointed out in the relevant chapters in this thesis (i.e., chapters 1, 2, 5 and 6), Information Technology education and training in general and computer skills related training courses in particular conducted in PNG (i.e., in both public and private sector institutions) have been uncoordinated and were conducted in an ad hoc manner. Individual private training organisations designed their own courses and taught them according to their particular interest, specialisation, and client-demands and within their particular resource constraints. Such a scenario could be described as *chaotic*, while

others might describe this as *democratic*. It is chaotic because training programs were uncoordinated and unregulated. In a chaotic situation (i.e., the private computer training organisations, their computer related training programs or curricula, and the overall private computer training environment) in PNG, it is easy to guess the outcome of the computer or IT education and training in the private computer training organisations. It will remain uncoordinated, unregulated, and chaotic until and unless the government intervenes by passing necessary legislation, formulating and adopting appropriate policies and guidelines (See Torres-Rivera *et al* , 1996). It must be remembered that even the use of chaos theory is debatable because while one group acknowledged its application in the curriculum, for example, Macpherson (1995 & 1997), others argued that indiscriminate application of chaos theory in any complex phenomenon is a misapplication and misinterpretation of the original concept of chaos theory (See Hunter & Benson, 1997).

In a chaotic information technology education and training environment exemplified in the private computer education and training environment in PNG, the following features have been identified in this thesis as contributing towards this chaos:

- a) Individual training agencies (both public and private sector training organisations or institutions) conduct their training activities in the manner and ways they felt were appropriate;
- b) Each individual training organisation had its own curriculum goals and standards which it pursues;
- c) Every training organisation had different and divergent training goals and objectives, placed emphasis on different areas of training, and course duration varied between training organisations;
- d) There was a mixture of both large and small training organisations. Some of the training organisations had the services and resources of other training organisations either overseas or within the country to enrich and accredit their training programs;

- e) There were many different forms of certification ranging from; letter of attendance, letter of completion, certificate and even diploma for the different training programs; reflecting the various courses and course duration, thereby communicating a diverse set of information;
- f) Most of the private computer related courses conducted were in the areas of general software application courses.
- g) Government departments and statutory bodies conduct their own in-house training programs. Most of the senior IT Professionals in the government departments and statutory bodies benefit from overseas training programs. Only the application-oriented users attended private computer training organisations in PNG;
- h) The universities and colleges in PNG had independently developed computer related courses and delivered them in the normal university teaching programs either as part of a degree or diploma studies in IT related subjects or as part of a degree requirement in another discipline;
- i) Schools do not have a formal computer studies curriculum. However, individual schools have conducted computer awareness and computer appreciation courses for select group of students in 'extra-curricula activity'. The 'curriculum' in this case was developed by teacher- enthusiasts in the respective schools;
- j) The various courses conducted by different institutions convey different information regarding the content covered, standard of competencies set, quality of training delivered, level of achievement attained, and level of accreditation and certification awarded. In other words, the training programs contain more of diversity and little of commonality between them which pose problems for employers and trainees in determining the level, competence, ability, achievement and potential in a trainee. Even the few incidences of commonality also differed in varying degrees and complexities (sections 7.1.3.1 to 7.1.3.4).



Figure 10.3 shows that Computer Education and Training in PNG have been conducted by individual agencies (public and private training institutions) within the country in which the IT curriculum and IT policy have not been clearly defined. The individual agencies operated independently of each other without any formal policy or guidelines to regulate and focus on their individual training activities. In such a situation, it was difficult to determine a 'line of best fit' to either adequately explain the present situation or predict future outcomes with some degree of confidence. For this reason, a new theory called *Ripple-Effect Theory* (Ripple metaphor) is postulated here to provide a meaningful explanation on the present situation in which IT education and training is conducted in PNG and to project future outcomes based on the research findings and recommendations.

## 10.2 Ripple-Effect Theory for IT Education and Training

The *Ripple-Effect Theory* advocated here may be likened to *ripples* caused by *disturbances* in a *pond*. There is always a disturbance regardless of whether it is large or small, and where such *disturbances* occur within a *pond*. Once a *disturbance* is caused, the *ripples* develop or originate from the *centre of disturbance* and moves in regular formation outwards in concentric circles as far out as possible within the *pond*.

The *centre of disturbance* metaphor represents the training organisation. The *ripples* represent the training curriculum content and training activity respectively developed and delivered. The *pond metaphor* symbolises the training industry in PNG. The *disturbance* metaphor symbolises the private computer or IT training and development activities within the *pond*<sup>1</sup>. The further the ripples flow out, the weaker or lesser the impact. In some instances, the ripples caused by larger training organisations (*disturbances*) would bounce back (deflected) causing further ripples inward. This situation is likely to be more problematic in a small *pond* (or a small country like PNG)

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<sup>1</sup> The *Pond* metaphor would well represent any closed system such as an institution, organisation or a nation-state.

while in a large *pond* the ripples are likely to dissipate as it ripples further outwards. The weaker ripples would naturally be overcome by the stronger and larger ripples from other sources of disturbance (e.g. training organisations) within the *pond*.

Before we continue discussing various scenarios of IT curriculum in PNG under different circumstances while applying the *Ripple-Effect Theory*, the pond metaphor and associated terminologies used above need to be put into perspective in the context of the research undertaken for this thesis.

For example: the *Pond* metaphor symbolises the IT education and training sector in PNG (but could easily be any other country or region with similar circumstances); *Ripples* metaphor symbolises the content or IT knowledge, skills, concepts, attitudes and values transmitted by the different training organisations; Splashes or *disturbances* metaphor symbolises the IT education and training activity in general and computer skills courses in particular (also applicable to any other subject or discipline); the *centre of disturbance* metaphor symbolise the individual IT education and training organisation (i.e., both public and private sector institutions) with their individual strengths and weaknesses (discussed in chapters 5, 6, and 7).

With these terminologies and *pond metaphor* in mind, three scenarios of IT education and training in PNG are presented before a fourth one and a preferred or an ideal pond model is described and recommended for adoption. In each case or scenario, the *Ripple-Effect Theory* is applied to illustrate the effect of the IT education and training in the current IT policy and IT curriculum environment.

**Scenario 1: Single Independent Training Organisation**

**Figure 10.1    IT Curriculum Space - ‘Regular Practice’**

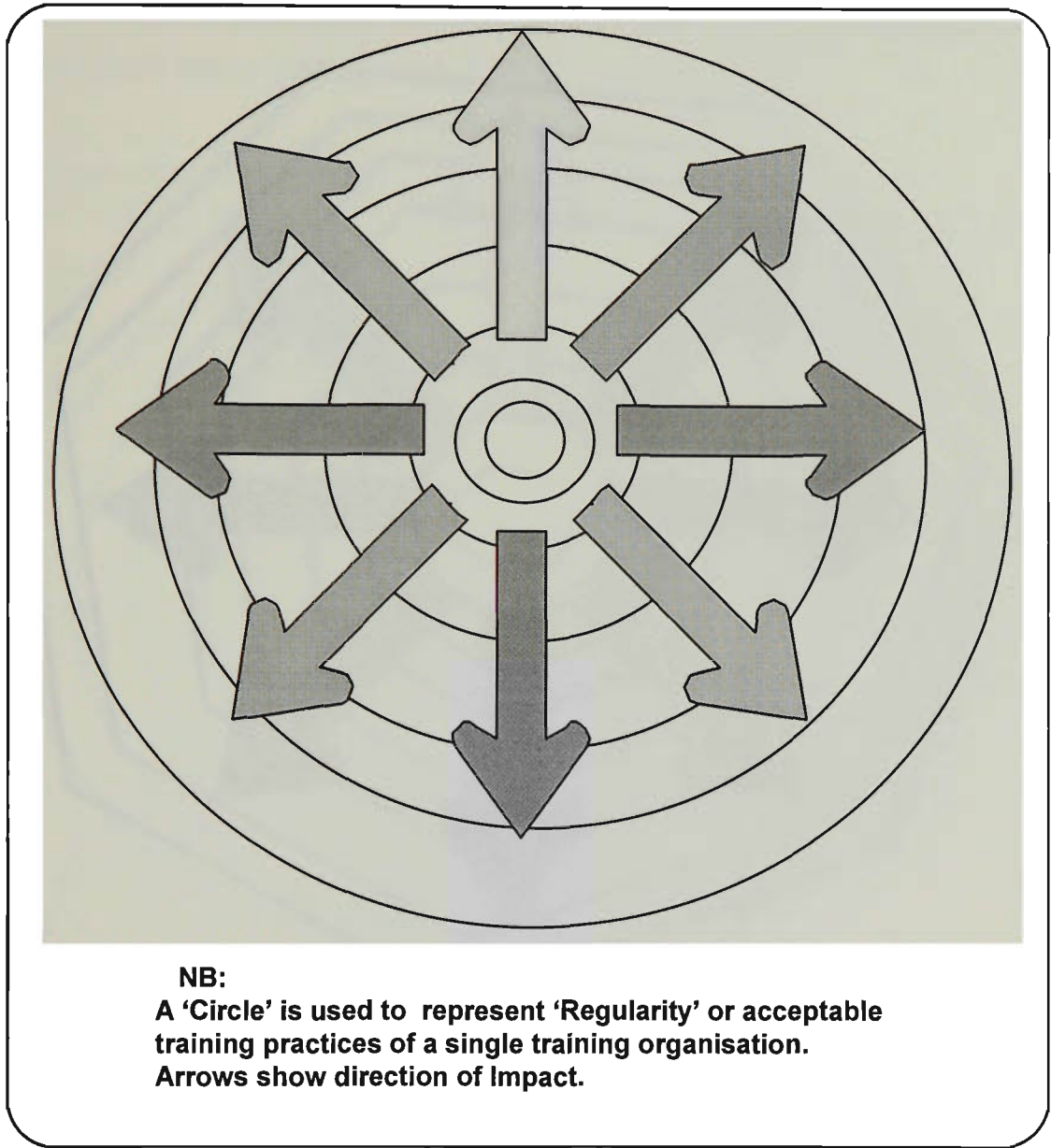


Figure 10.1 shows a single independent private training organisation with ‘acceptable’ or ‘high quality training practices’ as represented by perfect ripples moving outwards from such training organisations in PNG. Although this scenario would be better or favourable, in reality there are many training organisations each with varying degrees of complexity and quality of IT education and training programs conducted in PNG under existing legal and policy frameworks which make it even more difficult to have just one ideal training organisation.

**Scenario 2: Single Independent Training Organisation**

**Fig 10.2 IT Curriculum Space - 'Irregular Practice'**

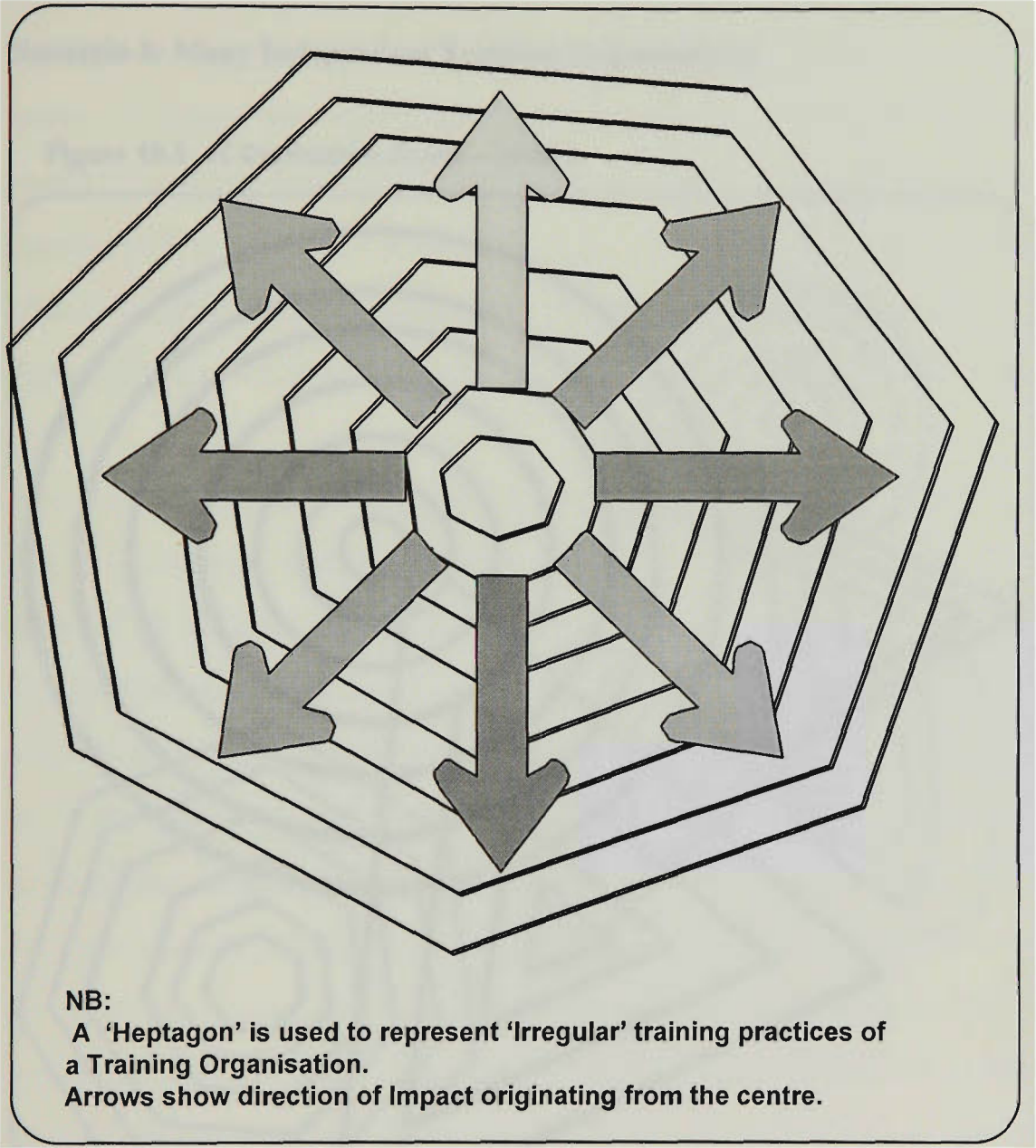


Figure 10.2 shows a single independent training organisation with 'irregular' training practices as represented by 'irregular ripples' moving outwards from the centre of activity. Many of the IT education and training organisations in the country can be categorised under this scenario. As can be seen, the 'irregular ripples' (representing irregularities in their different training programs, curriculum, and the various inherent inadequacies) ripple outwards which demonstrates that allowing such training programs would continue to deliver poor quality training in the country which further maintains

the status quo (i.e., the ad hoc, unregulated and grossly diverse forms of training practices) which was originally described as *chaotic*.

**Scenario 3: Many Independent Training Organisations**

**Figure 10.3 IT Curriculum Space - Chaos**

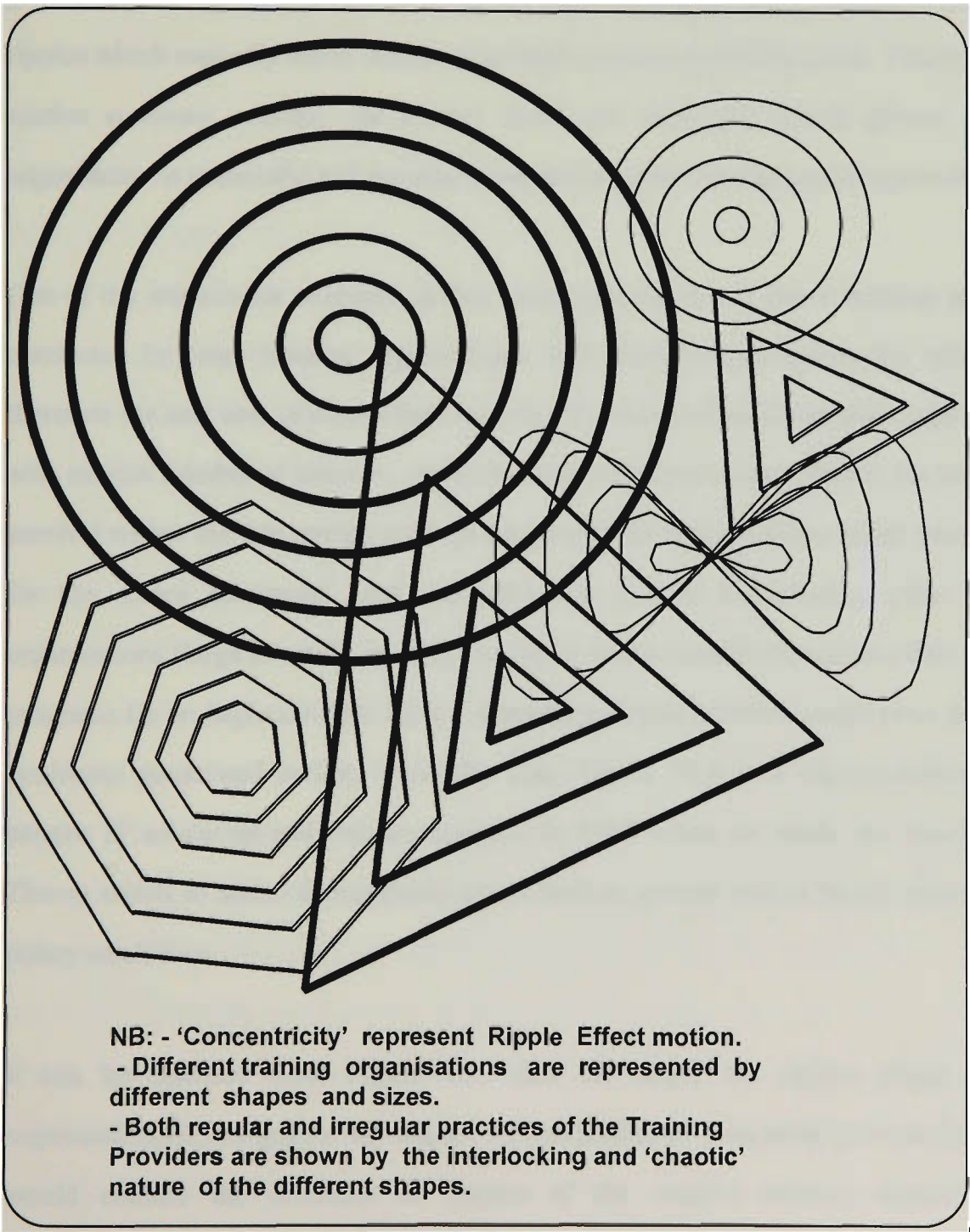




Figure 10.3 illustrates many independent training organisations operating within (a pond) PNG with a range of training practices falling between the ‘good quality’ - ‘poor quality’ training practices continuum. Their individual quality or standard of the training programs are represented by either a ‘regular’ or ‘irregular’ ripples within the ‘pond’. The larger and well-resourced training organisations cause large ripples or have greater impact on trainees and IT education and training as demonstrated by the larger ripples which naturally move outwards in ripple motion within the pond. Under the free market economy concept, the market itself will determine which private training organisation is successful and remains competitive under current legal framework.

One of the impacts for example, is that many trainees would attend training programs conducted by large training organisations with branches throughout the nation and therefore the unit cost of course fees is likely to be lower than the smaller organisations with smaller number of trainees. As a consequence this promotes, firstly; the law of the survival within the free market concept where only the fittest survive in the competition for the scarce resources<sup>2</sup>, and secondly; and just as importantly, other training organisations (large or small) in other centres or towns would still conduct their training programs (in an haphazard and ad hoc manner) and which further perpetuates the chaos syndrome mentioned earlier. Note also that, Figure 10.3 is a representation of the present IT education and training scenario in PNG when we apply the *Ripple-Effect Theory* which as stated demonstrates chaos both at present and in future under similar policy conditions.

It can be deduced from Figure 10.3 that the larger the ripples (large training organisation(s)), the greater the impact on conducting IT education and training which would counter the influence or impact of the smaller training organisation(s). Therefore, if the training programs conducted were useful or relevant to the needs of the

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<sup>2</sup> The ‘fittest’ here does NOT necessarily mean that they conducted the ‘best’ training program. For example, the training program or the organisation could be the only one available within the Province or town.

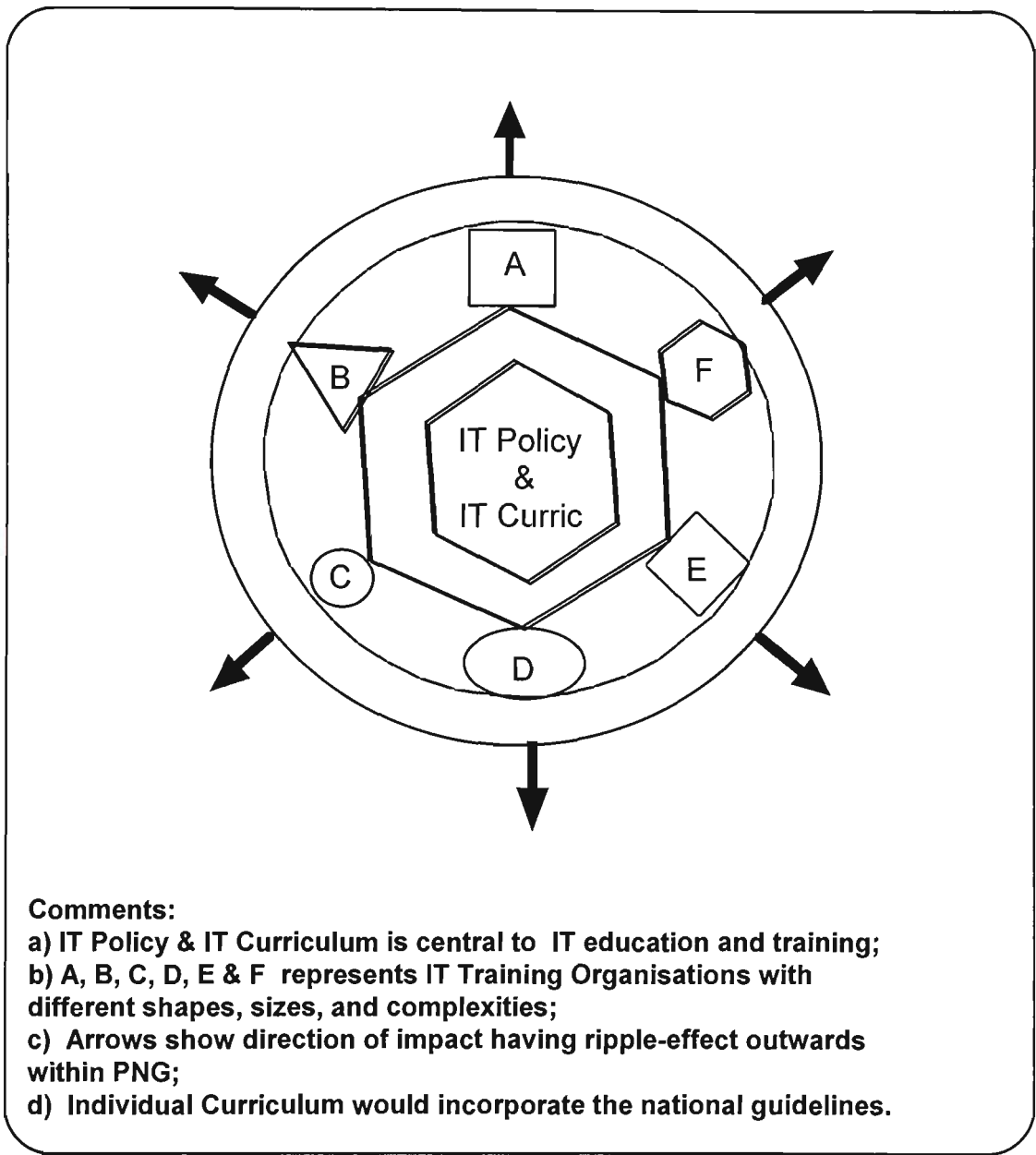
trainees, the employers, and the country in general, such training organisations were likely to remain competitive in the training industry. Obversely, if the training activities were regulated by formulating an IT policy and providing IT curriculum guidelines as to how IT education and training curriculum should be designed and delivered, then such formalisation and standardisation of programs would have a positive ripple-effect throughout PNG (or anywhere else where this model is applied) as the *Ripple-Effect Theory* suggests.

#### **Scenario 4: Ideal IT Education and Training Environment**

Scenario 3 (Figures 10.3 ) could be improved in order to create an ideal environment in which irregularities and ad hoc nature of IT education and training programs conducted were regulated for transparency. It was revealed in chapter 7 among others, many factors which needed urgent improvement. Further, several recommendations have been put forward for different agencies to implement in PNG. The major recommendations being the formulation of a national IT Policy and a national IT Curriculum. Through the formulation and adoption of a national IT Policy and a national IT Curriculum, an ideal IT education and training environment is likely to be created. Under such an ideal environment, development and delivery of IT curriculum by training providers in compliance with the set policy and guidelines are likely to have positive effects among trainees, employers and the economy. The net benefit towards the nation in terms of human resource development especially in IT would be enhanced. The application of *Ripple-Effect Theory* in this scenario would show that the impact of a regulated IT training program would flow outwards in the entire system because every agency concerned plays its particular complementary role according to a defined curriculum and policy guideline. This could also be analogous to an orchestra where an individual musician plays a particular instrument in an entire orchestra which is totally dependent on the individual instrument playing its part but for the benefit of the whole orchestra. The common thread running between the different instruments (shapes and sizes, wind, percussion, etc) would be the aesthetic or the music just as the common

thread running between the IT education and training organisation is the national IT Policy and the IT Curriculum. The IT policy and IT curriculum guidelines would encourage and ensure IT education and training are planned and executed accordingly to serve the country's IT requirements.

**Figure 10.4 IT Curriculum Space - 'Simplified Ripple-Effect Model'**



Some of the finer details of the features in the ideal environment (or Ripple-Effect Model) would among others include compliance of the following:

- a) Standards or guidelines for the IT curriculum;
- b) Specifications for training facilities and resources;
- c) Minimum qualifications set for trainers;



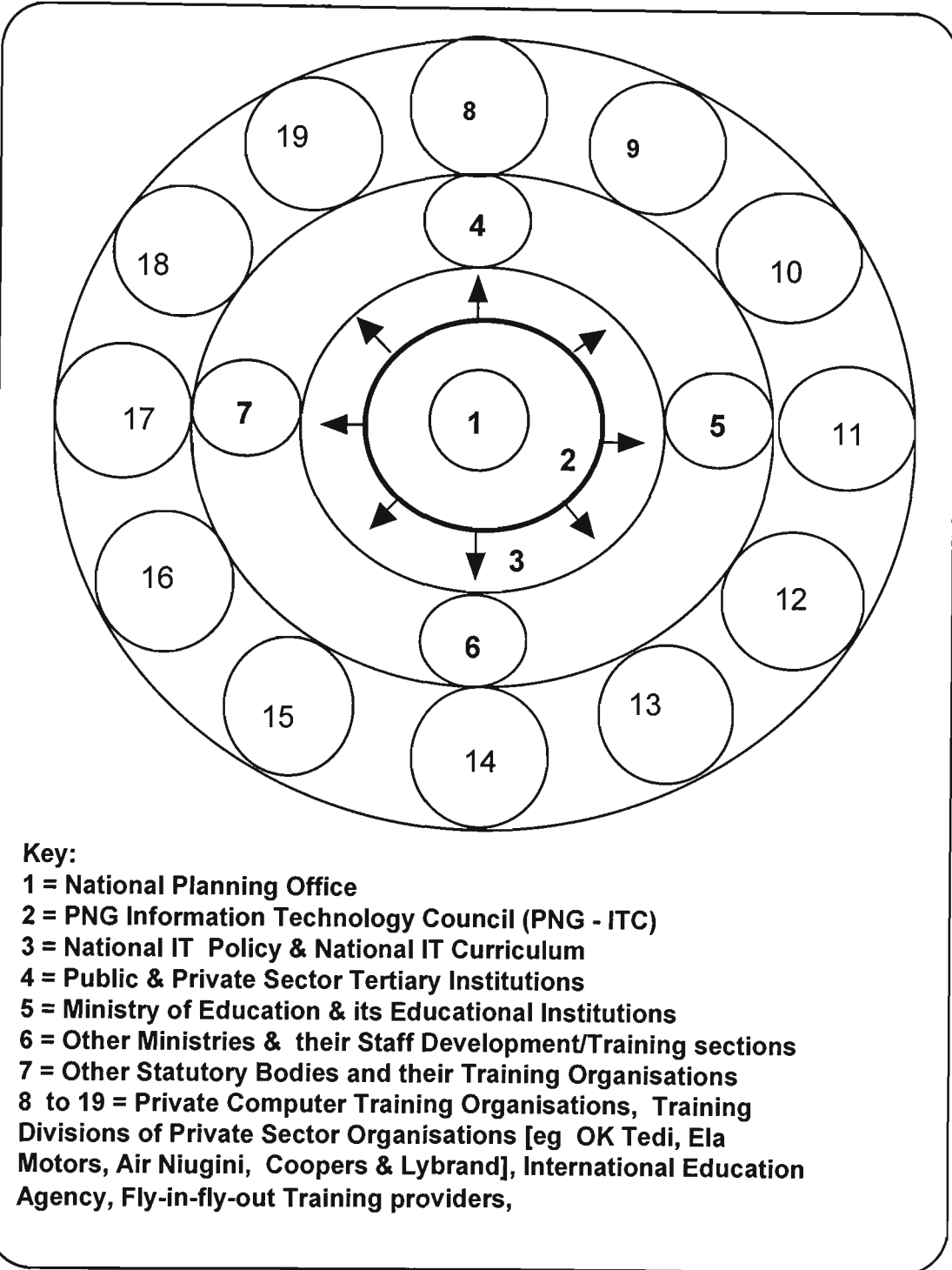
- d) Curriculum materials satisfy the established standards;
- e) Training conducted gains national recognition, certification, and accreditation;
- f) Training activities conforms to established standards and guidelines;
- g) IT human resource development is planned and executed in an orderly manner;
- h) Duplication of functions and activities minimised or drastically reduced;
- i) Resources and energies applied to areas of urgent national demand;
- j) Training paths clearly defined for the different entry and exit points for trainees to pursue individual career choices in both public and private institutions; and
- k) Most importantly, a common national policy and guidelines implemented by the different organisations which is central to all the agencies involved in IT education and training.

As can be seen in Figure 10.4, training organisations (i.e., in both public and private institutions) would no doubt retain their form (i.e., large or small, independent, semi-independent, private or public). They however, would have a common thread in the guise of a national IT policy and a national IT Curriculum guidelines woven through them and would also enable them to maintain their independence to design curriculum materials, teach, assess, and certify, as they have been doing so far but only this time, adopt or incorporate changes to their practices in accordance with the standards and guidelines established under the proposed national IT Policy and national IT Curriculum (in chapter 8). Consequently, IT education and training conducted would be formalised and hence, 'regular' ripples are envisaged within the training industry without compounding the chaos as being experienced in the current situation. This scenario could be described as a 'guided democracy' if the term 'democracy' was adopted earlier instead of the term chaos. This may be likened to a planned and regulated economy in which guidelines are established which have to be complied with by the players within the system.

**10.3    Ripple-Effect Theory: Proposed IT Policy & IT Curriculum    Framework**

How would the IT Curriculum framework in the PNG context fit into the *Ripple-Effect Theory*? To help us conceptualise this, we take another view (a top-view) of Figure 9.4, Proposed National IT Policy & Curriculum Framework (which is hierarchical in nature) and re-present it as the Pond or Ripple-Effect Model (See Figure 10.5).

**Figure 10.5    Bird's eye view of the Proposed Framework  
[Ripple-Effect Theory] for Implementing IT Policy & IT Curriculum**



The National Planning Office (NPO) is at the centre of this diagram. The NPO together with the PNG-ITC would formulate a national IT Policy. From this national IT Policy, a national IT Curriculum is developed in which many agencies at level 2 of Figure 9.4; i.e., educational and training institutions (private and public) make inputs into defining the parameters of an IT Curriculum and who would in turn implement this curriculum in their respective institutions.

The *disturbance* metaphor here is caused by the NPO through the PNG-ITC playing crucial policy making and facilitating role in the formulation of an IT Policy and an IT Curriculum which are implemented by different training agencies. The *ripple* metaphor is caused at the *centre* (in the form of IT policy and IT curriculum guidelines) and implemented outwards in the natural ripple-effect motion and direction within the country (represented by the *pond* metaphor). As stated, the curriculum implementation is conducted in an outward direction beginning from the centre while inputs for policy changes or curriculum revisions are fed back through normal channels of communications as indicated by the diagram shown in Figure 9.4. These inputs would then be incorporated periodically to revise the policy and curriculum guidelines and are effected from the centre.

This is a plausible model in which IT education and training in PNG could be implemented. However, minor changes or adjustments may have to be made for application in other countries or systems in accordance with their specific circumstances and needs, for example bureaucratic structure.

#### **10.4 General Discussion**

In PNG's ad hoc IT education and training environment, each individual training program (whether relevant or appropriate, the level and quality of training, content, concepts, values and attitudes, knowledge and information) is transmitted to the trainees (symbolised by the ripples) within PNG. Therefore, if the IT education and training

programs were relevant and appropriate for the workplace, then the impact of such training programs ripples further outwards in the system. If the quality of training is of doubtful nature the same is transmitted outwards. It was shown (in Figure 10.3) that the more ad hoc and unregulated the IT training scene, the more chaotic the training environment would be in PNG as symbolised by the different types and shapes of ripples. The greater the influence or impact of training organisations in their individual training programs, the larger the ripples which would counteract the impact and influence of the smaller and weaker ripples.

This is reminiscent of the Darwinian theory of ‘survival of the fittest’. However, whatever training program the ‘fittest’ training providers conduct does not necessarily mean that the quality and standard of such training are the ‘best’. It just means however, that such training providers have an unfair advantage over the others because of many factors such as; endowment of resources (e.g. financial and technical capabilities), established network of clients, little or no competition (i.e., monopolistic training environment), ‘endorsements’ or accreditation from other independent institutions from both PNG and abroad (for commercial or entrepreneurial convenience rather than for academic standards), and their individual creativity and initiatives.

The *Ripple-Effect Theory* advanced in this chapter is suggesting that private computer training organisations as well as public sector education and training institutions in an unregulated IT education and training environment have the potential of perpetuating chaos (the status quo) in PNG. Further more, as mentioned elsewhere, IT education and training scene in PNG should be regulated and organised by discouraging the negative features of the private computer training programs and encouraging the positive features (see chapter 6 and 7). IT education and training could be regulated and given prominence in the country through the following:

- develop or formulate a national IT Policy which covers wider IT areas;
- establish necessary infrastructure;

- facilitate, encourage and promote IT industries;
- establish research and development organisations; and
- institute human resource development programs and strategies (which has been the subject of this thesis).

From the IT Policy, a national IT Curriculum is to be determined which establishes the overall framework within which individual IT training providers develop their organisation-specific or work-related training programs. Hence, IT education and training in PNG would be well-organised and regulated. Every training provider (public or private training institutions) would develop its own training programs and deliver them within the established guidelines. Every training provider would at least be aware of the expectations such as the compliance of national IT Policy and national IT Curriculum. The suggestion to comply with the set guidelines does not necessarily mean total regulation of training industry in the country. This is only to ensure that IT education and training is planned, developed, and delivered in an orderly manner. Individual training organisations would still maintain their independence in developing and designing the courses but under the proposed national policy and curriculum framework, IT curriculum development and delivery are done in accordance with the guidelines drawn up and satisfy the standards set out in the national IT Curriculum.

Consequently, the chaotic (or democratic) IT education and training environment mentioned earlier in this chapter would be greatly reduced or minimised, the ad hoc IT education and training is now planned, coordinated, regulated, formalised, and non-standard methods and procedures are discouraged. A form of order is restored and maintained where accepted common guidelines and principles are enforced and individual training organisation's goals and objectives are pursued. As a result, the overall national human resource development projection as well as the overall IT policy objectives are striven for in the process. Therefore, while still maintaining individual independence, a common national policy and curriculum are implemented. Hence,

perfect or regular ripples are caused (in harmony with the other training providers) with little or no counter disturbances from opposing IT training providers in the opposite direction, and consequently, a perfect 'ripple-effect' is created within a given system (See Figure 10.5).

## 10.5 Summary

This chapter was aimed at theorising or constructing a theory which explains the IT education and training conducted in the computer training organisations (inclusive of both private and public sector institutions) under the existing legal and policy framework in PNG. Under the current legal and policy framework, IT education and training programs developed and delivered in the private training organisations were unregulated and uncoordinated. An individual training organisation is responsible for its own course or curriculum development without much direction or guidance in terms of policy guidelines from the authority. In the absence of policy and curriculum guidelines, IT education and training in PNG has been ignored for far too long and has been haphazardly conducted in recent years.

Hence, the IT education and training in PNG can be described as chaotic. Various scenarios of such chaotic training environments were exemplified using the *Ripple-Effect Theory*. To explain the different scenarios as well as identify an ideal environment to conduct IT education and training programs, the *Ripple-Effect Theory* was postulated. The various scenarios exemplified represent the different category of training organisations (representative of both public and private institutions) in PNG which if allowed to continue would further perpetuate the chaos currently in existence within the private computer training environment.

In view of this chaotic and uncoordinated scenario, a national IT Policy and national IT Curriculum have been strongly recommended ( in chapters 8 and 9). By applying the *Ripple-Effect Theory* espoused here in the context of IT education and training in PNG

training institutions, a 'guided democratic' IT training and education environment is created. Further, a highly organised and developed training program in accordance with the established policies and guidelines would be encouraged and supported which is likely to have greater impact within the training industry and ripple outwards where the net benefit will be realised throughout the system, especially in PNG.

The *Ripple-Effect Theory* espouses that, in an unorganised and chaotic training environment, the status quo (or chaos) will prevail while formulation of national IT Policy and national IT Curriculum and the subsequent implementation by individual training providers would ensure that the goals and objectives of IT education and training would have the intended impact, beginning with the training programs of the individual training organisations and gradually impact outwards within the training scene in the country (again in ripple-effect motion).

Therefore, it is suggested and strongly recommended that an IT policy be developed by the government in line with its socio-economic plans and human resource requirements in IT. Development and formulation of an IT policy is to be followed immediately by development and formulation of IT curriculum guidelines to formalise and guide computer or IT education and training in PNG's private training organisations. It is further suggested that formal administrative structure or a framework be established to implement such a policy and guidelines in all sectors of the country.

## **Chapter 11**

# **Summary & Conclusion**

### **11.0 Introduction**

This chapter summarises and draws conclusions from the thesis which includes the research findings, the recommendations made and their implications. A brief background of the research/study is provided in section 11.1 and the research problem surrounding the study is summarised in section 11.2. In section 11.3, the theoretical perspective of the research process is summarised while in section 11.4, the research and data collection methods used are summarised. The findings from the research, the subsequent recommendations and their implications are summarised in section 11.5 while the theoretical explanation of the research and its findings are briefly summarised in section 11.6 before drawing conclusions in section 11.7.

### **11.1 Brief Background**

The level of computer development in PNG could be described as ‘low’ or ‘Basic’ (Lau, 1981). However, this trend is gradually changing towards ‘Operational’ or ‘Advanced’ because of the rate at which IT systems are applied in the country by the public and private sector. The workplace requires potential employees to possess IT related knowledge and appropriate work skills, especially computer related application skills as reflected in the number of Positions Vacant advertisements carried in the nation’s daily newspapers.

There has been a huge demand from school leavers and the general unemployed public to acquire computer application skills and knowledge in order to enhance their chances of successfully obtaining a job. This demand has been necessitated by the fact that the public sector educational institutions, especially at the secondary school level, have



neither offered computer studies curriculum nor provided computer education and awareness opportunities. Further, the business and industry sector also demand people with skills, expertise and qualifications in IT related fields. However, only a handful of secondary schools provide 'computer studies' as an 'extra-curricula' activity. Such schools provides computer studies curriculums aimed at satisfying the 'Vocational Rationale' more than the pedagogical or any other rationales identified by Hawkrige *et al* (1990).

Secondary schools were not expected to provide a computer studies curriculum, nor are they supported either with resources (e.g., financial or staffing provisions) or specific curriculum guidelines. Computer studies curriculum at school level are left to the individual schools to design, develop and deliver within their individual resource constraints and outside of the official hours.

The Ministry of Education is strongly of the view that it should not be responsible for computer education in its schools (Rapeese, 1994). However, the official view was that computer related education and training be the responsibility of universities, technical colleges and 'private training organisations', hence the majority of the school leavers entering the workplace have limited educational opportunities for computer related education and training.

Since there were very limited computer studies opportunities in the public institutions, the private computer training organisations have grown and filled the computer application skills vacuum left within PNG. The private computer training organisations conduct computer related training programs under a policy and regulatory environment which does little to specifically facilitate IT education and training functions. Hence, training programs conducted, the training courses offered and the private computer training environment in general are ad hoc, unregulated, uncoordinated, and grossly fortuitous.

## 11.2 The Research Problem and Research Questions

Computer education in the country in a few secondary schools was conducted as an extra-curricula subject. Therefore, many school leavers who entered many of the post-secondary institutions including universities and colleges have very little opportunity of obtaining computer application skills, let alone general IT education and awareness by the time they graduated and become available for deployment in the job market.

Under the present policy environment, private computer training organisations in the country have been allowed to conduct computer training programs in an ad hoc and uncoordinated manner. This resulted has in wide disparities as well as serious discrepancies between training organisations, training providers, training programs, and the individual courses.

Some of the problems highlighted include:

- a) The computer curriculum offered by private training providers are different from each other because they serve the individual interest of the training organisation.
- b) The private training organisations are registered as a business or 'commercial organisation'. They are registered under the *PNG Companies Act 1997* and the *National Training Council Act 1991* as a 'training organisation'.
- c) There are no formal nationally recognised examination, inspection, evaluation or certification systems. Each private training provider is responsible for designing and delivering its own training program (i.e., curriculum, methodology, examination, evaluation, assessment, certification, and standards). No formal structure or mechanisms existed to formalise computer education or IT education and training.
- d) Very little formal computer education and training is conducted in the public sector institutions such as secondary schools. Computer studies curricula and computer related

training are offered at universities and some colleges. However, access to universities for example is restricted to those who meet the prerequisite criteria (matriculation status) but precludes those who have not 'matriculated'.

e) The Government does not have a computer education policy or IT policy to implement computer education or computer studies in its schools. Computer studies curriculums at school level is mostly conducted as 'extra-curricula' subjects in a few well-to-do schools.

f) While some computer courses are offered at local universities, most advanced level undergraduate and postgraduate studies in the field of computing or Information Technology were obtained from educational institutions abroad.

g) There has been a critical shortage of Papua New Guineans who are highly educated and sufficiently qualified to design, apply, manage, and implement information technology systems in the country. The country is still very much dependent on non-citizens with appropriate educational or professional qualifications and expertise to serve in both the private and public sectors.

h) Computer skills training in the private training organisation and computer courses in the universities have not produced sufficient numbers of graduates (between low to medium IT skills pyramid) to fill the IT related positions in both public and private sectors. Therefore, the demand for people with computer knowledge, skills, qualifications, and expertise continually grow as IT application in the workplace is increase.

In order to address these and other problems, four (4) research questions were developed and investigated. They were:

- a) What is the nature of computer training schemes used by training providers? [Summarised in section 11.5.1]
- b) What are the views of the private computer skills training providers with regard to the National Training Policy? [Summarised in section 11.5.2]
- c) Are the existing policies effective and conducive to facilitating IT education and training in the country? [Summarised in section 11.5.3]
- d) What are the characteristics of an appropriate computer curriculum in PNG? How can these characteristics be incorporated by government policies into future curriculum and policy? [Summarised in section 11.5.4]

### **11.3 Theoretical Framework**

The nature of the research problems under investigation (identified in section 11.2) and the fact that no such research was conducted before (that this author is aware of) makes it necessary to use a mixed-methodology design (i.e., use both Quantitative and Qualitative methods) and apply a mixture of theory-construction perspectives. The dominant methodology being Qualitative method and the dominant theoretical perspective being the Grounded Theory Perspective. The objective for using both a mixed-methodology and mixed-theoretical perspectives was to gather as much qualitative data as possible from as many and varied sources as possible in order to construct a plausible theory that explains the current private computer training organisations and their training programs as well as predict possible outcomes for the future of IT education and training in PNG under a new policy environment which is conducive to promoting IT education and training.

Further, the existing policies which could affect IT education and training were briefly analysed using ‘Intuition’ and ‘Muddling Through’ approaches within the available data and data sources (Quade, 1989). Such policies were analysed in order to provide the

policy makers with relevant new information about existing policies and regulations so that IT education and training in the private training organisations could be facilitated and promoted. The analysis conducted indicated that the present policy environment needs to be changed in order to regulate the training environment by formulating a relevant IT policy and IT curriculum guidelines to facilitate and implement IT education and training in the country.

#### **11.4 The Research Method**

The nature of the research problem under investigation, and the fact that the research was an exploratory one (there is no evidence that such a study or a similar one has been conducted elsewhere), dictates that the research method employed should be able to gather as much primary data as possible from as wide sources as possible (qualitative approach). This approach would enable the researcher to form the best possible opinion or judgement on the possible solutions to the individual research questions under investigation and determine what these solutions mean for the overall findings from the research.

Therefore, a mixed methodology research design was adopted in which qualitative research method was used. Through the use of qualitative methods, many valuable sources of data were consulted and varied data sets were employed. The sources of qualitative data includes:

1) Use of Questionnaires, namely;

- *Private Computing Skills Training Providers' Attitudes Towards the Papua New Guinea National Training Policy* opinionnaire; and
- *Private Computer Training in PNG: Current Practices and Future Policy Directions* questionnaire.

2) Focussed Interviews and Personal communications with:

- Training Providers;
- Senior officers of the Private Computer Training Organisations;
- Selected Trainees;
- Key personnel from the relevant government departments and statutory organisations; and
- Professional contacts of personnel in the IT education area and the private training industry.

3) Primary documents obtained from or cited include:

- Government Policy documents, e.g., Acts of Parliament;
- Newspaper articles, advertisements, letters to the editor;
- Individual course materials, brochures, handbooks;
- International professional organisations; and
- Print out from the World Wide Web pages.

4) Field notes and researcher's diary:

- Comments and remarks made by professionals, training providers, trainees and the general public;
- Researcher's personal experiences and knowledge of the IT education scene and private computer training organisations (including trainers and senior management personnel) in PNG.

5) Literature in general from:

- Both developing and developed countries; and
- Professional contacts from educational and research institutions in Developing countries.

The two questionnaires were administered respectively in 1994 and 1996 to the individual training providers. Being mindful of the limitations of the various methods and data sources, careful consideration was given to the variety of data obtained to provide a solid basis of argument to support and answer the research questions being investigated which is both valid and sensible. The use of diverse sources of data and information helps to paint an overall picture of the solution to the research being pursued which further enables the researcher to make recommendations and construct a theory which is robust enough to explain the current private computer training practices and environment in the country. The theory postulated should not only be able to help explain the current practices but also describe possible future scenarios or outcomes.

## **11.5 Research Findings and Recommendations**

The major findings from the research investigated through the questionnaires, interviews, personal communications, and document analyses based on the initial research questions have been highlighted in Chapter 7. Summarised below (sections 11.5.1 to 11.5.4) is a brief description of the findings for the respective research questions under investigation.

### **11.5.1 Research Question One**

The nature of computer skills training and development schemes employed by private computer training organisations differed immensely from each other. For example; the courses or the curriculum offered, the certificates awarded, assessment or grading systems employed, any external accreditation attached to the certificates awarded, the academic qualifications of trainers, vocational and professional experiences of the trainers, training facilities and resources available, the duration of the individual course, and the category or initial computer literacy level of trainees enrolled.

Bearing these differences in mind, private training providers made sure that they complied with existing policies such as the National Training Policy (NTP)

administered by the National Training Council (NTC) and the Training Levy concept administered by the Internal Revenue Commission. However, such existing policies had loopholes which do not facilitate effective administration in the Private Training Organisations. Therefore, every training organisation conducted computer training in the way that best suited its individual organisation, hence the differences and variations in the training organisations.

Whilst the differences may be considered advantageous on one hand, private computer training was uncoordinated and delivered in a piecemeal or an ad hoc manner which disadvantaged the trainees in many respects. For example, trainees were ignorant of whether they were making a worthwhile investment in a training program because the training programs on offer were heavily segmented, and conducted under questionable circumstances and educationally inappropriate environments. Further, the trainees continued to accumulate certificates from training providers which the other training providers had little recognition for and understanding of the different certificates. The range of certificates offered were like a blank key that cannot open any doors to the certificate holder.

### **11.5.2 Research Question Two**

As far as the National Training Policy (NTP) is concerned, the training providers believed that it was necessary and essential. But the NTP fell far short of addressing specific issues relating to computer related education and training just like the other policy initiatives analysed in chapter 7. These policies do not address IT education and training in the private computer training organisations. Therefore, it is important that a specific policy which covers computers and Information Technology issues be developed as opposed to a general training policy like NTP which does not cater for an important subject such as computer and IT education. The *PNG IT Policy for the Public Service* (Department of Personnel Management, 1991) which called for the establishment of an Information Technology Board to act as the overall authority for IT



policy matters and the creation of the Centre for Information Technology (CIT)<sup>1</sup> is further echoed here. The CIT is intended to:

- Provide advisory service and support to the government on all aspects of IT,
- Liaise and cooperate with all training organisations in the development and conduct of IT courses, carry out research and development on the application of IT, and
- Undertake other IT-related activities as directed by the government from time to time (Department of Personnel Management, 1991; Sinebare, 1993).

### **11.5.3 Research Questions Three**

There were, however, positive attributes of individual training organisations worth incorporating and formalising into a coherent action-oriented IT policy so that IT education and training in the country is adequately researched, developed and delivered in a well-coordinated manner. Since existing policies had serious discrepancies, an IT policy needs to be formulated in light of the findings presented and extend the scope of that policy to cover wider areas than the present policies.

Elements of such a policy should also consider and address some of the following general issues under computers and information technology.

- a) Combine both current private sector initiatives and government support to address the perceived structural weaknesses which impeded the development of IT in industry, trade, commerce, health, and education in the country at large. The aim here would be to enhance and foster the country's capacity to be competitive.
- b) The government through the Science and Technology Policy (inclusive of IT and Computers) must encourage foreign investment which helps create employment opportunities in the country. It must also ensure that technological capacity of

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<sup>1</sup> The National Executive Council approved the creation of the National Centre for Information Technology in 1997. (See *The National* (1997). NEC approves setting up of infotech centre. April 30. [Online] Available URL: <http://www.wr.com.au:80/national/w10.htm> [Accessed 30 April 1997].

nationals is enhanced and developed with real technological knowledge transferred from foreign investors into the country, not just an impressive policy on paper. The technology policy should also make it a condition for investment to educate and train nationals to use, and maintain IT, so that they in return would pass on their skills to their fellow nationals in extending the use of the technology.

- c) Consideration in the policy must also be given to ensure that the infrastructure developed should be affordable and accessible to individuals as well as corporate users. For example the integrated telecommunication and information systems should be capable of servicing educational institutions, health care, commerce, industry, public administration or government departments, and non-governmental organisations as well as individuals.
- d) Foster cooperation and collaboration in Information Technology research and development between industry, research groups, telecommunication authority, government departments, and educational institutions. This could be achieved by firstly, encouraging foreign corporations or investors to establish local operations together with their specific training programs to transfer technology and knowledge to the local staff, secondly encouraging or supporting local research and development groups to transfer their knowledge and technology to industries on the ground in the country.
- e) Adopt international standards and practices in IT and telecommunications and keep up to date with the latest in the technology so as not to be left behind. That means periodic assessment and evaluation to be internationally competitive. It also implies that whatever system is adopted must have the potential for expansion and upgrading with minimum hassles and disruptions to existing systems as the needs increase.

- f) Create an environment which is conducive to widespread use and exploitation of Information Technology through public education and awareness campaigns in schools and educational institutions. For example, deployment of computer hardware and software into schools together with effective teacher education programs and highly motivated educators to research and develop curriculum. Furthermore, the government could play an important role in reducing existing tariffs on computer hardware and software and relaxing the taxation regulation in order to encourage and motivate private sector initiatives in IT industry and related industries.
- g) The IT policy should address the perennial shortage of PNG citizens with IT skills. The policy in collaboration with the Personnel Management Department and the National Planning Office should provide attractive remuneration packages as well as contractually binding arrangements to attract qualified people in the IT area and be able to retain them for their services. As well, a coordinated staff development and training programs for staff must be instituted. Various ways of identifying, attracting, recruiting, training, and retaining qualified staff be worked out and maintained. Poaching of skilled personnel from the public service by private sector or vice versa is common and most likely to continue if the human resources development issues are ignored.

These are only some of the issues that might have to be considered by policy makers to make sure that the technology policy developed harnesses existing infrastructure, facilities or services and maximises the potential benefits of Information Technology to improve competitiveness, quality of life, human resource development, and the overall developmental goals and objectives of the government.

#### **11.5.4 Research Question Four**

The differences in and between the private training organisations in various aspects of the computer training and development activities have been described in Chapter 7. There were several positive characteristics which lent themselves to helping to formalise computer training. For example, the positive and negative characteristics considered respectively as the strengths and weaknesses of computer skills curriculum could provide a basis for designing a computer curriculum or at least establish guidelines for such a curriculum and formulate an Information Technology policy with these characteristics in mind. This policy would not only regulate existing computer education and training in the country but also allow for planning for the future of IT, its design, development, and implementation in all sectors of the economy.

There was overwhelming support among training organisations in PNG who would like to see that IT education and training in the country was regulated under a well-defined and clearly stated national IT policy. The government has been seen by the training providers as solely responsible for establishing the necessary framework such as the Papua New Guinea Information Technology Council (PNG-ITC) to draw up appropriate IT policy guidelines and administer these guidelines. Establishment of PNG-ITC was seen as significant for setting standards for IT application and implementation in the country which are either absent or have been ignored. It was absent because of the unregulated and uncoordinated computer training currently experienced in the country. It failed because it was not implemented under the existing legal and policy framework. Information Technology systems design, procurement, application and implementation were also ignored. Setting up formal structures such as PNG-ITC would require training providers to improve their individual training programs and to accommodate their activities within the framework of the guidelines or the policies established.

The advantages or benefits for Private Computer Training under a PNG-ITC umbrella would further facilitate the following:

- a) Consolidate the present strengths of the computer skills curriculum;
- b) Focus all attention and energies to improve on what are considered as weaknesses;
- c) Regulate private Computer Training Organisations (in a loose sense);
- d) Ensure private computer training programs were conducted according to the policies and guidelines established;
- e) Discourage all the known disparities or differences;
- f) Certificates awarded recognises and acknowledges relevant skills achieved,
- g) Endorse the individual computing curriculums offered;
- h) Design training paths in a progression rather than ad hoc, segmented and unrelated;
- i) Create awareness of the responsibilities of the government, employers, and trainers;
- j) Facilitate the improvement of the level of computing development with proactive government policies to create a conducive IT education and training environment;
- k) Maintain quality and standard of training; and
- l) Promote computer education and training at all levels of education.

These would mean that many changes have to be made by both private computer training organisations and the government in areas such as: IT curriculum development, research and development of training programs, provision of training facilities, certification of the training programs, and the change in the government's own attitudes and policies on this subject. The government plays a very important part to facilitate and regulate private computer training. It has to create an environment that would enable computer or IT education and training to prosper and promote private sector initiatives in both manufacturing, research and development, and education and training.

Some developing countries have at one stage in their development faced these policy challenges. Those countries with *explicit IT policies* combined with the establishment of formal structures such as a Ministry or a Department responsible for computers, science or technology fall into the category of *advanced* developing countries. They incorporate most of the features described above and aim at addressing the many issues

highlighted through a concerted national approach. Examples of these countries are India, Singapore, Brazil and Chile which have succeeded in their quest for advancement in Information Technology (Bhatnagar & Odedra, 1992). The efforts in the *advanced* developing countries provide an appropriate model for other developing countries to emulate. Other developing countries have adopted an *implicit IT policy* without formal structures where computer education and training and research and development in IT areas were left entirely up to the enthusiasts to administer with mixed results. This approach has proven to be problematic, mostly to the detriment of the trainees and in the long haul to the detriment of the nation.

The recommendations were made according to the major findings as revealed from the research and described in the relevant chapters. The recommendations were categorised under different authorities for implementation. By classifying the recommendations according to the different authorities, they stand a better chance of being considered and implemented by the respective authorities.

As might be noticed by now, the government has to play a significant part in ensuring that it played its role by establishing the necessary formal structures such as a Ministry, Council, Commission or Department to be responsible for Science and Technology related matters which includes Information Technology. The government should formulate appropriate policies and guidelines to promote IT use, application, implementation, development, and other strategies in the country. The recommendations made specific mention of the various aspects of computer education and training in private training organisations based on the current practices of the training providers. The recommendations need to be accommodated through appropriate policies and actions by the government and various statutory bodies and private sector organisations if IT education in particular and Science and Technology in general are to play any part in the country's development.

## 11.6 Theoretical Explanations

The Qualitative research methods employed and the Grounded Theory Perspective through which this study was conducted made it possible for the researcher to understand (or have a good grounding in) the current IT education and training system in the private computer training organisations. The research findings suggest that the private computer training environment in PNG is in a state of flux or chaos because of the absence of appropriate government policies and guidelines on IT in general. Each training organisation contributing its own version of a 'quality' training program hence adding further chaos within the private computer training organisations.

This particular event has a ripple-effect within the private training organisations as well as within the country. From this observation, a new theory (the *Ripple-Effect Theory*) was postulated on the basis of the research conducted and the findings from it. The *Ripple-Effect Theory* uses the 'ripples in the pond' metaphor to describe the current private computer training scenarios under existing policies and regulations. Through the *Ripple-Effect Theory* model and given the present IT related policy framework in PNG, private computer training in PNG would remain chaotic.

However, the Ripple-Effect Theory model could also be applied to have positive effect in the private computer training organisations under the proposed administrative and policy changes recommended in the thesis. By establishing the necessary administrative structure, physical infrastructure, formulating appropriate IT policy and IT curriculum guidelines, and enacting necessary legislation to specifically address IT matters, IT education and training in PNG would be properly planned, guided and implemented.

In other words, the implications of implementing the various recommendations by the various authorities, with the proposed PNG-ITC framework would have positive effects as suggested under the *Ripple-Effect Theory* (model).

The converse would occur if the recommendations were not implemented. Under the *Ripple-Effect Theory* (Chapter 10), the status quo would be perpetuated and chaos would be maintained which could have severe consequences in IT education and training in PNG.

## **11.7 Conclusion**

Papua New Guinea as a developing country needs better trained and qualified IT professionals who can help the government and the nation by making best use of modern technological developments such as Information Technology to develop the country socially and economically. The need for people in the workplace to be computer-literate and have a clear grasp of the potential of the advanced technology, what it should do and what it should not do has been identified and documented in the National Training Policy as an area worthy of immediate government attention and action (Independent State of PNG, 1989).

Clearly, the demand for highly skilled and appropriately qualified IT professionals has increased over the years and would continue to be the case as the economy changes from subsistence to cash driven economy, and the workplace requirements reflect that change in appointment and recruitment practices. However, education and training in IT has neither kept pace with the changing needs nor the environment conducive to facilitating IT education and training.

Private training schemes have taken the initiative in IT education and training but they have been beset by many problems such as; ad hoc training programs with ill-defined objectives, lack of coordination and consistency in effort, difficulty by authorities to compel training agencies to comply with national training requirements, multiplicity of training programs, and absence of appropriate government policies and initiatives (Martin, 1994).



The private training institutions have come into existence in many developing countries to offer low level courses, targeting those outside of the public education institutions. Because of the paucity of funds within the publicly funded universities and the selective nature of admitting students, the universities cannot extend their IT course offering to the general public thereby enabling the private training institutions to get a foothold in many developing countries (Bhatnagar, 1992a). The private training organisations in such countries would continue to carry a large burden of educating and training the growing IT professionals required in the workplace.

In PNG, training (including IT education and training) has been described as a ‘multi-million kina industry’ by virtue of the Training Levy of 2 per cent imposed in PNG (Joel, 1993). Therefore, training providers were involved in more than one training job to cash in on the opportunity (*ibid*). Further, little attention was paid to the details of the training programs because of the absence of government sanctioned IT policy and regulation. If the current absence of IT policy is prolonged, and the present ad hoc and sporadic computer training programs were allowed to continue then Papua New Guineans would continue to pay high fees for qualifications that would no doubt lead to a cul-de-sac (Sinebare, 1992b). As one concerned PNG national parent and educator expressed in the *PNG Post Courier* recently:

The future of having too many certificates/diplomas in a country that does not provide employment will certainly lead to a diploma disease which, in reality means the quality of the diplomas/certificates will fall and the curriculum content subdued. The country does not need a lot of people with ‘papers’ that really means nothing in terms of employment and academic quality (Tasol, 1998)<sup>2</sup>.

Many recommendations have been made for various authorities to implement. The government should play a key role to: state its goals and objectives, set the standards, establish the necessary administrative structure, implement the recommendations put

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<sup>2</sup> Tasol, T. (1998). Certificate versus the job market. [Opinion under pen name]. The PNG Post Courier, February 5. [Online] Available URL: <http://www.postcourier.com.pg/> [Accessed February 5, 1998].

forward in this thesis and enact relevant legislation or revise existing legislation to facilitate, promote, apply and implement IT in the country. The implications for the recommendations have also been highlighted and the relevant authorities, particularly the government need to seriously establish the PNG-ITC and formulate the recommended IT policy with the focus on *Using IT* to develop its human resources - one of the most critical economic resources which has been overlooked under the current policy framework and within the present education system (Mitchell, 1990). Private Computer Training in PNG could be transformed from 'chaos' to 'order' if the suggested recommendations were implemented, otherwise the chaos or the status quo would prevail.

Developing human resources to *Use IT* in the country and especially to use IT as technological leverage in the creation of knowledge-based industries would enable PNG (and any other developing countries taking this track) to make the best use of its most critical economic resource. Knowledge work or knowledge-based industries are the predicted growth area in the next millennium and therefore, planning and changing policy focus toward this area means the government will make the most significant investment not only in its human resources but also on an area of its economy predicted to be a success. With largely untapped human resources in PNG (as in many developing countries) and unlimited potential for strong growth in the information or service industry sector, planning and development in these areas would have the greatest combined effect for the country. It is hoped that the findings and recommendations of the research would be applied to achieve these ultimate goals.

It is now up to the legislators, policy makers, curriculum and educational planners in Papua New Guinea to set the nation on a right path in terms of putting in place a relevant IT policy and IT curriculum guidelines so that the public and private training providers are not on a collision course with each other as it is at present. That policy would determine whether PNG would use IT to exploit and develop its untapped human

resources in order for them to participate meaningfully in the knowledge-industries sector as a producer of knowledge and not necessarily as a technocolony as a consumer of knowledge in the next millennium. Just as it takes a small pebble to cause ripples in a pond, it takes government actions and commitments through appropriate policies and guidelines to have a positive socio-economic impact in PNG.

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## Appendix A1:

# Private Computing Skills Training Providers' Attitudes Towards the PNG National Training Policy

### 1.0 Introduction and Overview

Computing related skills for the workforce in Papua New Guinea (PNG) especially computer software application user-level training was conducted by private training providers. This is due to the fact that computing skills such as computer literacy or computer appreciation and computer software application user training were not provided in the public sector educational institutions as a subject of study. The hierarchical nature of the education system in PNG (Department of Education, 1991) coupled with low literacy and numeracy rates in comparison with other developing Pacific Island countries (United Nations Development Programme, 1994, p. 11), paucity of funds, and placement of priorities on other areas were some of the reasons for the absence of computer education and training program within the public sector educational institutions in PNG.

However, observation of the job advertisements in the country's newspapers which require personnel with prior knowledge and experience in computing indicated that there was a great demand for computer related skills training. Since the public sector educational institutions in general offer limited opportunities for computer education and training apart from the universities such as PNG University of Technology's Diploma in Microcomputer in Information Processing and Bachelor of Management Information System<sup>2</sup>, the private sector fills the vacuum by conducting *ad hoc* and often uncoordinated computer skills training programs. The private computer skills Training Providers' involvement was legitimised under PNG's *Income Tax Act* (as amended from time to time) with provision for Training Levy scheme in a clause instituted in 1990 by the government for implementation by the Internal Revenue Commission (Arua, not dated). Training courses in many fields including computer skills training were

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<sup>1</sup> The Results and Discussion and the Conclusion parts of this report (sections 7.0 (7.1-7.8) and 8.0) have been respectively incorporated into Chapter 7 in sections 7.2.3 to 7.2.10 and 7.5.2.

<sup>2</sup> Personal communication with Mr. Gerard Ryan, a Lecturer in the Department of Accounting and Business Studies at PNG University of Technology in a letter dated February 2, 1994.

conducted by private Training Providers and were operating under this legal framework until the enactment of the *National Training Council Act 1991* and the subsequent establishment of the National Training Council (Independent State of PNG, 1991). This training policy was inaugurated in 1992 and implemented in 1993.

A survey of private computer skills Training Providers conducting computing skills education and training activities in PNG was conducted in 1994 to gauge computer training provider's attitudes towards the National Training Policy (NTP)<sup>3</sup>. Training Providers' views of the various aspects of the National Training Policy were explored and presented under the following sub-headings:

- a) The National Training Policy (NTP)
- b) The National Training Council (NTC) & National Training Council Secretariat (NTCS)
- c) Private Computer Skills Training Providers
- d) Certification of Trainers and Training Providers.
- e) General Training Objectives considered Important by Training Providers
- f) General Comments and Views held by Training Providers.

## **2.0 Literature Review**

### **2.1 Computers and Computing Skills in PNG**

Computer skills education and training, Information Technology (IT) education and training, human resource development, and high technology training are all interrelated and the author was mindful of this in conducting the literature review. The literature on computer education and computer skills education and training in PNG is limited. This limitation is a reflection of the state of computer education and training conducted in PNG. Those who wish to acquire computer related skills and knowledge in recent years either to advance in their present career or increase their chances of obtaining a different job in PNG are part of a larger group of people who create a demand for computer related education and training.

Mainframe computers and minicomputers were introduced by the private sector such as the mining companies, banks and airlines (in the late 1960's) including key government department such as the Finance & Planning. The human resource requirements to operate and use these computers were and are still the responsibility of the private sector organisations to develop or train in order to support their activities. Both high level

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<sup>3</sup> The 'Opinionnaire' or the Questionnaire used is attached as Annexure A at the end of this Research Report (or Appendix A).

technical training and software application user-level training were required to use these computers. Such education and training were either conducted in-house initially but progressively trained the required personnel or sent for further studies overseas. In most cases, non-citizen staff with the relevant skills and qualifications were recruited and employed in various capacities to work in computing professions. Even those citizen staff with university degrees were employed in jobs other than those which they have majored in (Ryan, 1994b).

Microcomputers or personal computers (PCs) entered the private sector and government departments around the late 1970's and early 1980's. Therefore any literature available in the area of computing in PNG reflects this situation. Furthermore, the available literature covers wide ranging issues between 1980 and 1995 as described in the following paragraphs.

In the private sector and the government establishments, Salter-Duke and Salter-Duke (1984) were the first to highlight the need for policy and planning in terms of human resource development for computing related training in PNG. They surveyed the computer installations and uses of computers in government departments, statutory authorities and the private sector organisations in PNG. No evidence of literature on computing in PNG private sector was found since Salter-Duke and Salter-Duke's survey.

However, from the 1980's onwards microcomputers also made its way into the schools through individual school's initiative and interest. The Ministry of Education in Port Moresby released a statement that the government had no clear computer education policy in the use of computers in schools (Department of Education, 1987). But the schools have been purchasing computers from their own resources for use in school administration as well as teachers' aid even before this statement was released (Kalewa, 1985). The Ministry of Education statement came out after more than 7 years since the well-to-do secondary schools acquired computers and have been using them in an haphazard and uncoordinated manner. The manner in which the computers were used in secondary schools depended on the availability and ingenuity or creativity of 'staff expertise' within the school. This group of teachers were and still are predominantly expatriate teachers with a handful of nationals who had acquired the necessary computer skills through self-instruction or from the private training organisations (Sinebare, 1991). The Education Department's 1987 statement described what role the computer might play in the classroom but since then computer education was not on the official curriculum. It has been offered as an 'extra-curricula' activity by only very few schools (Sinebare, 1990). The available computers in schools were mainly being used in school

administration (Kalewa, 1985) and to a lesser extent by teachers in their teaching while students had little or no access to computer usage (Sinebare, 1990).

Sinebare's (1987) dissertation covered the usage of computers in mathematics education at the then Goroka Teachers College (now University of Goroka) while Lipscomb (1988), surveyed both the National High Schools and International Education Agency schools in PNG which were known to have computers to determine what computer hardware they have, how their computers were used and how they intend to use their computers in future. Again computers in the schools were mostly used by school administrators in performing administrative functions such as correspondence, record keeping, and word processing in preparing teaching materials.

Due to the absence of professional interest in computing and Information Technology (IT) in PNG, most of the literature available in the country has been contributed by this author. This again points to the fact that not much was written by others in PNG on this subject. The wide ranging issues covered by existing literature in PNG is summarised chronologically in the following paragraphs.

Salt (1988) reported on his survey on employer's views about what an appropriate university computing curriculum for PNG should be. The employers considered a computer curriculum with business or commercial application such as Business Information Systems as important and useful rather than purely academic computer subjects such as computer science. Sinebare (1989) highlighted the need for standardisation and normalisation of computing courses conducted by the private training providers, and Sinebare (1990) surveyed computer software and hardware system used in PNG secondary schools. Amongst the findings from this survey was that only 25% of the schools had some kind of computers purchased out of school funds or acquired them from other sources for use in school administration. As well, only very few secondary schools allowed their students to use the computers and even a smaller number of schools taught students either *with* the computer or *about* the computer as an 'extra-curricula' activity (Taylor, 1980). This reflected the teachers own lack of sufficient background knowledge to use computers both for self-instructional purposes as well as teaching. Huijeli's (1991) paper focused on how computers can be used as a teaching and learning tool in PNG secondary schools. Sinebare's (1991) seminar paper presented at UPNG called for the development of computer-literate teachers in the secondary schools within PNG and identified several computer competency skills which might be incorporated into the pre-service teacher education program. Sinebare's

(1992a)<sup>4</sup> paper highlights PNG's Information Technology Policy for the Public Service<sup>5</sup> and the possible social implications of computers in the public service. For example; IT awareness and human resource development, telecommunication infrastructure and misuse of IT among others. Sinebare (1992b) called for the monitoring of private computer skills training in PNG. The Department of Education (1993) through its Secretary released a statement advising schools to use computers as an 'extra-curricula' activity. Schools have been purchasing computers and the provision of curriculum and resources associated with this function had been left entirely up to the individual schools to provide if computing was to be 'taught' during the official school hours. Sinebare's (1993) paper about PNG's Technology Policy for the Public Service raised a number of questions about the policy. One of them being identification of relevant computing and IT skills needed for effective utilisation and implementation of the policy. Finally, Ryan's (1994b) paper focused on the growth and development of information processing and the associated training programs in PNG especially at the PNG University of Technology in Lae. In order to overcome the shortage of computing personnel, Ryan offered several suggestions that:

- a) The number of graduates from computing field be increased,
- b) The Technical Education in PNG be expanded to produce competent (Certificate and Diploma level) graduates, and
- c) Sandwich courses be provided for those graduates in fields other than computing to perform their tasks in their respective jobs.

## 2.2 Computer Skills Education in other Countries

The literature on computing skills education and training by the private training providers is extensive and covered wide ranging issues of training and computer related skills which differed from country to country. The developed countries have well-established training schemes for various categories of people through both private and public provisions of training opportunities. For example, in the USA a decentralised, unregulated and free market private sector training involvement in all areas exist (Berryman, 1991). In the U.K. however, among other initiatives the introduction of Training and Enterprise Councils in 1990 aimed to enable private training providers to contract with the Government to plan and deliver training (Marquand, 1994). In Germany, the syllabus was nationally determined but the training itself was conducted

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<sup>4</sup> Sinebare, Musawe (1992a). *The National Information Technology Policy and the Social Implications of Computers in Papua New Guinea*, a paper presented at the International Federation for Information Processing conference in Nairobi - Kenya, March 23 - 25. (The revised version of this paper was published in 1993. See Sinebare (1993)).

<sup>5</sup> Department of Personnel Management (1991). *The Information Technology Policy for the Public Service*, Port Moresby - PNG: Department of Personnel Management.

under the authority of the regional governments or Lander (Wagner, 1991). In this system formal instruction took place in the schools while apprenticeship training was conducted in the workplace, not just for computer related education and training but training in other disciplines as well. Computer skills training was widely available from both public and private institutions in the developed countries and therefore it was no longer a problem.

In Australia, the Australian National Training Authority was established to ensure coordination and consistency of training approaches in the country (Baker, 1994). The Australian Vocational Certificate Scheme is a competency-based training with a focus on outcomes rather than the training inputs such as the time-served on training programs. Much of PNG's training related legislation such as the National Training Policy can be traced to Australia because of Australia's close ties with PNG (through trade, economic, education and defence ties among others) and therefore training related literature have some similarities and relevance for PNG.

With regard to computer skills training and development, private training providers played a significant role in producing company-specific, hardware-specific and software-specific training (Whitehouse, 1984). User training was mainly directed at non-managerial staff by employer-provided training programs (Oxeley, 1984), which argued that training about new technology should be the responsibility of the industry rather than the government. Several recommendations were made to the Australian National Training Council to coordinate, liaise and assist in microelectronics related training in the private sector (National Training Council, 1984).

Only one survey of community attitudes towards government's policy and programs has been identified (e.g., Commonwealth of Australia, 1988). It was different because this survey narrowly focused on one government policy document, the PNG National Training Policy and one particular stakeholder, the private computer training providers for whom the training policy has been enacted to regulate all training providers to comply with the stipulated guidelines.

In the developing countries, there appeared to be a huge variation depending on many factors such as levels of development, political stability, human resource capital, and government priorities among others. The available literature point to the fact that even within the developing countries category, some are *advanced* in their own right to be classified as such in terms of human resource development in science, medicine, engineering and high technology areas; for example India and Brazil while countries



like PNG are on the other extremes of the 'less advanced - advanced' continuum. The rest of the developing countries can be located on this continuum but more concentrated towards the 'less advanced' end of the continuum. This was reflected in the different levels of Information Technology education and training and activities as described by Bhatnagar (1992a), in his overview of the trends and development of selected developing nations in the African and Asian regions.

The general trend however was that those governments playing positive roles and taking innovative actions in training and development of human resources were progressing well in terms of developing their human resource requirements which includes computer related and information technology skills (Pawar, 1992). There have been individual efforts in many countries of the African continent such as those of Nigeria (Ojo & Odusote, 1992), Zambia (Jere, 1992), Zimbabwe (Kadyamatimba, 1992) and in the Asian regions such as Bangladesh (Alam & Mondal, 1992), and Malaysia (Nordin, 1992) to name a few. They have attempted to develop IT related skills in the public sector educational institutions but also acknowledged the private sector initiatives and its immense potential to contribute towards IT skills education and training to complement the training efforts of the public sector educational institutions.

Existing literature revealed that there were wide ranging issues covered. It further revealed that no evidence can be found of a study of the perceptions of a government training policy as perceived by the private computer skills training providers. However, there was evidence of IT training and high technology studies in both developed and developing countries which also varied from country to country. Contributions made by the private training providers in developing human resource requirements in many countries were valuable.

### **3.0 Purpose and Limitations of this Investigation**

#### **3.1 Purpose**

The purpose of this exercise was to gauge the attitudes and views towards the various aspects of the National Training Policy as perceived by those private computer Training Providers involved in computer skills education and training in Papua New Guinea. More specifically, what are the attitudes of the training providers towards: the National Training Policy (NTP); National Training Council (NTC) and National Training Council Secretariat (NTCS); Private computer skills training providers; and Certification of trainers and training providers involved in conducting computer skills training program.

### **3.2 Limitations**

Any research activity has limitations in one form or another. The following limitations were identified for this research:

- a) The research method employed in gathering data through the use of questionnaire/interview in a country like PNG was not only costly but difficult. It was therefore impossible to do a follow-up with those who participated either to answer questions or clarify misunderstanding emanating from their earlier responses.
- b) There are many training providers whose contribution towards this research would have made a lot more difference. However, this did not eventuate because they were awaiting receipt of policy documents from the NTCS at the time of research. Since no documents were sent to these training providers, the questionnaire was not completed within the time limit given.
- c) There is a possibility that because an item might be relevant to more than one aspect of the NTC, classifying that item under another category might not represent the general views and attitudes held by training providers about this particular category i.e. the cross-relevance factor of the statements.
- d) The possibility of an 'information bias' on the basis of small sample used and the respondents interpretations of each individual items.
- e) The reader is reminded that the number of Training Providers which participated in this exercise was rather small (n=13). However, four of the participating Training Providers were probably the largest training organisations with operations extended to other major centres outside of Port Moresby.

### **4.0 Structure and Content of the Questionnaire**

The Questionnaire had four sections; Introduction, Authorisations and Acknowledgments, Background information on Training Providers, and finally the Survey Questions.

The purpose of the survey, researcher's identity and background and special instructions were contained in section one (introduction), while in section two; authorisations to conduct research and acknowledgment for cooperating in the research was sought. In section three, request for other background information and details about the Training Providers such as; size of organisation (small, medium or large), level of ownership (foreign, national or joint-venture), nationality of training staff and level of qualifications held by trainers, and costs and enrolment figures. Finally, section four contained; attitudinal questions/statements with/without opportunities for written comments and clarification, yes/no questions, statement of training objectives for rank ordering, and open-ended questions for completion (Annexure A is the condensed

opinionnaire or questionnaire entitled *Private Computing Skills Training Providers' Attitudes Towards the Papua New Guinea National Training Policy*).

## **5.0 Background Information on Training Providers**

Before a formal discussion is done, some key details of the Training Providers involved in Private Computer Skills Training in PNG is necessary in order to understand their background and the context in which they conduct training activities.

### **5.1 Ownership and Size of Training Organisations**

Less than half (46%) of those training providers conducting computer related courses were nationally-owned while the rest were either foreign-owned or a joint-venture between PNG nationals and foreigners. The size of the training organisation ranged from small (with less than K30 000 in assets), medium (over K30 000 and less than K50 000 inclusively) and large ones with assets in excess of K50 000. Less than half of the training organisations were medium sized by above criteria. All the training organisations were located in the main centres of PNG, where the demands for obtaining computer skills training existed.

### **5.2 Nationalities of Trainers and their Qualifications**

According to the survey nearly 40 staff personnel from both PNG and foreign nationalities, both males and females were gainfully employed as trainers in various capacities within the individual training organisations. There were 24 PNG nationals (M=13, F=11). Among the non-citizen staff, Filipino (n=11) ranked second to PNG while two from Sri Lanka and one each from USA, India, Australia, and Africa. The average staff strength in a training organisation were 4.7 and 1.6 for PNG nationals and non-citizen staff respectively.

The trainers' academic qualifications ranged from those who had Grade 10 or Grade 12 qualifications (mostly PNG nationals) to those with graduate and postgraduate qualifications in a wide range of subjects and fields (mostly foreign nationals). Some of the qualifications of the trainers (all nationalities) ranged from; Diploma in Secretarial Studies, Diploma in Accounting, Diploma in Teaching, Diploma in Computer Science, B.Sc in (engineering, geology, mathematics), B.A., Bachelor of Business Management, Bachelor of Business Administration and Bachelor of Accounting. First and second degree holders were predominantly non-citizen staff who were either owners or partners of the training organisations. Among the teaching staff there were two PNG nationals with first degrees but the rest were either diplomates or certificate holders. The second PNG national also had a postgraduate qualification in accounting and was the only one

with postgraduate training from abroad as well as held membership in other corporate and professional organisations. Most of the certificate holders were trained in-house by the respective training providers to serve as assistants or tutors in the business or have attended training in another private training organisation within PNG.

Even though there were eleven (11) females from PNG engaged as trainers or assistants compared to seven (7) of their Filipino counterparts, the average qualification of the latter was a first degree (the highest being an M.Sc and an MBA all obtained from the Philippines) while PNG females manage with a Diploma as their highest qualifications. The lowest qualification of the PNG females being a Grade 10 and they obtained in-house training certificates. Similar trend holds for PNG males with the least qualification being a Grade 10 Certificate, the average qualifications being a Diploma and the highest being a Masters degree in Accounting. The minimum qualification of non-citizen counterparts was a first degree and their highest being a doctoral degree in marketing and technical education.

### **5.3 Number of Computers**

Within each training organisation, there were on average, 5 to 38 (an average of 15) personal computers used solely for training purposes, while 1 to 8 ( an average of 2.4) personal computers were used for administrative purposes. All of these computers were purchased and owned by the training organisations. The total value of the computers used for training and administrative purposes range from K7 500 to K30 000 (average of K15 000) and K2 000 to K16 000 (average of K5 000) respectively.

### **5.4 Registration of Training Providers**

At the time of research (1994), none of the training providers (both staff personnel and organisations) were registered with the National Training Council (NTC). They were all registered as private companies under PNG's Investment Promotions Authority or Companies Act. Others stated that they have not yet received registration documents from NTC (even after many correspondence) or that they were in the process of obtaining registration at the time of completing the questionnaire. The training providers were in operations since 1987, long before the NTC was established

### **5.5 Types of Qualifications Awarded**

The Training Providers under study conduct computer related training skills courses for the following awards: Certificate of Attendance, Certificate of Proficiency, and Certificate. One institution's Certificate and Diploma were accredited by the National Computer Centre in United Kingdom. The computer skills courses last from as low as

18 hours to a high of 410 hours in order for one to successfully complete the course requirements.

**5.6 Enrolment and Cost Figures**

The cost of conducting a training program varied from year to year and course to course. The estimated yearly cost ranged from a minimum of K4 000 to a maximum of K50 000. The respondents claimed it cost a minimum of K700 to high of K10 000 for a computer course. The total annual enrolment figure ranged from 50 - 500 and student enrolment per course ranged from 10 to 250 students. Between 100 and 250 students completed their course each year from private training organisations.

**6.0 Methodology**

**6.1 Subjects or Participants**

The private computer skills Training Providers were those involved in training activities but were exempted from paying the Training Levy fee as stipulated under the Taxation Act (as amended) Section 196Y(j) (National Training Council, 1995). The participating private training providers involved in computer skills training were identified from three main sources: the list of private sector training organisations obtained from the National Training Council Secretariat (NTCS), advertisements placed in the country's newspapers and the Yellow Pages of the 1994 PNG Telephone Directory, and from professional contacts with those involved in computer skills training activities.

Since it was difficult to identify those specifically involved in computer skills training from the list obtained from the NTCS, every training provider held on the register was contacted by mail to determine if they were involved in any computer related skills training. However, training providers which advertised their training organisations and training programs were easily identified and cross-checked. A process of elimination was used to eliminate those from the NTCS list in order to identify those which conduct computer related courses (See Table 1). The following were eliminated:

- a) Training organisations governed by their own Acts of Parliament (shown in column EL1) which includes those statutory bodies and private sector firms conducting in-house training for their staff in job-specific or hardware-specific training programs;
- b) Training Providers in each center which responded "No" to an earlier questionnaire sent by the researcher asking them if they offered any computer related courses in their organisation (shown in column EL2);
- c) Training Providers not involved in conducting any computer related courses in their organisation (shown in column EL3) identified either by the nature of their

advertisements in the newspapers in PNG or based on information obtained from professional contacts; and

d) Those Training Providers that didn't respond to an earlier query by mail (shown in column EL4).

Table 1 contains the number of private Training Providers in PNG. Those involved in computer skills training and development are shown in the second-last column. It must be noted that the number of Training Providers is constantly changing with new ones starting or through other changes such as mergers or closures.

**Table 1            Number of Private Training Providers in PNG**

Center	No on NTC <sup>6</sup> Register 13.01.94	EL1	EL2	EL3	EL4	No of Training Providers	No of Questionnaires Returned
Alotau	2	-	1	1	-	-	-
Goroka	1	-	-	-	-	1	1
Lae	9	2	3	2	-	2	2
Madang	1	-	-	-	1	1	-
Mendi	1	-	-	-	1	1	1
MT. Hagen	4	-	1	1	1	1	1
Port Moresby	75	12	23	22	11	18 <sup>7</sup>	8 <sup>8</sup>
Rabaul	1	-	-	-	-	1	1
Tabubil	1	1	-	-	-	-	-
Total	95	15	28	26	14	25	13

As can be seen from Table 1, the percentage return was 52% of the total national sample of the private Training Providers in PNG. This means 52 per cent of private training providers were engaged in computing education and training which is encouraging for the purpose of this study. It was encouraging given that firstly; there was a small number of Training Providers involved in computer skills training in the whole country,

<sup>6</sup> Some training providers in PNG (at least 12) were not on the original register of the National Training Council Secretariat. Such training organisations have been identified from (i) advertisements placed in the newspapers between 1993 to 1994 and the 1994 Yellow Pages, and (ii) professional contacts with other training providers.

<sup>7</sup> It is possible that not all of these training providers conduct computing education and training because they failed to respond to the first questionnaire which asked all training providers if they conducted any such training. Some of these training providers were known to the author as conducting computing skills training courses but did not return the Questionnaire.

<sup>8</sup> Four of those organisations had branches in other centers of PNG. They were also the largest of such training providers in PNG. Only their headquarters participated in the survey.

secondly; the proportion of those computer skills Training Providers participating in this study was high, and thirdly; only those involved in computing skills training as a commercial activity were of interest in this study because they had the freedom under commercial regulation to operate as a business venture without much scrutiny of the curriculum on offer.

Those Training Providers involved in computer skills training as a business venture were small compared to other categories of Training Providers in PNG including private and statutory organisations conducting in-house training. However, four of the Training Providers which returned the questionnaire had training sites in other centers of PNG. They were also the largest and more reputable Training Providers in the country. Therefore, their views were most valuable not only to this research but also in terms of their contribution to the training needs of the country and the short-term training requirements of the trainees.

## **6.2 Administration of the Questionnaire and Interviews**

The private computer skills Training Providers identified from the various sources of information bases were personally visited where possible and were given the Questionnaire to be self-administered by the most senior staff member of the training organisations. The Training Providers which were difficult to access or to meet personally were either sent the Questionnaire or personally delivered to their premises for the persons concerned to complete and return to the researcher.

The researcher personally visited; MT Hagen, Goroka, Lae, Rabaul and Port Moresby during a fieldwork in 1994 to talk with those involved in computer skills training activity. Prior to the visit, the Training Providers were either contacted by mail, fax or telephone (from Goroka where the researcher was based for the duration of the research) to make arrangements for the meeting. Training Providers' reception of the researcher ranged from 'cooperative to uncooperative' attitudes towards the research as well as the researcher. The visit took nearly six weeks for face-to-face interviews and self-administration of the Questionnaire. The cooperative ones accepted the interviews to be conducted at their premises while others promised to complete the 1994 Questionnaire when they find time. Those training providers who supported the research completed the Questionnaire and returned them much later than the deadline set while the others have not kept their promises.

## 7.0 Results and Discussion

### 7.1 Description of how the Results were Computed

The attitude questionnaire is classified and discussed in six parts (sections 7.2 to 7.7). Each part is designed to identify the training providers' belief about the different aspects of the National Training Policy (NTP). The survey items or statements related to the different aspects of the National Training Policy are boxed in under the respective parts and precedes the individual discussions. The order in which the discussion is presented was based on descending order of popularity in opinions expressed for the three alternatives; Agreement, Disagreement, and Neutral opinion.

The statements about each aspect of the NTP (i.e., parts A to D of the Opinionnaire) was rated using a Likert scale. A 5 to 1 scale of response was used where the subjects checked whether they Strongly Agree (SA), Agree (A), Unsure (UN), Disagree (DA) or Strongly Disagree (SDA). The reverse scaling was used for negative statements (Shaw & Wright, 1967).

According to Thurstone (1967, p.77), attitude is '*... the sum or total of a man's [sic] inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats and convictions about any specified topics.*' It was in this context that attitudes of computing skills training providers in PNG towards the NTP was investigated.

For agreement on an item, the total attitudes scores (eg, sum of SA and A) was calculated to be interpreted as Positive Responses or positive attitudes towards a statement. While for disagreement, the total attitudes scores (the sum of SDA and DA) was calculated to be interpreted as Negative Responses or negative attitudes towards a statement. Scores for neither agreement nor disagreement were interpreted as Neutral Responses (no computation required) (See Tables 2 to 5). Each statement is scored according to the Likert scale and the total percentage responses towards positive, negative, and neutral attitudes were calculated. A descriptive approach is used to



measure the subjects' attitudes as shown in their acceptance or rejection of the opinion put forward (statements) in the research questionnaire (Thurstone, 1967). A fourth category, Error was also calculated to show: a) the blanks left in the questionnaire where the respondents failed to indicate their choice, and b) where the respondents mistakenly made more than one response (two or more choices) instead of just one of the five alternatives.

**7.2                    National Training Policy (NTP)**

Items or statements related to the National Training Policy (NTP) are shown in Figure 1. and the respective results of the opinion expressed are tabulated in Table 2.

**Figure 1**      **Items or Statements related to the NTP**

1. The goals and objectives of the National Training Policy could be achieved by my organisations.
2. The National Training Policy is simple to understand.
3. The National Training Policy requires my training organisations to do extra administrative work.
4. The expectations of the National Training Policy on private sector training organisations are realistic.
5. The PNG Government encourages the private sector involvement in the development and training of computer skilled personnel in the country.
6. My level of awareness of the National Training Policy as it relates to my training organisations is satisfactory.
7. The Government encourages private sector training organisations to develop and train computer personnel in overseas training institutions.
8. The Government's effort through the National Training Policy to give recognition to the private sector training organisation came at the right time.
9. The training levy concept for private training organisations is a way of encouraging training of personnel in PNG.
10. Credit transfer between training institutions benefits the trainees more than the institutions.
11. My training organisation had difficulty getting some of its courses registered by the National Training Council.
12. I have read the National Training Policy document.

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part A].

**Table 2            Percentage Breakdown of Responses to Statements about the National Training Policy (n=13)**

ITEM No	% Positive Response (n)		% Neutral Response (n)		% Negative Response (n)		% Errors or Blanks (n)	
1	(9)	69.23	(3)	23.08		-	(1)	7.69
2	(8)	61.54	(3)	23.08	(1)	7.69	(1)	7.69
3	(4)	30.77	(5)	38.46	(3)	23.08	(1)	7.69
4	(7)	53.85	(5)	38.46	(1)	7.69		-
5	(6)	46.15	(5)	38.46	(1)	7.69	(1)	7.69
6	(7)	53.85	(2)	15.38	(3)	23.08	(1)	7.69
7	(3)	23.08	(6)	46.15	(3)	23.08	(1)	7.69
8	(8)	61.54	(4)	30.77	(1)	7.69		-
9	(9)	69.23	(4)	30.77		-		-
10	(6)	46.15	(6)	46.15	(1)	7.69		-
11	(1)	7.69	(4)	30.77	(6)	46.15	(2)	15.38
12	(8)	61.54		-	(2)	15.38	(3)	23.08

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

As can be seen from Table 2, there is (in general) a highly positive attitude shown in the responses to various statements about the National Training Policy (See Figure 1). Most of the responses were well above 40% with the exception of items 3, 7 and 11.

**7.2.1 Neutral**

In items 3 and 7 the respondents were neutral in their view towards the extra administrative work required when complying with the NTP and whether the government encouraged the private Training Providers involvement in computer skills training. In item 11, they disagreed that they had any difficulty in obtaining registration for some of their courses with NTC. It is interesting though that there were still several training organisations which have not registered with the National Training Council by 1994.

**7.2.2 Agreement**

Furthermore, there was a high positive attitude (over 60%) shown towards items 1, 2, 8, 9, and 12. This respectively indicates that computer training providers believed that: the goals or objectives of NTP are achievable within their organisation, NTP is simple to

understand (for those who have read it), NTP is a welcome introduction to recognising private sector Training Providers, and the Training Levy concept encourages training of personnel in PNG to develop local staff expertise in computer application skills.

The next level of agreement (nearly 54% for items 4 and 6) respectively indicate that the NTP's expectations of the training providers were realistic and that their level of awareness of NTP as it relate to their training organisation was satisfactory. In item 5 the respondents view that the government encourages (through the NTP) the training and development of computer skilled personnel in the country.

There was a tie or parallel response for item 10 between positive and neutral responses towards transfer of credits between training institutions. This was probably because the mechanisms necessary for transferring credits between training institutions were being discussed only in the public sector (Commission for Higher Education, 1995a).

**7.3 National Training Council and National Training Council Secretariat**

Statements or items related to the National Training Council (NTC) and the NTC Secretariat are given in Figure 2 and the results of the response to these statements are shown in Table 3.

**Figure 2      Items related to NTC and NTCS**

1. A representative of the National Training Council Secretariat should visit my training organisation in a supervisory or inspection capacity.
2. The National Training Council should monitor the private sector training organisations to avoid exploitation of Papua New Guineans.
3. The establishment of the National Training Council is a threat to private entrepreneurship of training organisations.
4. The penalty of K1000.00 imposed for failing to supply information or for supplying false information to the National Training Council is lenient.
5. The training standards requirement of the National Training Council are easy to achieve in my training organisation.
6. The quality requirement of the National Training Council are easy to achieve in my training organisation.
7. The National Training Council Secretariat is prompt in helping my organisation with its inquiries.
8. The National Training Council described the specific training needs of computing personnel in the National Training Policy.
9. The National Training Council has provided my training organisation with clear guidelines on computer education and training in the private sector.
10. Computer related training courses should be periodically reviewed by the National Training Council on the basis of fees charged and the content of the course.
11. Computer related training providers or institutions should be registered under the National Training Council.

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part B].

**Table 3            Percentage Breakdown of Responses to Statements about the NTC and NTCS (n=13)**

ITEM No	Positive Response (%)		Neutral Response (%)		Negative Response (%)		Error or Blanks (%)
1	(8)	61.54	(3)	23.08	(1)	7.69	(1) 7.69
2		-	(1)	7.69	(12)	92.31	-
3	(3)	23.08	(3)	23.08	(7)	53.85	-
4	(2)	15.38	(7)	53.85	(4)	30.77	-
5	(7)	53.85	(6)	46.15		-	-
6	(8)	61.54	(5)	38.46		-	-
7	(3)	23.08	(7)	53.85	(3)	23.08	-
8		-	(8)	61.54	(4)	30.77	(1) 7.69
9	(2)	15.38	(6)	46.15	(5)	38.46	-
10	(9)	69.23	(3)	23.08	(1)	7.69	-
11	(13)	100.00		-		-	-

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

### 7.3.1 Disagreement

A 92% negative response for item 2 shows training providers believed that NTC/NTCS should not monitor the computer skills training providers and, nearly 54% (item 3) disagree that NTP is a threat to the entrepreneurial nature of training activities. One respondent stated thus: *'It is not a threat, it helps foster good training standards'*, while the second one stated: *'... this is long overdue - should have been formulated long time ago to serve the purpose which all can benefit'*, and yet another said: *'There must be some control on who is doing what and the quality expected.'*

### 7.3.2 Agreement

A high agreement (100%) was shown in item 11 that computer training providers should be registered under NTC. There is a further agreement with statements 1, 6, and 10 (62% - 70% agreement). For example, the respondents agreed that there should be periodic visits by NTC representatives in a supervisory or inspection capacity. But during the interview, one of the trainers commented: *'...there is no point visiting the training providers when the person visiting shows no interest in the technical discussion.'* This particular trainer claimed that the representative from the NTC said

computers and computing were too technical for him and left immediately without contributing anything meaningful to their discussions in Port Moresby.

Items 6 and 10 (nearly 60% and 70%) respectively showed favourable attitude towards the statement that: the quality requirements of the NTC were easy to achieve by the Training Providers and that all Training Providers be reviewed by the NTC on the basis of fees charged and course content planned and delivered. Nearly 54% (item 5) responded favourably that training standards requirement of the NTC can be achieved by the private computer skills Training Providers.

### **7.3.3 Neutral**

Neutral opinion was demonstrated on items 4, 7, 8, and 9. For example, nearly 54% (items 4 and 7) of the respondents were undecided on: the penalty of K1 000 imposed by the NTC for falsifying or failing to supply the information requested by it, and were uncertain of any prompt responses from NTC to inquiries raised by Training Providers. Nearly 62% (item 8) of the respondents were uncertain if the NTC had described the specific training needs of computing personnel in the NTP document. About 46% were also uncertain as to whether the NTC gave Training Providers clear guidelines on matters concerning computer skills training while nearly 39% disagreed, meaning that guidelines were given.

## **7.4 Computing Skills Training Providers**

The statements or items related to the Computer Skills Training Providers are shown in Figure 3 and the respective results are presented in Table 4.

**Figure 3      Items related to Computer Skills Training Provider**

- |   |
|---|
| <ol style="list-style-type: none"><li>1. My training organisation had trainers who are qualified to teach in their specific fields.</li><li>2. The training courses offered in my organisation meets the criteria for accreditation from the National Training Council.</li><li>3. Courses offered in my organisation are unique from those offered by other training organisations.</li><li>4. My training organisation is run on a for-profit-basis.</li><li>5. My training organisations conducts joint training courses with other training organisations.</li><li>6. The course fees charged for a computer course offered by my organisation varies.</li><li>7. My training organisation will recognise accredited courses conducted by other training organisations.</li><li>8. My training organisation sees that there is a need for Papua New Guineans to be trained or educated for computer related jobs in the private sector.</li><li>9. My training organisation had difficulty getting registered by the National Training Council.</li><li>10. Obtaining individual Course Accreditation from the National Training Council is easy.</li><li>11. Obtaining Institutional Accreditation from the National Training Council is easy.</li><li>12. The training courses offered by my organisation are independently evaluated.</li><li>13. The training offered by my training organisation will enhance job prospects for the unemployed.</li><li>14. The training courses conducted by my training organisation are designed and delivered with Papua New Guineans needs and conditions in mind.</li><li>15. The providers of computer related training must ensure that trainees are covered against financial exploitation.</li></ol> |
|---|

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part C].



**Table 4            Percentage Breakdown of Responses to Statements about Computing Skills Training Providers in PNG (n=13)**

ITEM No	Positive Response (%)		Neutral Response (%)		Negative Response (%)		Error or Blanks (%)
1	(13)	100.00	-	-	-	-	-
2	(8)	61.54	(5)	38.46	-	-	-
3	(9)	69.23	(3)	23.08	(1)	7.69	-
4	(8)	61.54	(4)	30.77	(1)	7.69	-
5	(1)	7.69	-	-	(10)	76.92	(2) 15.38
6	(7)	53.85	-	-	(3)	23.08	(3) 23.08
7	(7)	53.85	(5)	38.46	(1)	7.69	-
8	(13)	100.00	-	-	-	-	-
9	(2)	15.38	(4)	30.77	(5)	38.46	(2) 15.38
10	(3)	23.08	(6)	46.15	(2)	15.38	(2) 15.38
11	(3)	23.08	(7)	53.85	(2)	15.38	(1) 7.69
12	(7)	53.85	(1)	7.69	(4)	30.77	(1) 7.69
13	(10)	76.92	(2)	15.38	(1)	7.69	-
14	(10)	76.92	(3)	23.08	-	-	-
15	(11)	84.62	(2)	15.38	-	-	-

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

### 7.4.1 Agreement

There was a high positive response (ranging from 50% to 100%) to most items. The respondents overwhelmingly agreed (100%) on items 1 and 8 where they respectively indicated that their training organisation had trainers who were qualified to teach in their specific field and they saw that there was a need for PNG nationals to be trained or educated for computer related jobs in the private sector.

The next level of agreement (nearly 85% for item 15) indicate that Training Providers must make sure that the trainees were covered against financial exploitation. The respondents (almost 77% for items 12 and 14) further agreed that the training offered by their organisations would enhance job prospects for the unemployed and that their training program is designed and delivered with PNG needs and conditions in mind.

The Training Providers’ agreement (60% - 70%) with items 2 and 3 indicate that the trainers believed the courses conducted by the private sector satisfy the criteria for

accreditation from the NTC and that the courses were unique from other Training Providers.

For items 4, 6, 7 and 12 (between 50% and 60% agreement), the respondents respectively expressed a belief that: their training organisation were run on a for-profit-basis, the fees charged varied between Training Providers, they would recognise accredited courses conducted by other Training Providers, and the training courses they conduct were independently evaluated (within their organisation).

**7.4.2 Disagreement**

It was evident that each training organisation was operating independently from others because 77% responded negatively to item 5 which was intended to determine if there was any training course conducted jointly with other Training Providers. Two Training Providers in PNG indicated they have joint courses in association with overseas based training organisations, such as the National Computer Center in United Kingdom. There was also a slight negative attitude towards item 9 (nearly 39%) which meant that the Training Providers had no difficulty obtaining registration for their training organisation while nearly 31% were uncertain.

**7.4.3 Neutral**

The results from items 9, 10 and 11 indicate that the respondents found it neither easy nor difficult to obtain individual course accreditation from NTC. The same was also true for obtaining institutional accreditation from NTC.

**7.5 Certification of Computing Skills Training Providers**

Items or statements related to certification and registration of trainers and training providers are shown in Figure 4 and their respective results tabulated in Table 5.

**Figure 4**      **Items related to Certification of Trainers**

1.

All computer related training staff must be registered with the National Training Council.
2.

Trainers and their qualifications be screened before they are allowed to teach computer related courses.
3.

All training staff in the private training organisations must be qualified trainers in a specialist area in order to deliver training in PNG.
4.

Computer related trainers may also engage in any other income generating activities.
5.

Trainers must be fluent in English as a language of Instruction.
6.

My training organisation is financially well-placed so that the trainees are not disadvantaged in the even of sudden loss of training opportunities eg, in the event of liquidation, closures or mergers.
7.

Training facilities such as classrooms or teaching laboratories must be assessed and certified by the National Training Council.
8.

Providers of computer related training must observe and practices highest standard of ethics in their relationships with trainees.
9.

Trainers must possess trainer's qualifications as well as relevant technical and education qualifications from recognised institutions before they are registered.
10.

Certification of training staff in the private sector training organisation by the National Training Council is inadequate.
11.

The system of accrediting training organisations encourages my organisations to offer quality programs.

**Source:** *Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy* questionnaire. [Part D].

**Table 5**      **Percentage Breakdown of Responses to Statements about Certification of Training Providers (n=13)**

ITEM No	Positive Response (%)		Neutral Response (%)		Negative Response (%)		Error or Blanks (%)	
1	(11)	84.62	(2)	15.38	-	-	-	-
2	(10)	76.92	(2)	15.38	(1)	7.69	(1)	7.69
3	(11)	84.62	(1)	7.69	(1)	7.69	-	-
4	(5)	38.46	(3)	23.08	(5)	38.46	-	-
5	(11)	84.62	(2)	15.38	-	-	-	-
6	(6)	46.15	(4)	30.77	(2)	15.38	(1)	7.69
7	(10)	76.92	(2)	15.38	(1)	7.69	-	-
8	(11)	84.62	(2)	15.38	-	-	-	-
9	(9)	69.23	(3)	23.08	(1)	7.69	-	-
10	(6)	46.15	(4)	30.77	(2)	15.38	(1)	7.69
11	(9)	69.23	(1)	7.69	-	-	(3)	23.08

**Note:** Percentages are corrected to 2 decimal places. Due to rounding error, the row total may not all add up to 100%.

As can be observed from Table 5 there was a high positive response (over 40%) for all items except item 4 (Figure 4).

### **7.5.1 Agreement**

In general the respondents agreed (almost 85% for items 1, 3, 5 and 8 respectively) that all:

- a) Computer related trainers must be registered;
- b) Training staff must also be adequately qualified in a specialist area to deliver training;
- c) The trainers be sufficiently fluent in their spoken English in order to communicate meaningfully with trainees; and
- d) Training Providers should observe and practice the highest standard of ethics and morals in their dealings with trainees.

The next level of agreement registered (in descending order) for items 2, 7, 9 and 11 respectively (See Figure 4) showed that training providers believed that:

- a) individual trainers and their educational qualifications be screened by NTC before they are allowed to practice or conduct training activities as a business venture;
- b) all training and teaching facilities such as a classroom and teaching laboratory must be assessed and certified by NTC before training is conducted;
- c) trainers must possess a trainer's qualification as well as relevant academic qualifications from recognised institutions before they are registered and granted permission to practice their 'skills or knowledge'; and
- d) the proposed system of accreditation encourages training providers to offer quality programs.

An agreement of 46% (for items 6 and 10) showed respectively that: (a) their training organisation was financially well-placed to provide training where the trainees will not be unfairly disadvantaged in the event of liquidation, closure or mergers, and (b) the

certification of training staff in the private training organisation was unnecessary. This situation is likely to change once the idea of certification of training staff (trainers) is implemented.

7.5.2 Uncertain

In item 4, the respondents were evenly divided on the issue of whether or not training providers should engage in other income generating activities. This item was included because a few training providers were known to be involved in fast food outlets which raised concerns among the critics like Cox (1994).

7.6 Rank Ordering of Statements of Training Objectives

The list of objectives related to conducting private computer related training (shown in Figure 5) and the result from ranking these objectives in order of importance as seen by the respondents are shown in Table 6.

Figure 5 Items related to Ranking Training Objectives

- |  |
|--|
| <ol style="list-style-type: none"><li>1. To improve workers motivation &amp; performance</li><li>2. To upgrade the morale and skills of the workforce</li><li>3. To improve productivity &amp; efficiency of workers</li><li>4. To enable individuals to develop their marketable skills</li><li>5. To improve the individual trainees' quality of life</li><li>6. To fill a training gap which is unavailable in PNG</li><li>7. To meet a demand from citizens to acquire computer skills</li><li>8. To generate the greatest profit from the training courses</li><li>9. To have large number of course offerings in my organisation</li><li>10. To completely satisfy PNG National Training Policy</li><li>11. To compete against other Training Organisations</li><li>12. To help produce local computer expertise in the workforce</li><li>13. To encourage equal participation of women in the workforce</li><li>14. To help decrease dependency on non-citizen staff</li><li>15. To implement localisation process in the country</li><li>16. To help develop the full potential of the citizen trainees</li><li>17. To help citizens to improve their qualifications</li><li>18. To equip workers with relevant job skills to function well</li><li>19. To develop skills for specific jobs in the country</li></ol> |
|--|

Source: Private Computing Skills Training Providers' Attitudes Towards Papua New Guinea National Training Policy questionnaire. [Part E].

**Table 6                      Rank Ordering of a List of 19 Training related Objectives or Purposes as perceived by the participants.**

Item No	Statements or list of Training Objectives	Rank Order
3	To improve productivity and efficiency of workers	1
7	To meet a demand from citizens to acquire computer skills	2
5	To improve the individual trainee's quality of life	3
18	To equip workers with relevant job skills to function well	4
12	To help produce local computer expertise in the work force	5
2	To upgrade the moral and skills of the work force	6
4	To enable individuals to develop their marketable skills	7
17	To help citizens to improve their qualifications	8
1	To improve workers motivation & performance	9
16	To help develop the full potential of the citizen trainees	10
6	To fill a training gap which is unavailable in PNG	11
19	To develop skills for specific jobs in the country	12
15	To implement localisation process in the country	13
10	To completely satisfy PNG National Training Policy	14
14	To help decrease dependency on non-citizen staff	15
8	To generate the greatest profit	16
11	To compete against other Training Organisations	17
9	To have large number of course offerings in my organisation	=18
13	To encourage equal participation of women in the work force	=18

**Note:** Numbers in the first Column represents the Statement Number as given in the 1994 Research Questionnaire. (See also Figure 7.7).

A list of 19 training objectives or purposes (See Figure 5) was given for training providers to rank from the most important (number 1) to the least important (number 19) as perceived by the respondents. The overall mean rating of each item was computed and ranked from the smallest mean value to the largest mean value, where the least mean value on an item indicate a high ranking order while a high mean rating on an item indicate a low ranking order (See Hildebrand, Laing & Rosenthal, 1977). The result of this ranking is shown in Table 6. As shown on Table 7.8, the top 7 most important training objectives were those about individual trainees and potential workers. The objectives according to the respondents (in descending order of significance) were:

- a) To improve the productivity & efficiency of workers;
- b) To meet a demand from citizens to acquire computer skills;
- c) To improve the individual trainees' quality of life;
- d) To equip workers with relevant job skills to function well;
- e) To help produce local computer expertise in the work force;

- f) To upgrade the skills and morale of the work force; and
- g) To enable individual's to develop their marketable skills.

All these objectives were also stated by the NTC as important (National Training Council, 1993a). This shows that training providers are aware of the NTC expectation in their training organisations.

The second most important training objectives (in descending order) were:

- a) To help citizens to improve their qualification;
- b) To improve workers motivation & performance;
- c) To help develop the full potential of citizen trainees; and
- d) To fill a training gap which is unavailable in PNG.

The 7 least important training objectives were:

- a) To develop skills for specific jobs in the country
- b) To implement localisation process in the country
- c) To decrease dependency on non-citizen staff
- d) To generate the greatest profit from the training courses
- e) To compete with other training providers
- f) To have large number of course offering in my organisation
- g) To encourage equal participation of women in the work force.

Issues such as localisation, dependency (Joel & Peril, 1994), encouraging women's participation in the economy (Kila, 1995), and development of appropriate skills for specific jobs would normally attract much debate and support from the wider spectrum of the community. The training providers however, considered them as insignificant objectives in their training organisation as shown in their ranking of the set of objectives.

While training has been conducted as a commercial activity, the respondents rated competition, private enterprise and generation of profit from such training activity very low in the bottom 7 of the list of 19 training objectives.

7.7 Open-ended Statements

In this section, participants were asked to answer the following open-ended statements (Figure 6). Responses to the first three statement are respectively presented under sections 7.2.9.1 to 7.2.9.3 while the responses to the last statement are presented in section 7.2.10.

Figure 6 Items related to Answering Open-ended Statements

1. List three (3) most important suggestions you would like to make to policy makers such as the National Training Council regarding computer education and training in private training organisations in PNG.
  2. List in order of importance eg, from the most important to the least important) any **weaknesses** you perceive of the National Training Policy as it relates to computer education and training in your training organisation.
  3. List in order of importance (eg, from the most important to the least important) any **strengths** of the national Training Policy as it relates to computer education and training in your training organisation.
  4. Please write below any other general comments you have about the National Training Policy as it relates to your particular training organisation that in your view need to be raised.

Source: Private Computing Skills Training Providers' Attitudes Towards the Papua New Guinea National Training Policy questionnaire. [Part F].

7.7.1 List of Suggestions [Part F:1]

The list of suggestions made by the respondents were wide ranging. However, the suggestions fall into specific headings and are discussed accordingly.

Under **standards issues**, many respondents showed that an independent authority be established. For example, one of the respondents stated that: '*...an independent body be established to set standards specific to computing skills training, regulate and monitor its implementation, and evaluate it from time to time.*' The standard established will be used by all Training Providers to comply with or implement and this independent body



will be empowered to obtain computer related skills requirement from all Training Providers in the country and set training guidelines and standards geared to achieving the NTP objectives.

Related to the standards issue are the **coordination and screening** of Trainers and Training Providers. The general views of the respondents indicated (in the questionnaire) that this independent body comprising of professional people (from both the government and private sector organisations) with expertise in computer education and curriculum, should be able to coordinate and liaise with: universities in PNG for relevance in training; the private sector for training needs or requirements; and other Private Training Providers to develop and deliver an efficient training program geared towards meeting the needs of both trainees and the industry in a most rational and cost-effective manner.

In terms of screening, the respondents were of the view that the independent body established should:

- a) Thoroughly screen all computer skills instructors or trainers, and Training Providers to ensure that trainers were qualified in their specialist areas;
- b) Ensure that Training Providers must have an adequate financial base;
- c) Have adequate physical teaching and learning resources to teach effectively; and
- d) Periodically assess the courses offered, scrutinise the qualifications of trainers recruited, and maintain regular contact with all Training Providers to ensure that only those who are competent and qualified engage in any training activity in PNG.

The respondents also indicated that the NTC should ensure that all courses offered by private Training Providers must have the potential to foster employment opportunities in the future. Some respondents stated that computer skills training must be introduced as one of the secondary school subjects in the country.

Some respondents indicated that the NTC's communication channels be improved because the Training Providers felt they were kept in the dark in the lead up to the launching of the NTP when the advertisement placed in the newspaper left little time for those outside of Port Moresby to be physically present at the launching in the capital. The respondents cited cases where more awareness of the NTP was needed to inform, educate and familiarise Training Providers (the NTC staff have visited some provinces to brief training providers about NTP (Joel & Peril, 1994)). This is because, many Training Providers were either unaware of the existence of the NTP (at the time of research in May - June 1994) or have not seen the policy document even though they have been in the training business since long before the NTP was enacted and the NTC established. Others have not been sent the policy documents even after repeated correspondence originating from Training Providers to the NTC Secretariat<sup>9</sup>.

#### **7.7.2 Perceived weaknesses of the National Training Policy**

The most common weakness as perceived by the respondents is that the NTP is too broad. For example, as one respondent wrote: ‘ (The NTP)...*is too broad and very generalised and does not address training and development of specific skills such as computing skills training.*’ The respondents commented that the lack of adequate computer literacy and background knowledge in computing among NTC staff will be the greatest impediment to professionally assess standards and provide professional advice or monitor quality of computing skills training and development in PNG.

Those who have read the policy document claimed that the NTP was lacking cohesion and stated that implementation will be difficult. One of the respondents commented that: ‘...*the NTP is too broad and generalised and does not address computing skills training issues.*’ Another claimed that the private Training Providers were ‘*over-regulated*’, and that the NTP was an extra burden.

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<sup>9</sup> Personal communication with Training Providers in Lae and Port Moresby in May/June, 1994.

### 7.7.3 Perceived strengths of the National Training Policy [Part F:3]

The respondents stated that the strengths of the NTP as they perceived it would help to achieve the following:

(a) Regulate/monitor training programs in the country and in the process sort out the 'mess' created by those Training Providers whose motive is 'quick profit'. An example cited is the 'fly-in-fly-out' training consultants who enter the country to conduct 'training' and zoom off several days later.

(b) As one respondent stated, the NTP is long overdue and welcomed it. She stated that: *'...it (NTP) will enforce training in information technology area in PNG and would encourage the maintenance of uniform training standards in training and human resource development in the country.'*

(c) Another training provider stated that the NTP will provide an, *'...impetus for full cooperation between government, private sector, and non-governmental organisations to address the issue of computer training in PNG.'*

(d) Help support and recognise the contribution made by the private Training Providers in the overall education and training program of citizens.

(e) Ensure trainees get the best deal for their money as well as obtaining a qualification to indicate their accomplishment.

## 7.8 General Comments [Part F:4]

The general comments made by the respondents (in Part F:4 of the questionnaire) point to the following:

(a) That the intentions and motives for the NTP were considered valuable. However, the more specific details in the field of computer skills training should be clearly defined and addressed in the wider context of private computer training.

(b) It (NTC) must continue to involve private training institutions to contribute towards formulating relevant policies, set guidelines and maintain standards. One of the trainers commented: *'NTC should maintain a regular contact with all private training providers to implement the standards set by the NTC .... to avoid commercialism, profiteering and exploitation of trainees to use their hard-earned money.'* Regular meetings or conferences should be conducted by the NTC between senior NTC officers and administrators of private Training Providers so that opinions expressed by the participants might enable the authorities to implement and/or revise the existing policies and further achieve their objectives in the most cost-effective way.

(c) Set up a research division in order to guide Training Providers in determining new training requirements, identify additional training needs, design or develop specialist training programs as demanded by the workplace requirements and advice the NTC on computer education and training related matters.

(d) The establishment of a watchdog (eg, NTC) on training matters is commendable. However, concerns were raised as to how the NTC could minimise the number of Training Providers and properly supervise the many Training Providers engaged not only in computer skills training but also in a range of other subjects. One respondent commented: *' (I) Hope NTC does not end up being a white elephant or ghost organisation. It must be seen to serve its purpose.'* Already the NTC indicated the

financial and staffing constraints under which it is operating needs urgent attention if it is to effectively perform its functions (Joel & Peril, 1994).

(e) Fly-in-fly-out training consultants engaged in training activities in PNG should be carefully monitored and screened prior to conducting any training activities in PNG. Both wholly foreign-owned or wholly nationally-owned and partly PNG-owned training organisations should also be screened in the same manner, to ensure that course syllabus, instructors' academic credentials or background satisfy the requirements of the National Training Policy.

## **8.0 Conclusion**

The Training Providers involved in computer skills training in PNG were generally in favour of the National Training Policy (NTP). The respondents showed a favourable attitude towards the NTP goals and objectives, what it sets out to do (eg, its expectations such as encourage and recognise private sector involvement in computer skills training and development). They saw the NTP as helping to maintain training standards which will control what is occurring in the training scene.

There was high agreement that all Training Providers should be registered with the NTC and that the NTC would periodically visit Training Providers, review their programs and maintain regular dialogue or contact in order to be kept informed of the developments in both sectors. They felt that the requirements of the NTC can be achieved within their organisation. They however, indicated that NTC/NTCS should not monitor their training activities without giving any reasons.

There was uncertainty in the penalty of K1000 imposed by NTC for falsifying or failing to provide information, and whether they received any prompt response from NTC. They were also uncertain of whether they received any specific information on the

training needs of computing personnel and whether all providers were given any specific guidelines as to the provision of computing skills training.

The Training Providers' attitudes regarding accreditation was neutral for both course and institutional accreditation from the NTC. They strongly believed that they have qualified trainers to conduct training in their organisation. They stated that the computing skills training conducted should have the potential to help trainees get jobs. They also saw that there was a need for computer skills training for PNG nationals. They felt too that the trainees should be covered against exploitation of all kinds. The courses they conducted were different from other training organisations in the country. That was why they conducted their program independently from other Training Providers in the country.

The Training Providers ranked training objectives related to improving and empowering the individual trainees and potential workers higher than those about Training Providers themselves or even those that fall within the government's responsibilities. For example, profitability and competition, localisation and equity issues (women's participation), and dependency were all ranked lowly compared with improving the skills, knowledge, productivity, and efficiency of individual trainees were highly ranked in the top 7 objectives.

The Training Providers suggested that an independent body be established which will be responsible for the following functions:

- a) Set standards and guidelines, monitor and evaluate its implementation in the context of computing skills training;
- b) Identify specific computing skills requirement in the workplace;
- c) Coordinate and screen all trainers and Training Providers;

- d) Coordinate with government, statutory bodies and private sector to develop a strategy that will use expertise and experience of all parties concerned for the common good of all.

The main weaknesses of NTP as perceived by the respondents indicated that it was too broad and does not address specifically the computer related education and training in the country.

Some of the main strengths of NTP are that it would help to: regulate and monitor training programs in PNG, enforce training standards, provide an opportunity for cooperation between Training Providers and the government, support and recognise the private sector involvement in training, and help ensure that the trainees are not unnecessarily disadvantaged.

So in order to address the specific needs of different training providers, persons with relevant expertise be drawn in from both the public and private sector and engage them to offer advice and consult on the different subjects. In this case persons with expertise in computers, education, and curriculum should be engaged from time to time to advise the NTC and NTCS on matters relating to computer education and training in the private sector. This body would influence training providers, act as a catalyst and an agent for change by breaking down barriers between the government systems such as public service, education, the Internal Revenue Commission, the National Training Council, the training providers, and coordinate between these entities.

Furthermore, the private computer skills training providers would be more actively involved in all stages of formulating policies that will affect them and their training activities. Computing related skills is a specialist skill and therefore education and training should not be left to the whims of the so-called 'computer specialist' to conduct training in whatever manner they fancy. It must be given serious attention in order to

ensure that Training Providers in this field do not capitalise on the ignorance of the authority and the loopholes (if any) in the system to further enhance their personal commercial interest at the expense of ordinary Papua New Guineans. Many PNG nationals strive hard to make ends meet in their struggle to: acquire a marketable and employable skill, upgrade their qualifications and knowledge, and catch up with technological tools of the workplace so as not to be left out of the competition from potential job-seekers now and in the future.

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## Annexure A

# Private Computing Skills Training Providers' Attitudes to PNG National Training Policy: An 'Opinionnaire'<sup>1</sup>

The following statements were part of an Attitudinal Questionnaire which have been extracted for the purpose of this report. To determine the attitudes, a Likert Scale as shown below was used for each of the statements: These statements are grouped under the relevant sections.

5 = Strongly Agree, 4 = Agree, 3 = Unsure, 2 = Disagree, 1 = Strongly Disagree
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### PART A: National Training Policy

#### Attitude Statements

1. The goals and objectives of the National Training Policy could be achieved by my organizations.
2. The National Training Policy is simple to understand.
3. The National Training Policy requires my training organizations to do extra administrative work.
4. The expectations of the National Training Policy on private sector training organizations are realistic.
5. The PNG Government encourages the private sector involvement in the development and training of computer skilled personnel in the country.
6. My level of awareness of the National Training Policy as it relates to my training organizations is satisfactory.
7. The Government encourages private sector training organizations to develop and train computer personnel in overseas training institutions.
8. The Government's effort through the National Training Policy to give recognition to the private sector training organization came at the right time.
9. The training levy concept for private training organizations is a way of encouraging training of personnel in PNG.

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<sup>1</sup> Term coined by Shaw, Marvin E. and Wright, Jack. (1967). *Scales for the Measurement of Attitudes*, McGraw-Hill, USA.

10. Credit transfer between training institutions benefits the trainees more than the institutions.
11. My training organization had difficulty getting some of its courses registered by the National Training Council.
12. I have read the National Training Policy document.

## **PART B: NATIONAL TRAINING COUNCIL AND NATIONAL TRAINING COUNCIL SECRETARIAT.**

### **Attitude Statement**

1. A representative of the National Training Council Secretariat should visit my training organization in a supervisory or inspection capacity.
2. The National Training Council should monitor the private sector training organizations to avoid exploitation of Papua New Guineans.
3. The establishment of the National Training Council is a threat to private entrepreneurship of training organizations.
4. The penalty of K1000.00 imposed for failing to supply information or for supplying false information to the National Training Council is lenient.
5. The training standards requirement of the National Training Council are easy to achieve in my training organization.
6. The quality requirement of the National Training Council are easy to achieve in my training organization.
7. The National Training Council Secretariat is prompt in helping my organization with its inquiries.
8. The National Training Council described the specific training needs of computing personnel in the National Training Policy.
9. The National Training Council has provided my training organization with clear guidelines on computer education and training in the private sector.
10. Computer related training courses should be periodically reviewed by the National Training Council on the basis of fees charged and the content of the course.
11. Computer related training providers or institutions should be registered under the National Training Council.

## **PART C: PRIVATE COMPUTER SKILLS TRAINING PROVIDERS**

### **Attitude Statement**

1. My training organization had trainers who are qualified to teach in their specific fields.
2. The training courses offered in my organization meets the criteria for accreditation from the National Training Council.
3. Courses offered in my organization are unique from those offered by other training organizations.
4. My training organization is run on a for-profit-basis.
5. My training organizations conducts joint training courses with other training organizations.
6. The course fees charged for a computer course offered by my organization varies.
7. My training organization will recognize accredited courses conducted by other training organizations.
8. My training organization sees that there is a need for Papua New Guineans to be trained or educated for computer related jobs in the private sector.
9. My training organization had difficulty getting registered by the National Training Council.
10. Obtaining individual Course Accreditation from the National Training Council is easy.
11. Obtaining Institutional Accreditation from the National Training Council is easy.
12. The training courses offered by my organization are independently evaluated.
13. The training offered by my training organization will enhance job prospects for the unemployed.
14. The training courses conducted by my training organization are designed and delivered with Papua New Guineans needs and conditions in mind.
15. The providers of computer related training must ensure that trainees are covered against financial exploitation.

**PART D: CERTIFICATION OF TRAINERS AND TRAINING PROVIDERS.**

**Attitudes Statements**

1. All computer related training staff must be registered with the National Training Council.
2. Trainers and their qualifications be screened before they are allowed to teach computer related courses.
3. All training staff in the private training organizations must be qualified trainers in a specialist area in order to deliver training in PNG.
4. Computer related trainers may also engage in any other income generating activities.
5. Trainers must be fluent in English as a language of Instruction.
6. My training organization is financially well-placed so that the trainees are not disadvantaged in the even of sudden loss of training opportunities e.g. in the event of liquidation, closures or mergers.
7. Training facilities such as classrooms or teaching laboratories must be assessed and certified by the National Training Council.
8. Providers of computer related training must observe and practices highest standard of ethics in their relationships with trainees.
9. Trainers must possess trainer's qualifications as well as relevant technical and education qualifications from recognized institutions before they are registered.
10. Certification of training staff in the private sector training organization by the National Training Council is inadequate.
- 11 The system of accrediting training organizations encourages my organizations to offer quality programs.

**PART E: RANKING OF PURPOSES OR OBJECTIVES OF TRAINING**

*The following statement of Training Purposes or Objectives were given in the Questionnaire. The participants were asked to rank from (1) the most important to (19) the least important objectives under Rank column. They were instructed to leave a blank if not applicable. These training objectives were not listed in any special order.*

## Purposes or Objectives of Training

1. To improve workers motivation & performance
2. To upgrade the morale and skills of the workforce
3. To improve productivity & efficiency of workers
4. To enable individuals to develop their marketable skills
5. To improve the individual trainees' quality of life
6. To fill a training gap which is unavailable in PNG
7. To meet a demand from citizens to acquire computer skills
8. To generate the greatest profit from the training courses
9. To have large number of course offerings in my organization
10. To completely satisfy PNG National Training Policy
11. To compete against other Training Organizations
12. To help produce local computer expertise in the workforce
13. To encourage equal participation of women in the workforce
14. To help decrease dependency on non-citizen staff
15. To implement localization process in the country
16. To help develop the full potential of the citizen trainees
17. To help citizens to improve their qualifications
18. To equip workers with relevant job skills to function well
19. To develop skills for specific jobs in the country

## PART F: OPEN-ENDED QUESTIONS

*The following completion questions were given in the questionnaire for the participants to complete it by giving their opinion of each questions.*

1. List three (3) most important suggestions you would like to make to policy makers such as the National Training Council regarding computer education and training in private training organizations in PNG.
2. List in order of importance i.e. from the most important to the least important) any **weaknesses** you perceive of the National Training Policy as it relates to computer education and training in your training organization.
3. List in order of importance (i.e. from the most important to the least important) any **strengths** of the national Training Policy as it relates to computer education and training in your training organization.
4. Please write below any other general comments you have about the National Training Policy as it relates to your particular training organization that in your view need to be raised.



## **Appendix B**

# **‘Private Computer Training in PNG: Current Practices and Future Policy Directions’ Questionnaire**

### **PART A. INTRODUCTION**

#### **1.1 PURPOSE OF THE QUESTIONNAIRE**

The purpose of this Questionnaire is to collect views of the Private Computer Training Organisations in Papua New Guinea (PNG) on their current practices in Computer Training and how they would like to see the development of Computer Training established in the future. It is intended that from these views a framework will be recommended which will help to formulate an ‘appropriate computing curriculum’ and possibly establish standards for PNG on Computer Education, Training and Development. The views sought includes questions like; the characteristics of an appropriate computing curriculum, the current nature of computer training programmes, whether to regulate or de-regulate training activities, Certification and Accreditation of Training activities, what actions are required by Training Organisations, and what roles the government should play in Computer Training and Development.

Additional documentary materials such as course handbooks, course descriptions, and any other literature provided by the Training Organisations will also be obtained. The request to obtain these materials were sent to those concerned earlier in the year.

#### **1.2 RESPONDENTS**

It is hoped that the Questionnaire will aid the researcher to conduct face to face interview of the most senior member of the Organisation’s hierarchy such as Director, Principal, Managing Director or in their absence a nominee whose views will be that of the Organisation. It is further hoped that the interview will take place at the premises of the Organisation at the time agreed to by the researcher (interviewer) and the organisation (interviewee) or such other arrangements mutually beneficial to both parties.

#### **1.3 CONFIDENTIALITY**

The specific details of the materials obtained from the individual Training Organisation will not be released to the public. Names of the individual participants and their Training Organisations will be acknowledged in the thesis only where permission is given.

#### **1.4 RESEARCHER’S BACKGROUND**

Musawe Sinebare is a teacher educator at the Goroka Campus of the University of Papua New Guinea. He has been teaching Computers and Mathematics Education at Goroka Campus since 1982. He is now on study leave at the University of Wollongong, Australia. This research activity is part of the requirement for postgraduate work (Ph.D

degree). He is expected to return to PNG after completing postgraduate studies in Australia to continue teaching at Goroka.

### 1.5 APPEAL OR PLEA

I personally appeal to all the Private Computer related Training Organisations in PNG who are actively involved in Computer related Training and Development activities to cooperate with me by giving me the face to face interview and provide me with necessary computer related course descriptions, course handbooks and any other printed materials that might be useful to the research. These information will not only help me to complete my thesis but also help me to provide policy makers in PNG with necessary information on computer policy and computing curriculum. Such information may be useful in future to formulate Computing Policy and develop Computing Curriculum in PNG.

I sincerely hope and look forward to your full cooperation and support in this research exercise.

## PART B. MAJOR CHARACTERISTICS

1. Given your present involvement and the wealth of experience gained from conducting Computer Courses in PNG, what would you suggest as some of the **weaknesses** or **disadvantages** in your current Training Programmes?
2. Given your present involvement and wealth of experience you've gained from conducting Computer Courses in PNG, what would you suggest as some of the **strengths** or **advantages** of your current Training Programmes?
3. List some of the **main reasons why** you think the Computer related Courses offered by your Training Organisation should be '**recognised**' by:
  - 3.1 Employers?
  - 3.2 Other Training Organisations/Institutions?
  - 3.3 Government?

## PART C. PROBLEMS FACED BY TRAINING PROVIDERS

1. What specific **problems or difficulties** does your **Training Programme/Organisation** face in conducting Computer related Courses?
2. What specific **problems or difficulties** do you think are being faced by most of the **Computer related Training Organisations** in PNG?
3. What **changes** do you think the **Private Training Organisations** must make in order to solve the problems you have identified in Questions 1 and 2 above?

## PART D. REGULATE/DE-REGULATE PRIVATE COMPUTER TRAINING

1. Should Computing Skills Training Courses conducted by Private Training Organisations in PNG be '**regulated**'?

YES

NO [Choose ONE option]

Give reasons for your choice of answer:

2. Which of the following aspects of the Private Computer related Training Organisations in PNG would you like to see being '**regulated**'?

[Tick or Circle as many as applicable]

- a) Aims/Objectives/Outcomes/Competencies
- b) Teaching Methods and Materials
- c) Resources eg Trainers/teachers/tutors
- d) Assessment & Evaluation procedures
- e) Certification (Certificates, Diplomas)
- f) Job experience (Practical work in the workplace)
- g) Others [Specify \_\_\_\_\_]

3. Give your reasons for your choice (in Number 2 above):

4. If the **Computing Curriculum (or Courses)** offered in PNG Private Training Organisations are to be of any value to the workplace environment; **what other important elements of the course/s should be regulated?**

## PART E. A NATIONAL FRAMEWORK

1. If there is to be a National Qualification Framework or a similar body established to ensure that past skills, knowledge and qualifications obtained by trainees are recognised, what should be some of the aspects that must be included in this national framework?

2. What would you suggest should be the structure or levels of Computing qualifications in this national qualification framework?

3. What should be some of the criteria for 'recognising' a Computer related Course or Courses conducted by Private Training Organisations in PNG so that the public is fully aware of the courses and the qualifications awarded?

4. How can Computer related Courses conducted in the Private Training Organisations be organised in such a way that Trainees can use credits from courses offered by one Training Provider to obtain 'recognition' of past knowledge or skills and qualifications in order to 'advance' to another course in a different Training Organisation?

5. **If** there is going to be a ‘**National Computing Curriculum**’ guidelines developed for use in PNG at a future time:

5.1 What should be some of the most important features or characteristics of such a curriculum? [List as many characteristics as you can.]

5.2 What would you suggest the aim/s of this **National Computing Curriculum** should be?

5.3 Should there be a National Examination on this Computing Curriculum?

NO

YES

[Tick or Circle ONE]

Give your reasons for your choice of answer above.

6. **If** an Independent Body is to be formed in PNG which is made up of specialists from: computing fields, curriculum and education fields, private training providers, and private sector organisations. The functions of this body will be to formulate a computing curriculum, set or establish educational standards such as national examination in Computing, and award nationally recognised computing qualifications to trainees.

6.1 Who else in addition to those mentioned above should be on this Body?

6.2 What suggestions would you like to make that might help this body to perform its duties and carry out its responsibilities well?

6.3 What additional functions apart from those stated in ( # 6) above do you foresee as being performed by this Independent Body?

## **PART F. FUTURE OF COMPUTER RELATED TRAINING in PNG**

1. What do you think or foresee might happen in the Private Computer related Training area in PNG within the next five to ten years?

2. Computing and Information Technology are a fastest growing area and therefore Computer related Courses and Training in PNG is also going to change within the next five to ten years.

2.1 What would be some of the changes your training organisation is likely to make under such changing environment?

[List as many such changes/developments as you possibly can.]

2.2 What should be some of the Curriculum and structural changes you would like to see made by other Private Computer related Training Organisations for the benefit of Computer Training in PNG? [List as many changes as possible.]

2.3 What should be some of the Policy changes in the area of Computer related Courses or Education and Training in PNG that you would like to see the Government make in order to accommodate for the changing nature of Computer technology in the future?

2.4 What other role or roles should the government play in enhancing or promoting Computer related Training offered in the Private Training organisations in PNG?

**PART G. LEVEL OF COMPUTER DEVELOPMENT**

- 1. How would you describe the current **Level of Computer Development** in PNG based on your own awareness and knowledge of Computer related Training activities carried out in the country?
- 2. **Which direction do you think PNG is heading now** given the current status and level of Computer Development taking place in the country?
- 3. Which **Level of Computer Development** (given in the **Attached Table on Page 9**) would you prefer to see PNG work towards in the next decade or so?
- 4. What should PNG as a country do now if it is to reach that stage or Level of Computer Development you identified in Question number 3 above?
- 5. Which of the following four (4) **Levels of Computer Development** (given in the **last page**) do you think PNG is in at this stage of its development?

**PART H. GENERAL COMMENTS, POINTS OF VIEW, & SUGGESTIONS**

- 1. What other general comments, points of view, or suggestions can you offer that might be of help either to this research now or the future of Private Computer related Courses/Training in PNG? [List as many as possible.]
- 2. What would be **the ideal situation** or a **suitable environment** under which Private Computer related Training Organisation can operate well (ie efficiently and profitably) given your own personal experience in PNG?

++++++  
{END OF QUESTIONNAIRE}  
++++++

[THANK YOU VERY MUCH FOR ASSISTING ME BY COMPLETING THIS  
RESEARCH QUESTIONNAIRE]

## Appendix C

# PC Application Courses Conducted by Private Computer Training Providers

### 1. PC Application Software Training Courses

#### 1.1 Word Processing Courses

Almost all the Private Computer Training Organisations (PCTOs) conduct training courses on at least one industry standard Word processing software as a subject or a course of study. Among the Word processing software courses offered were *WordPerfect* (versions 4.2, 5.1 and 6.0) and *Microsoft Word* (windows version 6.0). The Word processing courses were conducted in three stages: Introductory/Basic/Beginner, Intermediate, and Advanced levels. Each stage varied in: course length, prerequisites (often offered in-house), topics or depth of the content covered, fees charged, and certificate awarded after completion of the training program. Whilst the private training providers conduct Word processing courses of their choice, it is noteworthy that the Department of Personnel Management (1991) through its Information Technology Policy for the Public Service recommended *WordPerfect* version 5.1 as a standard for use in the public service. The private training providers are not required to comply with this standard hence there is a dualism or a dichotomy in existence where both sectors are performing different training functions and emphasising different standards. The trainees seek employment opportunities in both private and public sector armed with the certificates obtained from private computer training organisations.

##### 1.1.1 Microsoft Word 6.0

*Microsoft Word 6.0* (windows version) is offered at three stages: Introductory/Basic, Intermediate, and Advanced by one training provider. *Microsoft Word 6.0* (windows

version) apparently is the most common word processing course being conducted by training providers, despite the *WordPerfect 5.1* being the standard recommended by the Department of Personnel Management. Figure 1 provides an overview of the main concepts covered in *Microsoft Word 6.0* (Windows version) course at the three levels by two training providers.

**Figure 1: Content Overview of Microsoft Word for Windows Course**

INTRODUCTORY	INTERMEDIATE	ADVANCED
<ul style="list-style-type: none"> <li>Starting Windows and Word for Windows</li> <li>Basic Windows Concept</li> <li>Identifying different parts of the Word screen</li> <li>Moving around the Word screen</li> <li>Moving and sizing the window</li> <li>Working with files: Opening, Closing, Saving, Printing files</li> <li>Inserting and deleting text</li> <li>Copying, cutting and pasting</li> <li>Autocorrect</li> <li>Using Spell Check</li> <li>Formatting characters: Size, Fonts, inserting special characters</li> </ul>	<ul style="list-style-type: none"> <li>Review of the basics</li> <li>Numbering paragraphs: manual numbering and automatic numbering</li> <li>Tabulations</li> <li>Setting Page Options</li> <li>Creating Fill-in letters</li> <li>Creating Tables</li> <li>Using Autotext entries</li> <li>Mail Merging documents</li> <li>Page formatting: setting margins, portrait and landscape</li> <li>Formatting paragraphs: justification, line spacing, indentation, numbering paragraphs, setting tabs</li> </ul>	<ul style="list-style-type: none"> <li>Review of the topics covered earlier</li> <li>Headers and Footers</li> <li>Columns</li> <li>Tables: creating a table, Modifying a table size, Modify table shape, using shading, Border options, justification within cells.</li> <li>Mail Merge: Merging letters, Merging labels</li> <li>Graphics</li> <li>Creating Standard documents - Templates</li> <li>Automated Templates</li> <li>Using autonew macro to automate fields</li> <li>Creating Facsimile Forms</li> <li>Mail merging documents</li> <li>Attaching an existing data file</li> <li>Mail Merging documents</li> <li>Planning a mail merge</li> <li>Mail labels</li> <li>Merging to envelopes</li> </ul>

Sources: a) Daltron Electronic, Word for Windows Course Description, 1996b.  
b) Haus Computer, Word for Windows, [Course Booklet], 1996a.

### 1.1.2 WordPerfect 5.1

As mentioned earlier, *WordPerfect 5.1* has been the standard recommended by the Department of Personnel Management for use in the Public Service. It is also one of the common word processing courses offered at the private computer training institutions in PNG. In most cases, the course is intended for users to word process by learning to

create a range of business and professional documents such as letters, memos, reports, minutes and other publications. Figure 2 is an overview of the content covered in the *WordPerfect 5.1* course.

**Figure 2:      Content Overview of WordPerfect 5.1 Course**

INTRODUCTORY	INTERMEDIATE	ADVANCED
<ul style="list-style-type: none"> <li>Starting WordPerfect</li> <li>Identify different part of the WP screen</li> <li>Using function keys</li> <li>Setting defaults</li> <li>Moving around WP screen</li> <li>Moving and copying text</li> <li>Working with files: Using list file menu, Retrieving files, closing, saving, viewing , printing files, deleting , copying and moving files.</li> <li>Inserting and deleting text</li> <li>Using Spell Check</li> <li>Reveal Codes</li> <li>Formatting characters: Size and Fonts</li> <li>Aligning text</li> <li>Justification</li> <li>Line spacing</li> <li>Indentation</li> <li>Setting Tabs</li> <li>Page formatting: Setting margins, centring a page, Page breaks, page numbering</li> </ul>	<ul style="list-style-type: none"> <li>WordPerfect template</li> <li>Wordwrap</li> <li>Hard and soft page breaks</li> <li>Help</li> <li>Paths</li> <li>File names</li> <li>Undelete</li> <li>Reveal Codes</li> <li>Tabs, indents and decimal tabs</li> <li>Column move/copy/ delete</li> <li>Rectangle move/copy/delete</li> <li>Protect block</li> <li>Sort a block</li> <li>Document handling: look at files, create directories, copy a file</li> <li>Move a file, rename a file, delete files</li> <li>Switch documents</li> <li>Windows</li> <li>Copy and move between windows</li> <li>Search, search and replace, Header and Footer creation</li> <li>Printing,</li> </ul>	<ul style="list-style-type: none"> <li>Revision of introductory concepts</li> <li>Set up commands: changing units of measure, location of files, display options, initial codes</li> <li>Long document names</li> <li>Passwords</li> <li>Headers and Footers</li> <li>Inserting Special Codes</li> <li>Tables: creating a table, modifying table size, modifying table shape, using shading, line options, justifications within cells</li> <li>Columns</li> <li>Mail merge: merging letters, merging labels, using input codes to merge</li> <li>Sorting documents: line sorting, paragraph sorting</li> <li>Macros: ALT Macros, named macros</li> <li>Printing pages, control printer, and view document</li> </ul>

**Sources:** a) Daltron Electronic, WordPerfect Course Description, 1996c.  
b) Haus Computer, Intermediate WordPerfect, [Course Booklet], 1996b.

### 1.2              Spreadsheet Courses

Like Word processing, training providers conduct courses on two different Spreadsheet software. The popular ones being *Lotus 1-2-3* (windows version) which is the standard recommended for the Public Service; and *Microsoft Excel 5.0* (windows version).



Courses in Spreadsheet are delivered in three stages; Introductory/Basic; Intermediate; and Advanced. Each stage varies between training providers in terms of the course aims, course content and time set aside for teaching such a course. The course descriptions of two spreadsheet courses (*Lotus 1-2-3* and *Excel 5.0*) conducted by PCTOs are respectively shown in Figures 3 and 4.

### **1.2.1 Lotus 1-2-3 (Rel 4.0) Spreadsheet Course**

*Lotus 1-2-3* is one of the two popular spreadsheet software courses offered in most of the training organisations. *Lotus 1-2-3* software for both DOS and Windows versions were available and training conducted for both versions. However, the Windows version was common among the training providers. Figure 3 provides an overview of the content covered in all three stages (Introductory, Intermediate, Advanced) for *Lotus 1-2-3* spreadsheet course.

**Figure 3: Content Overview of Lotus 1-2-3 Spreadsheet Courses**

INTRODUCTORY	INTERMEDIATE	ADVANCED
<ul style="list-style-type: none"><li>• What is a spreadsheet?</li><li>• Starting Windows and Lotus 1-2-3</li><li>• Familiarisation with Lotus 1-2-3 screen</li><li>• Lotus 1-2-3 smart icons</li><li>• Moving around the worksheet</li><li>• Selecting cells</li><li>• Entering information in the worksheet and editing entries</li><li>• Working with files: Opening, Closing, Saving, Previewing and Printing files</li><li>• Accessing the Help facility</li><li>• Entering and editing formulas</li><li>• Percentages</li><li>• Entering formulas: @SUM, @MAX, @MIN, @AVG</li><li>• Relative vs absolute cell referencing</li><li>• Formatting cells: Fonts and Fonts sizes, changing column widths, text alignment, borders and shading, number formats</li><li>• Cut, copy and paste</li><li>• Insert and delete rows or columns</li><li>• Adding Headers and Footers in Page setup</li><li>• Landscape printing</li><li>• Creating charts.</li></ul>	<ul style="list-style-type: none"><li>• Review of Lotus 1-2-3 basics</li><li>• Absolute/Relative addressing</li><li>• Entering Formulas: @SUM, @MAX, @MIN, @AVG, @IF</li><li>• Naming range(s)</li><li>• Working with database: sorting and setting criteria</li><li>• Creating panes to view data</li><li>• Working with more than one file</li><li>• Freezing screen titles</li><li>• Working in group mode</li><li>• Headers and Footers</li><li>• Creating and editing Charts</li><li>• Creating and editing Drawings</li><li>• Moving and resizing chart</li><li>• Manipulating a chart</li></ul>	<ul style="list-style-type: none"><li>• Review of basic Lotus 1-2-3 concepts</li><li>• Using relative/absolute addressing</li><li>• Entering formulas: @IF, @VLOOKUP</li><li>• Linking formula on multiple sheets</li><li>• Protecting data</li><li>• Working with databases: Planning the database, defining a database range, sorting database record, specifying criteria used to select database records, extracting criteria-matching database records, using the @DSUM, @DAVG, @DMAX and @DMIN functions to perform statistical calculation on criteria matching records</li><li>• Developing Macros</li><li>• Using Lotus 1-2-3 as a database</li><li>• Database structure</li><li>• Creating a database</li><li>• Sorting a database</li><li>• Analysing data</li><li>• Finding records</li><li>• Deleting records</li><li>• Using Queries</li><li>• Altering Queries</li></ul>

Sources: a) Haus Computer, Lotus 1-2-3 for Windows, [Course Booklet], 1996c.  
b) Daltron Electronic, Lotus 1-2-3 Course Description 1996d.

**1.2.2 Microsoft Excel 5.0 Spreadsheet Course**

*Microsoft Excel 5.0* is another common spreadsheet course conducted by private training providers in PNG. Courses on both Windows and Macintosh versions were offered. This course was aimed at introducing participants to the basics of *Excel* for

Windows and to familiarise them with the operations, functions, and uses of spreadsheet in commercial applications. Many examples in relation to commercial applications were provided in the course to enhance the teaching of the spreadsheet concepts. However, the depth of the content covered vary between training providers. Figure 4 provides an overview of the range of concepts covered in the different stages.

**Figure 4: Content Overview of Microsoft Excel 5.0 Course**

INTRODUCTORY	INTERMEDIATE	ADVANCED
<ul style="list-style-type: none"> <li>• Creating a workbook</li> <li>• Save and file a workbook</li> <li>• What is a spreadsheet</li> <li>• Working in workbooks</li> <li>• Select cells and move in workbooks</li> </ul>	<ul style="list-style-type: none"> <li>• Selecting cells, choosing commands</li> <li>• Using and customising toolbars</li> <li>• Creating formulas and links</li> <li>• Using the function wizard</li> <li>• Working with names</li> <li>• Formatting a worksheet</li> <li>• Creating graphic objects</li> </ul>	<ul style="list-style-type: none"> <li>• Working in workbooks: How workbooks work, Finding files, Create, Save, and name workbooks.</li> <li>• Worksheet and Workbook specifications, Working with names</li> <li>• Pivot tables: Create and modify pivot tables, Create a chart from Pivot tables, Changing organisation of data</li> </ul>
<ul style="list-style-type: none"> <li>• Zoom in and out of worksheets</li> <li>• Go to specific cells or Ranges</li> <li>• Freeze titles</li> <li>• Manage workbook windows</li> <li>• Save workspace files</li> <li>• Using toolbars</li> <li>• Entering data</li> <li>• Editing a worksheet</li> <li>• Formatting a worksheet</li> <li>• Printing</li> </ul>	<ul style="list-style-type: none"> <li>• Create and format a chart</li> <li>• Formatting data markers</li> <li>• Adding trendlines to a data series</li> <li>• Adding data labels</li> <li>• Creating pivot tables</li> </ul>	<ul style="list-style-type: none"> <li>• Linking MS Excel Workbooks: Entering an external reference in a formula, Save unnamed linked workbooks, Redirecting links for source workbooks, Removing links between workbooks</li> </ul>
	<ul style="list-style-type: none"> <li>• Overview of wizards</li> <li>• How pivot tables work</li> <li>• Creating charts from pivot tables</li> <li>• Displaying multiple levels of data in a chart</li> <li>• Customising pivot tables</li> <li>• Create and edit templates</li> <li>• Slide show</li> </ul>	<ul style="list-style-type: none"> <li>• Sharing and importing data: Share data and graphics from other applications, Using WordArt 2.0, Using the text wizard, Open and Save documents in different file formats</li> </ul>
<ul style="list-style-type: none"> <li>• Create and format a chart</li> <li>• Organise data in a list</li> <li>• Tips for editing data</li> </ul>	<ul style="list-style-type: none"> <li>• Organise data in a list</li> <li>• Share and import data</li> <li>• Protection</li> <li>• A quick run through file manager</li> </ul>	<ul style="list-style-type: none"> <li>• Scenario Manager</li> <li>• Solver: Delete and change constraints, Adjust the solver settings, Set the integer tolerance</li> </ul>

**Sources:** a) Computers & Communications Training Centre, Course Description, 1996c.  
b) Computrain Computer Training Centre, Microsoft Excel for Windows, [Course Booklet], 1996a.  
c) Haus Computer, Excel for Windows, [Course Booklet], 1996d.

### 1.3 Database Courses

Some training providers conduct training in the use of the 'spreadsheet' software like *Microsoft Excel 5.0* or *Lotus 1-2-3* version 5.0 as a database application. Other training providers conduct training in the use of dedicated database software such as *Microsoft Access 2.0* or *Dbase III+*.

#### 1.3.1 Microsoft Access 2.0

The objectives of the *Microsoft Access 2.0* course were to provide participants with the basic concepts and skills to effectively use *Microsoft Access 2.0* software. The participants were introduced to the proper techniques for developing good database systems and provided with necessary tools and concepts to create and use an effective database system. The course covers a range of techniques for using the *Microsoft Access 2.0*'s development tools and macros. Instructional methodology included: group and individual instruction, hands-on with plenty of practical exercises, detailed course notes, exclusive use of PCs with VGA graphics screen and printer with other visual aids (*Computrain Computer Training Centre, 1996b*).

*Microsoft Access 2.0* software training was conducted in a series of day-long course for participants. In this day-long course, participants were given familiarity with the terminology used before they were taught how to design a database (i.e. design process, determine the purpose, table, fields, keys and determine the relationships), build a database (i.e. create a table, create a form, customise a form and adjust column widths), work with data (i.e. create a query, select fields, specify criteria, sort records, find data required), show and present data. Once competencies in these areas are achieved, participants were allowed to continue to the next stage which cover links to *Word* and *Excel*, buttons, macros, programming, graphs, calculated fields on forms and reports, and passwords and network security (*Computers & Communications Training Centre, 1996d*).

1.3.2 Dbase III and Dbase IV Courses

*Dbase III*<sup>+</sup> curriculum involved: creating a database with various field types such as character, numeric, date, logical and memo. A step-by-step instruction as to how to go about creating and solving a given file was provided. It also includes adding records, editing and printing selected data from the database just created. Students were also taught how to: retrieve selected information, make backup copies and appropriate exercises to reinforce the main concepts taught.

*Dbase IV* course was also offered by another training provider. The target group for *Dbase IV* course were: students who have completed Grade 10, 12 or University graduates from fields other than computing. The *Dbase IV* course runs for 4 weeks and participants are awarded a ‘Certificate of Achievement’ at the end of the course (*Professional Staff Training Centre*, 1996). Figure 5 is a list of possible topics covered in *Dbase IV* curriculum.

Figure 5: Dbase IV Course Objectives and Content

COURSE OBJECTIVES	GENERAL COURSE CONTENT
<ul style="list-style-type: none"><li>• Understand database management terminologies and theories</li><li>• Create a database structure</li><li>• Enter and edit data in a database structure</li><li>• Make a backup copy of your database</li><li>• Create and use view queries to display selected data</li><li>• Link two database files</li><li>• Modify a database structure</li><li>• Sort records in a specific order</li><li>• Design and print record and labels</li></ul>	<ul style="list-style-type: none"><li>• How data is organised and retrieved</li><li>• Who uses database</li><li>• Parts of database management system</li><li>• Types of DBMS</li><li>• Creating and entering the mailing list data</li><li>• Modify the file structure</li><li>• Edit data in database</li><li>• Indexing database field</li><li>• Creating report from database files</li><li>• Selecting and managing a database management systems</li><li>• Issues in Database Administration</li></ul>

Source: Professional Staff Training Centre, Course Information 1996.

### 1.3.3 Lotus 1-2-3

Database capability of *Lotus 1-2-3* has been taught by one training provider as part of the database course. Using *Lotus 1-2-3* as a database is especially useful for many small to large organisations in their operations. *Lotus 1-2-3* was the Spreadsheet standard recommended by the Department of Personnel Management (1991, p.3).

In this case, the course content covered many areas such as: database structure, creating a database, sorting a database, analysing data, setting search criteria, finding records, deleting records, using queries and altering a query (*Haus Computer*, 1996c).

## 1.4 Dedicated Software Courses

A dedicated software with strong business or commercial application lends itself to computer related studies which are popular with many small to large corporate organisations. One such course is *Attache' Accounting Software* course described below.

### 1.4.1 Attache' Accounting Software

Participants in this course went through a series of modules where each module focussed on the various aspects of accounting principles. The major modules covered include: sales analysis, purchase orders (including Foreign currencies, supplier pricing & requisitions), order entry/invoicing, general ledger work including, Bank reconciliation and general administration such as security aspects. Course participants were required to investigate all menu items and complete the practical exercises set. They were expected to set up a fictitious company and perform full pay run. Sub modules included: payroll, set ups, maintaining employee records, Bank Accounts, standard pay, end of pay run (i.e. timesheet pays, check pays, pre-processing reports uncheck pays, correct pays, backing up after processing pays) and special circumstances (i.e. holiday pays, terminations, rehiring, group certificates). Table 1 shows *Attache' Accounting Software* course modules conducted by one training provider which includes

duration of the module and the cost per person. No further details of the course content were made available to the author.<sup>1</sup>

**Table 1: Attache Software Course Modules**

SOFTWARE	MODULE	DURATION	COST/PERSON
ATTACHE	Administration	1 hour	K25.00
ATTACHE	Customers	3 hours	K75.00
ATTACHE	General Ledger	4 hours	K100.00
ATTACHE	Intro to Business Partner	4 hours	K100.00
ATTACHE	Invoicing	3 hours	K75.00
ATTACHE	Payroll	2 hours	K400.00
ATTACHE	Products	3 hours	K75.00
ATTACHE	Purchase Order	4 hours	K100.00
ATTACHE	Report Writers	6 hours	K150.00
ATTACHE	Suppliers	3 hours	K75.00

Source: Computers & Communications Training Centre. Second Half of 1996 Course Listing, 1996e.

**1.5 Programming Language Courses**

Computer programming courses were offered by one training provider. The course was broken down into modules where each module was dedicated to specific aspects of the applications courses. Each aspect of a module ran for 1 calendar month. No other details including the list of possible content or topics covered were released by the training providers except a summary table from one provider as shown below in Table 2.

**Table 2: Computer Programming Courses Modules**

Module No.	Title	Duration	Cost/person
I	Introduction to Computer Systems	1 month	K150.00
II	Introduction to Programming (Flowcharting)	1 month	K100.00
III	Programming Using COBOL	1 month	K150.00
IV	Introduction to Dbase Programming.	1 month	K175.00
V	Advanced Dbase Programming	1 month	K200.00
VI	Intro. to Foxbase Programming	1 month	K185.00
VII	Advanced Foxbase Programming	1 month	K230.00

Source: Port Moresby Business Training Institute, Course Brochure 1995.

<sup>1</sup> Many Private Computer Training Organisations in PNG deliberately withheld vital information such as course materials and course details from the researcher for fear of them landing in the hands of a ‘competitor’ which might disadvantage their own organisation. This has been a common occurrence over the Fieldwork period in 1994 and 1996.

Only one other training provider has offered programming courses in C++ beginning with introductory level programming through to an Advanced C++ Programming course. The courses were run for two days for corporate clients who have to book in advance. The trainers for this course were brought in from its Australian regional office in Sydney. The same is true for many advanced courses offered by this provider (*AT&T Global Information Solutions*, 1995).

## **1.6 Courses on Operating Systems**

Courses on operating systems differed from provider to provider and ranged from Graphic User - Interface such as those on the Macintosh Platform to those on the Windows-based IBM-compatible systems. Further, command driven MS-DOS courses were also quite popular among training providers. Each of the courses on operating systems are briefly described in the next section.

### **1.6.1 MS-DOS Version 6.0 (Microsoft Disk Operating System)**

Various versions of MS-DOS were being taught but the latest releases were more common. One training provider offered a day-long introduction to DOS course for those who wished to learn about basic DOS principles or commands. The course was designed to teach students practical DOS commands in order to: carry out routine housekeeping and maintenance functions, use DOS text editor to interpret and edit configurations files, conduct diagnostic and maintenance utilities such as Virus Scan/Clean, and work with Autoexec.bat and Config.sys files to best configure a PC for its working environment (*Daltron Electronic*, 1996a). Figure 6 shows the content overview of MS-DOS course.



**Figure 6: Content Overview of MS-DOS Courses**

INTRODUCTORY	INTERMEDIATE	ADVANCED
<ul style="list-style-type: none"><li>• Computer hardware components: Keyboard, System unit, External devices, Storage media, VDU</li><li>• Computer Configurations</li><li>• Software Configurations</li><li>• Software</li><li>• An introduction to basic DOS commands: DIR Command, Wildcards, CD Command, MD Command, Date and Time, Copy, Del, Rename, Ver</li><li>• Formatting a diskette</li><li>• Stopping a Process</li></ul>	<ul style="list-style-type: none"><li>• Using DOS or Windows to change the time and date</li><li>• Use the File Manager to: Create directories, Move files, Copy files, Delete and undelete files, Copy disks, Change file attributes, Create a system disk</li><li>• Use DOS to: Delete and undelete files, CHKDSK, Change the file attributes, Access help, Check Memory using MEM, Use MSD to look at a computer components</li><li>• Functions of Config.sys and Autoexec.bat</li><li>• Use MS DOS Editor</li><li>• Scan and clean</li></ul>	<ul style="list-style-type: none"><li>• Operating systems</li><li>• Configuring DOS</li><li>• The Boot process</li><li>• Objectives of the Configuration Files Terminate and Stay Resident (TSRs)</li><li>• Basic Configuring of Config.sys</li><li>• Basic Configuring of Autoexec.bat</li><li>• Optimizing the configuration</li><li>• Memory management: Types of memory, Memory space analysis, Maximising memory space, Memmaker.</li><li>• Netware Configuration</li></ul>

Source: a) Daltron Electronic, Course Description 1996a.

The topic covered in the introductory course included: Computer hardware components (ie. keyboard, systems unit, External devices, storage media), Computer configurations, Software, an introduction to basic DOS commands (e.g. Dir command, wildcards, CD commands, MD command, Date and time, copy, del, rename, Rendir, Ver), Formatting a Diskette, and interrupt a process (*Daltron Electronic*, 1996a).

Another training provider conducted a 4-week long MS-DOS Basic for Beginners course. Here the course participants were introduced to view the contents of a directory, create and delete directories, change from one directory to another, copy, rename, delete files and format a floppy disk.

The contents covered in this course included: familiarising the hardware, identifying different types of PC, tips to assist in troubleshooting, importance of DOS to both hardware and software, internal and external DOS commands, Basic DOS shell,

working with files and directories and managing disks. The target group for whom the course was aimed at included computer novices and those with limited basic understanding of computers but lacked familiarity with DOS (*Professional Staff Training Centre*, 1995). At the completion of the course, participants were awarded a 'Certificate of Achievement'.

### **1.6.2 Microsoft Windows (Windows Version 3.1)**

Microsoft Windows is one of the operating systems taught besides MS-DOS. It has been quite popular with many software application programs like, *WordPerfect 6.0 for Windows*, *Microsoft Word 6.0*, *Microsoft Excel 5.0* and *Microsoft Powerpoint*. Windows make it easy for users to interact with the computer while using many of the application software. Most training providers incorporated windows concepts in different application courses such as *Microsoft Word 6.0*, *WordPerfect*, or *Lotus 1-2-3*.

Other training organisations conducted courses on Apple Macintosh and IBM compatible Windows-based computer systems under either 'getting started' or 'introduction to computer' courses. The aims/objectives of such courses were designed to assist trainees to gain basic skills and knowledge in order for them to effectively use Macintosh or Windows-based desktop computer systems.

The range of topics or concepts taught under this course included: how the computer can assist the user, creating and organising a filing system within the computer, how to work with more than one application, use of advanced features on the computer, introduction to software, printing documents, working with storage devices such as a floppy disk and making back up of data.

Microsoft Windows provides the user a more visual way of working on a computer using Graphics User Interface (GUI). Other Windows concepts covered in this course are shown in Figure 7. The course duration was 5 hours per week lasting up to 4 weeks

and participants were awarded ‘Certificate of Achievement in Computer Studies’ after the trainees completed their courses.

**Figure 7:      Microsoft Windows Course Content**

- - Starting Windows
- - Exploring Windows
- - Learning to use a Mouse
- - Windows basic skills
- - Working with Windows
- - Working with Menus and Commands
- - Working with dialogue boxes
- - Starting and Quitting programs
- - Customising Windows
- - Working with Group
- - File Manager Basic
- - Working with Files and Directories
- - Working with your diskettes
- - Learning different Fonts
- - Moving Windows
- - Resizing Windows
- - Using Windows Paintbrush
- - Using Windows Write
- - Using Desktop and Accessories

Sources: a) Port Moresby Business Training Institute Course Description, 1996c.  
b) Daltron Electronic, Computers - The First Step , Course Description 1996e.  
c) Haus Computer, Introduction to Windows, [Course Booklet], 1996e.

**1.6.3              UNIX V.4**

The only training organisation involved in UNIX related courses has been the *AT & T Global Information Solutions* which took over the NCR (National Cash Register) and is now operating under *AT&T Global Information Solutions* name, AT&T for short. The AT&T corporate objective states that it is, ‘...committed to providing high quality education and training on NCR products and services to assist both staff and customers in obtaining the highest level of performances from the NCR systems’, (*AT&T Customer Education Brochure*, not dated). *AT&T* training centres are located overseas including Australia but also has a training centre in Port Moresby to provide customer focussed training.

The UNIX V.4 courses were designed to train clients with the following job titles: Managers, System Administrator, Systems Analyst, System Support and Developer/Programmer who were drawn from organisations employing AT&T supplied and serviced hardware and software within their establishments. Figure 8 provides a brief content overview of the various courses conducted under the UNIX V.4 Curriculum.

**Figure 8: UNIX V.4 Curriculum Overview**

**INTRODUCTION TO UNIX**

This course is designed to be the first contact with UNIX, hence there are no prerequisite for this course. It provides an introductory level treatment of the structure of UNIX commands, logging on and off, the “vi” text editor, UNIX file system and related commands, and selected features of the Bourne shell.

**BASIC UNIX V.4 ADMINISTRATION**

This course is intended for the non-technical administrator who will be concerned with routine administration and housekeeping tasks, and who will be delegating more technical matters to support personnel. The course is highly oriented around the “sysadm” menu system, with only minimal use of UNIX commands.

**UNIX OPERATING SYSTEM**

This course is intended for the more technical user who already has some experience with UNIX or other operating systems. It covers a wide range of UNIX commands, utilities, text editing, file system manipulation, and an introduction to shell programming.

**UNIX V.4 SYSTEM ADMINISTRATION**

A high-level course for those who are using UNIX commands to administer, support or program in a UNIX V.4 system. Covers the hardware, file system internals, process theory, backup/recovery commands, and real-time processing.

**UNIX SHELL PROGRAMMING**

This course covers all aspects of Bourne shell programming, including variables, argument lists, metacharacters, signal handling, control flow, and functions.

**UNIX V.4 SYSTEM TUNING**

This course covers the UNIX kernel in detail together with performance measurements tools and methods, and non-kernel aspects of tuning. It includes the structure, use and management of system tables, UNIX processes, IPCS, and kernel reconfiguration.

**CU/UUCP COMMUNICATIONS**

This course, based on Honey Danber cu/uucp, covers planning for an installation, the controlling files and their contents, programs and their use, and troubleshooting.

**UNIX V.4 UPDATE FOR ADMINISTRATORS**

This course is designed to upgrade the non-technical system administrator who has used either “sa” or “va” menus under a previous UNIX release, to the equivalent knowledge and skills under UNIX V.4.

**UNIX V.4 UPDATE FOR DEVELOPERS/SUPPORT**

This course, for UNIX-experienced developers and support personnel, is a comprehensive and high-level technical coverage of the differences between UNIX V.4 and previous Systems V releases. Major topics covered include the Berkeley files system, and new shell commands for administrators and developers.

Source: Extracted from AT&T Global Information Solutions, Course Brochures (not dated).

Table 3 shows the recommended UNIX V.4 Courses for the different client groups according to their perceived needs in performing their duties and functions. For example, the course with **Necessary** classification means that it is essential that the client group concerned *must* take this course while those with **Suggested** classification implies that it is *not essential but will be useful* in their job if taken and finally those with **Optional** label means, they are *neither essential nor suggested* but are worth taking them.

**Table 3: Recommended UNIX V.4 Courses**

Course	Days	Manager	System Administrators	System Analyst	System Support	Developer/ Programmer
Introduction to UNIX	2	Suggested	Necessary	Necessary	Necessary	Necessary
Basic UNIX V.4 Administration	3	Optional	Necessary	Optional	Necessary	Optional
UNIX Operating System	5	Optional	Optional	Necessary	Necessary	Suggested
C Programming	5				Necessary	Necessary
UNIX V.4 System Administration	5		Optional	Optional	Necessary	Optional
UNIX Shell Programming	3				Necessary	Suggested
UNIX V.4 System Tuning	3			Optional	Necessary	
cu/uucp Communications	2			Suggested	Suggested	

Source: AT&T Global Information Solutions, Course Brochures (not dated).

There were other courses conducted by *AT&T Global Information Solutions* but details of these courses were not made available as most of the courses were conducted at the clients’ premises in accordance with their specific needs and requirements.

Before commencing a training program with *AT&T Global Information Solutions*, the trainees are given a **pretest** to determine their level of understanding of the courses. The training proper takes into account the supposedly ‘missing links’ identified from the

**pretest** and as much as possible correct them during the ensuing training period. Towards the end of the training program, a **post test** is administered to see if such missing links identified earlier in the pretest have been corrected. A 'Certificate of Educational Achievement' which carries *AT&T Global Information Solutions'* training excellence standard is presented to the participants after the completion of their courses.

## **1.7 Integrated Software Courses**

Integrated software come with more than one application. The different applications were integrated or packaged together into one large software package. There were many such integrated software packages. The few integrated software courses being offered included: *Clarisworks* and *Microsoft Office*. The integrated software package is cheap and convenient for small organisation which may not be able to afford the individual software application or even large and expensive ones.

### **1.7.1 Clarisworks Software Course**

The *Macintosh Computer Academy* in Port Moresby being the only training provider conducting courses on a Macintosh platform offers *Clarisworks* training. However, separate courses are conducted under individual applications for example: Word processing & Graphics, and spreadsheet and databases. Each application was taught in either a 8 x 3 hours or 6 x 4 hours training slots. Trainees were awarded a 'Certificate of Achievement' at the completion of the training program (*Project Solutions*, 1996).

Under word processing and graphics course, the participants were taught how to improve the presentation and outlook of their business documents in a variety of ways. For example, letterheads and logos were created in graphics environment and then merged with text to produce professional looking documentation, or store addresses on a database and then automatically print addresses onto a form letter to send to all those listed or to the selected customers.

While for spreadsheet and database courses, participants learn to set up spreadsheets to do auto-calculating, create payroll, invoices, inventories, accounting records, add a spreadsheet to word processing document, create a chart from a spreadsheet and add it to a word processing document to produce a perfectly presented report, and manage all office information with database.

### **1.7.2 Microsoft Works (Windows Version)**

*Microsoft Works* is another integrated software with more than one applications combined together into one package. It has word processor, spreadsheet and charting and database management program.

Like *Clarisworks*, courses were conducted in each of the individual application and the course participants had the opportunity of combining more than one application to create a chart using spreadsheet application and combine it into a word processing document.

### **1.7.3 Microsoft Office (Both Windows and Macintosh Versions)**

Training courses using both Windows and Macintosh versions of *Microsoft Office* have been conducted by the private training organisations. Generally, private training organisations have been conducting *Microsoft Office* course under *Windows 95* environment during the fieldwork in 1996. Popular courses under this software includes Word processing, Database, and Spreadsheet applications as briefly described in earlier (section 1.2). Training was also conducted for individual application. However no courses were run as *Microsoft Office* among the training organisations studied. Further more, no course was conducted on other applications such as communications, because there was no immediate need for it at the time of conducting fieldwork in June/July 1996.

However, courses in communication such as electronic mail (E-mail) and World Wide Web design and publishing have already begun (Advertisement for Internet and WWW

Seminar in PNG, *The National*, May 2, 1997, p.20), now that the *Tiare Internet Gateway* has been launched in May 1997 (*The National*, April 10, 1997). It has already started providing the internet service in PNG. Many organisations in PNG have their own Local Area Networks (LANs) and as soon as the internet service provider is fully established, the local networks may be connected to other LANs or even Metropolitan Area Networks within PNG and abroad through the PNG's *Tiare Internet Gateway* or other value-added network providers. This has already taken off in May 1997 with many organisations (e.g. *PNG Post Courier* and *The National* connected to the information super highway through the internet service providers such as *Datec* and *AT&T Global network*. The College of Distance Education is to have all its provincial centres connected to the internet by the commencement of 1998 school year (*PNG Post Courier*, Nov 26, 1997).

## **1.8 Desktop Publishing Courses**

A company's image is often promoted through publications such as: leaflets, brochures, fliers, pamphlets, etc. General word processors can adequately handle most of these business needs but for any complex formatting of text and graphics the tool of choice is the dedicated desktop publishing software. Such software enables one to: control where the text and graphics are placed, control how large or small they should be, and determine the number of columns, font sizes, spacing, tables (*Computers & Communications Training Centre*, 1996f). In some limited way, any word processor can also do these. Such documents are best produced using dedicated Desktop Publishing system in order to give a professional outlook for clients or the wider public. There were two common desktop publishing software courses conducted in PNG. The desktop publishing systems are described in the following sections.

### **1.8.1 Word for Windows 6.0**

Like most word processors which have the basic features necessary in desktop publishing, *Word for Windows 6.0* contains essential features which are used in



producing professional looking documents. A desktop publishing course using *Word for Windows 6.0* was designed to give students the desktop publishing skills necessary to produce professional looking business documents such as newsletters, brochures and pamphlets by incorporating graphics, borders and columns into text (word processing) documents.

The topics covered include: Using borders and shading; Using Columns (eg column tools, balancing columns and changing the spacing between columns); Section Breaks; Working with Graphics (eg inserting graphics, sizing, moving, selecting, editing); and putting a graphic in a frame (*Daltron Electronic*, 1996a; *Haus Computer*, 1996a; *Computrain Computer Training Centre*, 1996c).

### **1.8.2 Aldus Pagemaker 5.0**

An introduction to *Pagemaker 5.0* course was conducted by one training provider which was aimed at producing standard business publications such as newsletters, brochures, pamphlets, etc. The course lasted four half days (or 12 hrs) at a cost of K399.40 per participant inclusive of sales tax (*Daltron Electronic*, 1996a).

The topics covered under this introductory course included: starting windows and *Pagemaker 5.0*; basic window concepts, general desktop publishing concepts, opening, saving and printing documents, setting up master pages (inserting page numbers, rulers, working with texts grids, placing text, window globe handles, joining and splitting text, blanks, text flow, editing text, setting up columns, working with graphics, working with elements (line & fill, changing line styles, drawing shapes), using tabs, and setting up paragraph styles (*Daltron Electronic*, 1996a).

### **1.8.3 Microsoft Publisher 2.0**

Another desktop publishing course conducted was the *Microsoft Publisher 2.0* under *Windows 95* environment. Most of the fundamental desktop publishing concepts or principles have been covered in this course.

The fundamental concepts taught or covered includes: Publisher Commands, Cue Cards, getting instructions while working, Cue Card dialogue box options, starting a publication, using the PageWizzard Design Assistant, using a Template, objects, saving, naming and closing a publication. The course is taught over a four whole day period from 8.30 am to 5 pm with lunch and coffee breaks in between at one of the training providers in Port Moresby.

## **1.9 Presentation and Graphics Software Courses**

Presentation of information in a professional manner helps increase motivation of listeners or audiences as well as getting across important messages. The following Presentation and Graphics Software courses have been offered by the private computer training organisations in PNG. Each course is described in the following paragraphs.

### **1.9.1 Microsoft Powerpoint 4.0**

*Microsoft Powerpoint 4.0* as a professional and efficient computerised presentation program is one common application used by Senior staff personnel. This application was designed for professional presenters, instructors, trainers, tutors/teachers, seminar or workshop coordinators as well as for managers and supervisors, who present ideas and concepts to their audience. The course was conducted over one full day (6 hours).

The course covers basic text editing and formatting of paragraphs. There are variety of slide masters that come with *Microsoft Powerpoint 4.0* and the course participants use these slide masters to create bulleted lists, charts, tables and organisation charts.

The list of topics covered include: starting windows and *Microsoft Powerpoint*, basic windows concepts, identifying different parts of the *Microsoft Powerpoint* screen, moving and sizing a window, starting a new presentation, changing views in *Microsoft Powerpoint*. Working with files (i.e. opening, closing, saving a printing files), choosing a template for the presentation, using *Microsoft Powerpoint* page layouts, what slide masters are, how to insert (i.e. date, time or page number on slide master), adding a shape or logo, inserting a clip art, working with text (i.e. entering text, formatting text appearance, picking up and applying a style, text alignment, line spacing, and changing bullet styles), creating charts, creating organisation charts and creating tables (*Daltron Electronic*, 1996a). The course basically covers essential component in order to produce eye catching and effective presentation by viewing existing presentation templates, creating a presentation by mimicking the templates, designing presentations to put fancy extras to enhance the presentation and print the presentations created (*Computers & Communications Training Centre*, 1996d).

### **1.9.2 Freelance Graphics**

*Freelance Graphics* was another presentation software course taught by private training organisations in PNG. *Freelance Graphics* can be used to create professional looking display of important information in the form of graphics, charts and tables to highlight or illustrate/demonstrate a product, or service. *Freelance Graphics* helps to create presentations quickly and easily making page layouts, backgrounds, and fill-in-the-blank steps for creating titles, Bulleted lists, tables, and a variety of charts/tables. The presentation can be both on screen or printed on a colour printer for added impact. *Freelance Graphics* also displays dialogue boxes which offer trainees or users a variety of choices for creating and modifying presentations which enable trainees to select the options according to the responses made at the dialogue prompt.

The course outline from one training provider (*Computrain Computer Training Centre*, 1996d) indicated that the following areas were covered: introduction to *Freelance*

*Graphics*, entering, editing and formatting text, formatting styles, creating organisation charts, creating tables, creating charts, viewing and editing the presentation and creating a screen show. A course workbook written for this course was followed very closely by trainees in order to successfully complete the course.

Trainees work through the workbook at the computer terminal following the step by step instructions given in the workbook either typing into the computer or manipulating the document with the use of the mouse while following the different exercises in the workbook. Each workbook contains a glossary of terms used in creating a presentation in *Freelance Graphics* which helps the user to understand and apply these terms in their interaction with the computer.

## **1.10 Other Computer Application Courses**

There were also other PC Software Application courses conducted by training organisations in PNG. These courses do not fall under any of the application software courses described earlier (sections 1.1 to 1.9.2) and therefore they are described in the following sections (sections 1.10.1 to 1.10.3.4).

### **1.10.1 Introduction to Computers & Basic DOS**

This course is an introduction to Computers and Basic DOS which was aimed at providing newcomers to the world of computers with a basic understanding of what computers are, what the different components of a computer hardware are, what they can do with a particular software and how humans can best use the computers (both software and hardware) to achieve a desired outcome. The list of concepts covered is shown in Figure 9.

The course length was of one month duration (approximately 40 hours) and was taught for two hours per day. It cost K250.00 per student. On completion of the course, participants were awarded a 'Certificate of Completion' from the training provider.

**Figure 9: Course Outline - Introduction to Computers and Basic DOS Training Program**

<p><b>I. Introduction to Computers</b></p> <ul style="list-style-type: none"> <li>• - What a computer is?</li> <li>• - The computer as an 'information processor'</li> <li>• - The functional components of a computer</li> <li>• - History of computers</li> <li>• - Classification of computers</li> </ul> <p><b>II. The who, what &amp; why of computers</b></p> <ul style="list-style-type: none"> <li>• - Computer hardware</li> <li>• - Computer Software</li> <li>• - Peopleware</li> <li>• - The basic configuration of a computer</li> <li>• - Disk and disk storage Devices</li> </ul> <p><b>III. Number system and data representation used with computers</b></p> <ul style="list-style-type: none"> <li>• - Conversion Table</li> <li>• - The Decimal Number</li> <li>• - The Binary Number</li> <li>• - The Hexadecimal Number</li> </ul> <p><b>IV. Data Processing Concepts</b></p> <p><b>V. The Processor and Programs</b></p> <p><b>VI. Basic Disk Operating System (DOS)</b></p> <ul style="list-style-type: none"> <li>• - What 'DOS' is</li> <li>• - Functions of DOS</li> <li>• - Internal and External Commands</li> </ul>
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**Sources:** a) Port Moresby Business Training Institute, Course Outline, 1996d.  
b) Haus Computer, Introduction to Computers, [Course Booklet], 1996f.

### 1.10.2 Introduction to Computers & COBOL Programming

'Introduction to Computers & COBOL Programming' was also structured in the same way as that of 'Introduction to Computers & Basic DOS' described earlier (section 1.10.1). The course is aimed at introducing COBOL programming concepts to trainees.

The course was broader than simply writing a program. The concepts taught includes:

- defining the function of the program (i.e. program specification);
- designing the program or determine how it is to be organised (i.e. program structure);
- what it is to perform or do (i.e. program logic and function);
- coding appropriately in a programming language (program coding); and

e) testing and debugging the program (i.e. debugging) to make sure that it was free from errors or bugs and does exactly what it was meant to do. [Figure 10 is the Course Outline of this course].

**Figure 10: Course Outline - Introduction to Computers and COBOL Programming**

<b>I. Introduction to Computers</b> <ul style="list-style-type: none"><li>• What is a computer, the computer as an information processor, Functional Components, Classification of computers, Basic configuration of a computer, Disk Storage Devices.</li></ul>
<b>II. The who, what and why of Computers</b> <ul style="list-style-type: none"><li>• Hardware, Software, Peopleware</li></ul>
<b>III. Number System and Data Representation</b> <ul style="list-style-type: none"><li>• Conversion Table, Decimal Number, Binary Number, Hexadecimal Number, The EBCDIC Table, Data Formats</li></ul>
<b>IV. Data Processing Concepts</b> <ul style="list-style-type: none"><li>• Introduction to Data Processing, Data, Record, File</li></ul>
<b>V. Operating System</b> <ul style="list-style-type: none"><li>• Basic Commands, Internal and External Commands</li></ul>
<b>VI. Flowcharting</b> <ul style="list-style-type: none"><li>• Types of Flowcharting, Block Commonly used, Flowcharting using COBOL instructions</li></ul>
<b>VII. COBOL Language</b> <ul style="list-style-type: none"><li>• What is COBOL?, General Rules in Word Formation, Types of COBOL Words, 4 Division of COBOL</li></ul>
<b>VIII. Writing COBOL Program</b>

Source: Port Moresby Business Training Institute, Course Description 1996c.

The course runs for 3 months and conducted for 2 hours per day, making a total of 120 hours. This course costs K400 per person. At the completion of the course the participants are awarded a ‘Certificate of Completion’.

**1.10.3 NetWare V3.12x**

There were at least four courses conducted on this software by one training provider. The courses were conducted with specific group of students or trainees in mind. Each course builds on from the previous one so that successful completion of the first leads to the next course until all the modules of this course are completed.

#### **1.10.3.1 Systems Manager**

This course teaches students the fundamental skills needed to effectively manage a NetWare v3.11 or v3.12 network. The course begins with a discussion on NetWare basics such as how to set up users, directories and security, create login scripts, set up printing, manage a network using NetWare 3.11 or 3.12 server and use Novell's electronic mail package. This course was run over four days.

The list of possible topics covered in this course includes: Introduction, Connecting to the network, Using NetWare 3.12 resources (including v3.11 details), planning network file systems, accessing network file systems, managing network file systems, implementing login security, implementing file system security, automating the workstation connection, creating login scripts, setting up user menus, managing the NetWare 3.12 server (including 3.11 details), implementing network printing, protecting network data, implementing electronic mail, and installing network applications (*Daltron Electronic*, 1996f).

#### **1.10.3.2 Advanced Systems Manager**

This course teaches experienced NetWare 3.1x Administrators to monitor and maintain a v3.11 or v3.12 network. The main topics covered included: perform server startup procedures, maintain the server configuration files, installation of client support protocols, monitor and manage fileserver memory usage, use server utilities, advance setup and maintenance of printing services and maintain client configurations files (*Daltron Electronic*, 1996g).

#### **1.10.3.3 NetWare 3.1x Installation and Configuration**

This course provides participants with the opportunity to apply skills learnt in the Advanced System Manager and Advanced Administration classes. It is useful for day to day administration of a NetWare 3.1x network and technicians who perform installation work on the network.

The list of topics covered included:

- a) install and configure NetWare 2.2 & 3.1x servers;
- b) upgrade servers to NetWare 3.1x;
- c) install NetWare 2.2 or 3.1x client software;
- d) customise network environment;
- e) view available network resources;
- f) upgrade server using the migration utility;
- g) client server installation;
- h) DOS requester (VLMs);
- i) NET.CFG parameters;
- j) create and manage network users;
- k) modify user parameters;
- l) implementation of security;
- m) server utilities;
- n) increase performance through modifications;
- o) critical areas for troubleshooting; and
- p) diverse configurations (*Daltron Electronic*, 1996h).

#### **1.10.3.4                      Netware Service and Support**

This course was designed for technical support personnel who are responsible for conducting network diagnostics and repairing/correcting network problems. A good grounding in DOS and NetWare is a must if one is to gain anything from this course. This course was conducted over a four day period.

The topics or areas covered include:

- a) diagnose and resolve hardware related problems encountered when using NetWare;
- b) optimisation or maintenance of many Novell products;



- c) understand and use the research tools which are available to assist solve ‘real world problems’;
- d) use the course materials as on the job references;
- e) troubleshooting the network;
- f) using research tools in troubleshooting;
- g) working with network adaptor cards and cabling;
- h) troubleshooting network storage devices;
- i) troubleshooting the DOS workstation;
- j) troubleshooting network printing; and
- k) perform network optimisation and disaster recovery operations (*Daltron Electronic*, 1996i).

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