Netcitizens: information hunters and gatherers

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NETCITIZENS: INFORMATION HUNTERS AND GATHERERS

A thesis in fulfilment of the requirements for the award of the degree of Doctor of Philosophy (PhD)

from

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by

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Declaration

I certify that this is my original work and that it has not been submitted for a degree at any other university or institution.

Michael Arrighi
11 October 2000
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Professors Barry Harper and John Hedberg have given me support well and above the call of duty throughout this project. Their continuing encouragement has always been a mainstay stimulant for me, and it is very much appreciated.

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I thank my wife Ginetta, and my family for their input by way of their tolerance of all the common scholastic mood swings that dissertation projects are generally accompanied by.

I dedicate this work to my youngest grandchildren Declan, Bridee and Caden who so often dragged me from my machine to “play” with them in those moments of hilarious rough and tumble havoc that only young children can create. And I publicly acknowledge the intervention of St Jude who never put me “on hold” at those times when I would make emergency support calls to him.
ABSTRACT

This study explores the possibilities of utilising the World Wide Web, by way of the Internet, to benefit learners in the creation of knowledge. It examines way and means of gathering and collating productive resources in order to enrich learner understanding and interpretation of Information Technology as such.

There are several phases to this study. There is a review of the history of the World Wide Web (WWW); an account of the structure of the study, known as the Web Inquiry Project (WIP); a review of information retrieval mechanisms; observations of student teachers in the context of their own understanding of the WWW and their appraisals of its worth as learning tool; studies in their subsequent tutoring of a cohort of elementary school students, their individual and collective observations, findings and resources constructed on their individually created web pages. All of this to be achieved in the spirit of collaborative learning.

It is a narrative account of the journeyings of all the participants through the Information Superhighway and an account of the outcomes of this exploratory study and the methodology for achieving best practices in information gathering and its utility in the interest of knowledge creation in this electronic age.
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Knowledge production in an irresistible Information Society

Everything informational and important to the life of individuals [...] will be found for sale, or for the taking in cyberspace.

*Michael Benedikt*

Think what it would be like to have a work conceived from outside the self, a work that would let us escape the limited perspective of the individual ego, not only to enter into selves like our own but to give speech to that which has no language [...] [perhaps this is] what Lucretius was aiming at when he identified himself with that nature common to each and every thing?

*Italo Calvino*

Information technology has made dynamic changes in the harvesting and dissemination of knowledge with a similar impetus to globalisation as did the Industrial Revolution to commerce. At the time of implementing this study in 1995, there were a discerned twenty-six million WWW users online. From 1996 through 1998 this market had increased by 50 million, and from 1999 through 1999 by a further 50 million. Then it has been predicted that from 2000 through 2005 a further 100 million would get online. Conversely, in 1995, *general* television viewing had declined by some 32%; distance phone calls by 25%; watching videos by 15%; reading magazines by 13%; reading newspapers by 12% and radio listening by 10%.


3 Courtesy NUA - 16/1/01

[http://www.nua.ie/surveys/analysis/graphs_charts/comparisons/how_many_online.html]
Whilst such demographic quotes most likely exclude password protected sites, they nevertheless suggest that World Wide Web client memberships should continue to spiral, with no clear horizon in sight at this point.

**Purpose of this study**

Concurrent survey configurations have stimulated questions upon which the Web Inquiry Project (WIP) study was based. In that light, the project had attempted to determine the effect(s) of contemporary Web literacy on beginner users in order to evaluate whether the:

Web's architecture and resources at that time might be of hitherto unparalleled benefit as a formative schooling medium generating superior threshold harvesting of information. And that the Web's electronic literature had already challenged conventional schooling paradigms for the new millennium when the study was introduced in 1995

The Web Inquiry Project (WIP) (1995) study of itself is, therefore, a narration of the explorations and discoveries of a collaborative, instructor-learner's voyage into the possibilities of utilising the World Wide Web, and its *cyberspace*, as a substantive cognitive resource in a nascent, unprecedented technological age of digital information delivery.

Essentially, it was an excursion into self learning, self understanding of knowledge acquisition in an entirely innovative ambience. As *navigator*, I myself was a novice. As inquiry informants, through our mutual collaboration, we had adopted the roles of chart makers for that journey, as it were. Each of us was to learn in our respective modes. Each would develop unexpected perspectives in the out coming synthesis: the participant student teachers, the targeted schoolchildren, and not, least of all, myself as participant researcher.

By nature, my ever inquiring mind had focused on the promising new technology of the Web. As a mature aged student I had entered academia with an open mind which, regrettably, had been eroded by patches of teaching methods (instructors, rather) which I had perceived to be alien and obstructive of the end product visualised by me and my

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4 Courtesy NUA - 16/1/01

[http://www.nua.ie/surveys/analysis/graphs_charts/comparisons/how_many_online.html]
then peer group student teachers. Ironically, these “shortcomings” existed over a wide campus spectrum despite the currency of technological buzz words then germinating.

Having dabbled in elementary mode with the Web and travelled many routes through the growing superhighway I began to acquire a taste for **hunting and gathering**. This led to the logical area for acquiring a better sense of direction in that dimension: the Graduate School of the Faculty of Education. It was there at the cutting edge of information technology that my introduction to the Web flourished.

The Internet Service Providers then were still embryonic, although Australia itself was a relative newcomer in online information technology delivery. The Oceanic region had not apparently developed the internet service area of knowledge manufacturing at the same pace as its established multimedia expertise. Consequently, and to “get up and running” with growing competition from overseas, there existed a sort of helter-skelter raid on conventional teaching resources which were hastily converted to Hypertext Web publication.

The growing mass of home pages available in Australia at that time had to build on a formidable infusion of Information Technology (IT) from the USA, where the technology had been established for some time. However, academic enthusiasm of the potential - as well as scepticism - had been effectively triggered. Digital **Americanised** publications - generally perceived as being of dubious educational merit - were gradually being displaced; but, nevertheless, suggesting much opportunity for research and subsequent improvement.

In classrooms, scholars had minimal access to the basic requirements - computers and internet service provision. Teachers at the coal face were frustrated because neither they nor their pupils, could acquire needed IT skills; even their basic requirements. It was in the tertiary sector that those skills were slowly being practised. Not quite in a sense of innovation but rather the cutting and pasting of ideas exploding elsewhere.

In that environment, I was determined to explore the potential of the Web as a learning and teaching vehicle and adopted that objective as the theme for this thesis. With enthusiastic encouragement from my joint supervisors, peers and colleagues, that had become my mission.

**The retrospective generalised, philosophical, learning arena**

The assault on reality Michael Benedict (1996) refers to in my first epigraph was already underway globally in relative national budgetary constraints. The take up of
hitherto non-existent technological know-how and vitality; had become fully armed through the introduction of personal computers, and was already mesmerising and simultaneously confounding the masses prolifically.

The Italo Calvino (1998) vista was that of the existing power of semiotics - now harnessed to the concept of the World Wide Web and its incursion into cyberspace. It was more or less in the same light as Teilhard de Chardin (1964)⁵. Not in the sense of Chardin's universality of Christian enlightenment, but in the sense of the globalisation of intellectual enrichments and what H G Wells (1866-1946) had labelled, The World Brain⁶ or now more commonplace known as The Internet.

The term “Internet” is an inadequate connotation for delivery of information and subsequent manufacturing of knowledge. It does not translate the enormity of its planetary reaches into the homes and minds of a human race in continuing evolution. Nor does it effectively construe the consequences of a spectacular increment in human cognitive potential. A fatal flaw is the euphoria to exploit its realisable computer based technology for less than altruistic reasons befitting an increasingly judicious global quality of life it first promotes.

Throughout this study I will be referring to that side of information technology identifiable as the World Wide Web because it better defines the real extent of the flourishing togetherness it has generated and encouraged in the wide ranging spheres of education and skills acquisition. Technically, the World Wide Web is really better recognised a digitised segment of a global information infrastructure.

Educators were at the forefront of utilising the escalating Information Age as resources treasure trove. But there were wide gaps between the more conventional and the laterally imaginative applications of it. Innovation has always been easy prey for the traditionalists in society.

A conjectural perspective

Media and anecdotal speculation had been leaning towards recognising the Web or attributing to the Web the characteristics of enriching the quality of life within our

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world-wide social fabric. Underlying this, however, there was a patina foreshadowing that this electronic vehicle was in danger of being hijacked and derailed in the name of national, state and corporate interests. In the scholastic arena, educators continued to vacillate about substance versus quantity in the realisable implementation of online delivery of knowledge within education systems.

In 1937, H G Wells\(^7\) had given us a preview of technological possibilities and the reasons for the need of New Age thinking in information technology and education:

Concurrently with these realisations there is a growing discontent with the part played by universities, schools and libraries in the intellectual life of mankind. [...] 

Both the assembling and the distribution of knowledge in the world at present are extremely ineffective, and thinkers of the forward looking type whose ideas we are now considering, are beginning to realise that the most hopeful line for the development of our racial intelligence lies rather in the direction of creating a new world organ for the collection, indexing, summarising and release of knowledge, than in any further tinkering with the highly conservative and resistant university system, local, national, and traditional in texture, which already exists. These innovators, who may be dreamers today, but who hope to become very active organisers tomorrow, project a unified, if not centralised, world organ to “pull the mind of the world together”, which will be not so much a rival to the universities, as a supplementary and coordinating addition to their educational activities - on a planetary scale. [p 1]

The embryonic evolution of the World Wide Web, merely a decade later, would nevertheless seek to overcome such ‘tinkering’ to its development for the benefit of educators, particularly if it could substantiate that: Learning would be made more accessible; that it would stimulate and facilitate learning capacities and that it would simultaneously accommodate those features. There was a fiscal vision, also, that, most likely, a resulting decrease of existing costs of knowledge production would be forthcoming eventually; despite the prodigious funding necessary for its global introduction. Such motivational constituents had been central to this study.

In the fields of librarianship, however, a quasi prototype of the Web was by then already under construction. Jennifer Cram (1996)\(^8\) suggested this, in part:

The Internet gave birth to the concept of the library without walls. In some sense there is much to be said for the concept - academic research particularly relies very much upon electronic transmission and text transfer. Yet for the library user, the inter library loan system, union catalogues and other forms of co-operative service delivery have for many years provided access to much more than is housed in any one library. The great myth of

\(^7\) H G Wells (1937) *World Brain: the idea of a permanent world encyclopaedia*, Contribution to the Encyclopédie Francaise, August 1937 (online @ http://art-bin.com/art/obrain/html 3 March 2000

the Internet is that libraries will be obsolete because the Internet is seen by many, particularly the uninformed, as the repository of all knowledge. [p 6]

That “libraries will be obsolete” is indeed stretching a very long bow because there is little evidence to indicate that their present and future clientele will be totally comfortable in abandoning the tactile sensation of a hardcopy reading process. On the contrary, printouts of digitised publications would tend to increase the flow of hardcopy and give rise to individual DIY bookbinding, perhaps.

**The research strategy**

The strategy was to develop a viable programme that, in a brief thirteen weeks (one semester), would advantage a nucleus of *a priori* relatively unskilled student teachers attempting to provide a preselected group of primary schoolchildren with an elementary hands-on grasp of the workings of the Web, given a brevity of contact with them in that environment.

The wider account of this endeavour is explained where the methodology devised is discussed in Chapter 4. following, but what had been devised fragmentarily became the starting point(s).

Since the previously mentioned Web Inquiry Project (WIP) as it subsequently became labelled, was a unique initiative its objectives and course work plan were devised by the researcher as elected instructor and his supervisor (Professor John Hedberg) who had “recruited” a cohort of student teachers for the purpose. Ironically there had been no rush to enrol in what had been apparently deemed a subject for the more technologically adept amongst the appropriate student body of that time. However, this proved to be advantageous in that the lack of numbers permitted more personal interaction within the progressive teamwork nature of the task(s) to be engaged.

The first thought had been to instruct the student teachers firstly, and then target various local schools where one or more of the inductees would later teach a dedicated group of schoolchildren so that a wider band of variables would apply. Further exploration of that notion indicated that that ploy would be impracticable if not unlikely because the various local schools had, at that time, ineffectually compatible networking resources.

At the time of this study, the hardware/software essentials in the various schools tended to be a hotchpotch of breeds assembled in measures of school fundings available aside amenable timetables. The student teachers and school
managements had consequently deemed the condition frustratingly impracticable. Mutually agreeable teaching time slots for the student teachers and the schools were also an insurmountable barrier. A further frustration had been a lack of available class teachers within the schools who were competently skilled in supporting the envisaged project.

Given that initial dilemma, the researched discussed the problem at length with his colleague Dr Brian Ferry, who was simultaneously undertaking his own particular doctorate research study. Because he himself had been well qualified in coal face teaching, he had been able to direct the researcher towards a novel group of gifted children which proved to be the ideal target group.

With the collaboration of his supervisors, the researcher was then able to devise a situation where those children would be able to utilise the full ongoing resources of the campus' Interactive Multimedia Laboratory in keeping with the projected programme- and courteously provided by its director Professor Barry Harper.

Through growing collaboration with their dedicated multimedia class teacher, Mrs Karene Harris, and the respective Parents and Teachers Associations (who had sponsored the gifted children's project initially) the mutually harmonious transportation and ancillary logistic obstacles were overcome.

Independently the researcher had undertaken a rigid, in-depth, and personal appraisal of the Web's electronic literature and an ongoing appraisal of its general architecture and its graphics so that he himself became adequately proficient to undertake the tasks required of the Web Inquiry Project. His journey would therefore parallel that of the informants themselves, but moreso as a participant observer in a collaborative climate.

Having organised the elements of the project's unfolding, first briefing encounters with the student teachers were implemented in terms of the devised methodology outlined in Chapter 4.

**Sources of data compiling**

This WIP study had enabled substantive data from the six student teachers in the first instance, and that had been subsequently supported by the input from a cohort of twenty-three primary school children, regarded as “gifted”.

In the first instance, the Web itself had provided more practical insight into the meaningfulness of its information delivery contrasted with the more conventional
hardcopy publications then available. The body of education providers as jurors “was still out” regarding the Web’s capacity as trustworthy education vehicle. Electronic literature comprised the principal bridgework of the research tasks. Respective printouts of the perceived, most reliable, research worthy elements had been archived continuously, before, during and after the study’s progress. At that time a widely practised criteria was still grounded in the experienced strength of conventional thinking as the essence of educational curricula.

At each classroom/workshop face-to-face session the researcher would brief and debrief to stimulate wash-up dialogue opportunities of approximately thirty minutes each, at which time, the informants, the technical supporter and the researcher would interact freely; except for those times when the NetKids were on in situ location. With the NetKids there were modified versions of the process, given the constraints of access times. At those informants’ hands-on sessions, the researcher would assume an observer role, making brief notes that then became the basis of his electronic journal observations. Subsequently the observations were integrated with draft writings. The researcher’s own observations and notes contributed to the analyses of the extensive data provided by the participants. [cf methodology implemented and outlined in Chapter 4.]

The student teachers were required to contribute to issues based on preliminary mind mapping as individuals and as a collective. Individual essays and memoirs were presented for instructor evaluation, and the web pages ultimately provided by the targeted cohorts had delivered the essential elements of search data hoped for.

The co-learners generally had sought out subsidiary study resources from online e-mail traffic exercises by way of list servers and through their variously contacting peer e-mail users. That routine had been valuable to all participants whilst the supportive course work was being implemented simultaneously. Numerous online frequently asked questions (FAQs) provided useful incremental “explanations”.

Constraints and limitations to interpreting this study.

The logistical constraints of workplace accommodation, transport to and from the WIP’s locale etc. had been a primary challenge, but these had been overcome by a mutually satisfactory accord with providers of the schoolchildren participants.

Online resources had created some problems because of networking overloads which had not been expected during the study sessions. “Web whacking” - to provide adequate off line/downtime backup situations - had not been an option at that time, and, in any
case may not have produced the verity of realtime access in the context of this study. It should be noted that, at such times, the technical staff of the laboratory had done everything possible to overcome sporadic networking problems arising outwith their personal control.

Definition of terms

**Gifted Children**

This refers to the primary schoolchildren informants who had been accredited with well above average cognitive skills and selected as a group by their parent school(s) to amplify their cognitive skills under the supervision of an accredited teacher with the necessary expertise for doing so. The twenty-three children comprising the group had for some time earlier been targeted from various local primary schools to assist them to take advantage of their individual and collective exceptional intellectual attributes. They had already been accustomed to interactive team working and collaborative cognitive exercises all of which had been nourished by supportive volunteer parents and qualified teaching staff. Additionally, they were already computer literate.

**NetKid(s)**

Schoolchildren who participated. They have been indicated as “NetKid(s)” in describing their respective/collective input(s) various, but satisfactory, degrees.

**Informant(s)**

That is the term used to signify the specifically targeted participant(s) of the WIP: the researcher, the student teachers, the gifted children and technical supporters.

**Participant observation**

In employing the terms “participant observation” and “ethnographic” data the connotation adopted in this study is similar in that:
(1) “By participant observation we mean that method in which the observer participates in the daily life of the people under study [...] observing things that happen, listening to what is said and questioning people over some length of time.”

(2) “The ethnographer participates overtly or covertly in people’s daily lives for an extended period of time, watching what happens, listening to what is said, asking questions, in fact collecting whatever data are available to throw light on the issues with which he or she is concerned”. [Occasionally, differences are made between ethnography and participant observation where ‘ethnography’ is seen as having a wider perspective than the latter term; whence in this study ‘ethnography’, played its part to a somewhat lesser degree.] Thus “ethnography” was applicable to the research framework whereas “participant observation” refers to the particular methodology used for data collection in this instance.

**Player(s)**

The informant student teachers participating in the WIP have been indicated as “Player(s)” in describing their individual/collective input(s). This term is concomitant/synonymous with their various role(s) as persons engaged in or skilful in interpreting questions and thus discerning their impact on their particular learning processes in acquiring necessary skills for employing the Web as an innovation for learning.

**WWW**

This is the commonplace acronym for World Wide Web which is the principal technological resource for information delivery in the context of this particular study. Often it has been perceived as analogous with the “Internet”. Technically, this is not so. The Internet is the singular, universal technological mechanism for delivery of digital transmissions which include e-mail, file transfer facilities, document facsimile transport, list servers, chat rooms et al in addition to digital publications such as home pages as such. Where participants have intermixed terms in their inputs, it should be recognised the term WWW/WEB is a pedestrian assignment in this case.

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The Web Inquiry Project

Summary of the WIP project

The study essentially had to compare, contrast, investigate, describe, and determine reactions in examining a co-partnership of students exploring those characteristics of the World Wide Web which, as innovative information distributor, suggest that its evolving architecture might enrich existing educational multimedia resources.

The significance of the problem

Given the growth of online scholarship and the consequence of its global impact, World Wide Web literacy will become an established accreditation benchmark and prerequisite for educational professionals, future educators and researchers. James Morrison has put the significance saliently:

After a critical reading of some recent articles in The Chronicle of Higher Education, Gary Brown verbalises a chilling thought: "In spite of boasts and hopes from many quarters, the window of opportunity for significant instructional change made possible by new technologies appears to be closing". Brown differentiates between simply incorporating technology and successfully using it to transform student thinking. As his critique suggests, educators need to remain committed to developing content and pedagogy as they employ technology, or education may be supplanted by entertainment.

The WIP Inquiry Project had perceptively been considered as a beginning to that larger cognitive window through which others might further explore the phenomenon of the Web.

Outline of thesis structure

This thesis comprises seven chapters of which Chapters Two through Seven are organised as follows.

Chapter Two - Relates the historical background of the World Wide Web from nascence to the time within which this study was effected.

Chapter Three - Continues that perspective but focuses on the architecture and mechanics of search engines and their capacity to swiftly access the desired information. Again this takes in to account the state-of-the-art at the time of the study.

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11 James L Morrison "On the horizon" Jan-Feb Issue 3 January 2000 morrison@unc.edu (online at http://horizon.unc.edu/horizon)
Chapter Four - Explains the methodology adopted and the rationale for the qualitative measures adopted in the Web Inquiry Project.

Chapter Five (Parts 1/2) - Reflects on the philosophical aspects of teaching modes and suggests that Constructivist Theory aligns well with the Web as learning/teaching vehicle. This continues to relate the focal experiences of the Players and synthesises their respective journeys into the new cognitive mode; which section is analysed in that light (Part 2). In unison, a framework for the structure of the study is provided.

Chapter Six - Reviews the WIP as jointly perceived by the Players, the NetKids and the researcher as participant observer instructor.

Chapter Seven - This final chapter comprises the overall review of the study in revisiting the salient points and the perceived achievements resulting from the study. It considers some outcomes and developments in the near future which sustain reasons for further concentrated, continuing research in the field of information technology. And, in terms of the World Wide Web, best practise, reviewing skills in implementing it as cognitive field of high importance both for present and oncoming educators confronting technological developments in the new millennium.
World Wide Web: Road to Damascus or Yellow Brick Road?

Just as the human brain consists of millions of neurons which have been composed into a unity through innumerable connections and combinations and thus make possible the unitary consciousness in man, so must men combine with one another to form a kind of super-organism in which communal consciousness, a super personal unity, would be manifested - with this difference: that the cells which constitute our brain no longer have individual existence, whereas man, in virtue of his reflective consciousness, retains his individual freedom and separate existence, even within the larger organisation. Teilhard de Chardin, Christologie et évolution, p 71

The title of this chapter alludes to the metaphors of the biblical Road to Damascus where miraculous enlightenment was granted to a non believing Saul2 and to another highway to that fabulous fantasy land of Oz for a dreaming adolescent Dorothy3. The World Wide Web (colloquially: The Superhighway) presents contemporary users with such a dilemma: which is it to lead to, truth or illusion?

For many years the researcher has seen the purpose of education to be a facilitation for learners to strengthen their richer comprehensions as to the way things perform - all that

1 In N M Wilier (1968), An introduction to Teilhard de Chardin, London: Fontana Books. Pierre Teilhard de Chardin (1881-1955) was concurrently a biologist, a highly prestigious palaeontologist, extraordinary scientist, predictor scholar and a Jesuit priest. His role in the discovery of the Peking Man (1929) added considerably to his prestige. His writings were from time to time regarded as “heretical” by the Vatican and there was a long lasting flow of conflict as a result.


comprises our ways of life and our various cultural mores - and thereby engineering more judicious means of solving their quandaries. The history of the Internet had followed these dramatic intercession lines as means: The Internet itself 1969; E-mail 1971; Mailing Lists 1972; MUDS 1979; Usenet 1980; IRC 1988 and The World Wide Web 1990 (all of which are comprehensively defined at Appendix A of this study).

The World Wide Web (WWW) offered a means to empower learners to that end and to explore its architecture for better solutions to societal mores in this day and age. The researcher saw the Web as a means of counteracting traditional policies and an ongoing perpetuation of apparently hackneyed notions which had outrun coexistent bearings, but which obstinately clung to life within education practices.

Thus, in order to prepare for initiating the Web Inquiry Project, the researcher first of all had to travel through the maze of electronic literature then being published through the World Wide Web. This then permitted a better understanding of the "nuts and bolts" of the Web's origins, and also served as an elementary overview of its potential in the educational arena. Its most important elements, are defined below by Living Internet Com.

**Why The Internet Is Important**

Western Civilisation has had a centuries-long romance with technology and has often worshipped it as the "saviour of mankind". Alternately, ever since Shelley conjured up Frankenstein, anti-utopians have depicted it as the destroyer of humankind and human values.

Technology is power and, as such, can serve many purposes. Whereas an earlier vision of the computer predicted an Orwellian "big brother" utilising a centralised computer system to control society, the advent of the personal computer has turned this power pyramid on its head.

Increasing thousands of people have a computer on their desk with as much capability at their fingertips as once was housed in an expensive and complicated mainframe. Obviously, the decentralisation of power is no guarantee that the people will make good or wise use of it.


The Internet is unlike any previous human invention. Because it is a world wide resource in developed and developing countries, it is important to all of the people in the world. Specific features of the net are described in the following sections:

**Geographic Distribution** -- The net reaches around the world. [Figure 1.1]

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4 Living Internet com @ [http://www.websidestory.com/content](http://www.websidestory.com/content) (online 16/1/01)
Robust Architecture -- The net adapts to damage and error.

Speed -- Data travels at 2/3 the speed of light on copper and fibre.

Universal Access -- The net provides the same functionality to everyone.

Growth Rates -- The Web and its implementation are exponentially the fastest growing technology ever experienced world-wide.

Freedom of Speech -- The net promotes freedom of speech.

The Digital Advantage -- The net is digital, and can correct errors.

Genesis of the World Wide Web

The World Wide Web, as we know it today, evolved out of the Internet. It had been widely acclaimed to be an incomparable safeguard against the establishment when, in fact, it actually was a derivative of a strategy for safeguarding military intelligence. Yet, its roots are more deeply embedded in the 15th century, evolving means of information dispersal, the Age of Enlightenment, a developing emancipation from compassionless quality of lifestyles of the masses, an instinctive human compulsion to consistently better that condition, and, essentially, explore, discover and to know things.

The term “history” tends to belong to a, sometimes misty, antecedent. No history in the sense of “history of the Internet” can yet be satisfactorily complete, because its subject is still in an evolutionary state of dynamic transition where its periphery still remains indeterminate.

And so, ‘We find ourselves immersed in a sea of words produced much too easily, without depth of weight, and saying nothing in particular. And today the required work is to distinguish ourselves from our machines. It is to rediscover, for example, that all knowledge is knowledge of man, and that nothing worth calling an ideal can be found in the engineered world, but only in ourselves’

The art of information technology is really hinted at as early as modern Cro-Magnon humans appeared on the scene of civilisation some 35,000 years ago but even then the spread of information was not structured world-wide till about 11,600 years ago. As

5 Stephen L Talbot ((1995), The future does not compute: transcending the machine in our midst, Sebastopol Calif: O'Reilly & Associates Inc. p 14
territorial rights were gradually established around 6,000 years ago whatever verbal means of communication used were subdivided into the Chinese of 5,000 years ago, the Saravati Sindu of India, Sumerian and hieroglyphics of the Egyptians (the germination of Hypertext, cryptography perhaps). The Basques, the Japanese and the Ge’ez of Abyssinia continued to use their 9,000 years aged language.\textsuperscript{6} Such evolutionary factors in generating information comprised the genesis of today’s information technology and that window of potential knowledge presently known as the Internet.

A worthwhile correlation might be noted here: It may not be clear whether cave drawings as a communication tool came before speech, but certainly, before primitive writing existed, these were prominently preserved on cave walls in France, Australia and elsewhere. They were the first “illustrated archives” on human experiences where attempts were made to permanently record facets of day-to-day life in the era in which they originated, even though crudely at first.

Today, the converse is happening, where writing is now heavily dependent on graphics within interactive multimedia and Web-based, machine generated resources. Paradoxically, self perpetuating, capricious graffiti is frowned upon though a derivative of such cave drawings. [Poetry and art have had a long relationship where verse can sometimes be better explained with a supporting picture (graphic) or, in reverse, where a picture can best be interpreted with the help of verse.]

The Web may be said to have had its beginning with the invention of flatbed printing; which Fust & Shoefer and Gutenberg developed synchronously, but separately, in the 1450s. A religious related \textit{Mainz Psalter}, the earliest publication example, was commissioned by the Archbishop of Mainz in 1457, some five hundred years ago, and this resulted in a flood of publications and a vast shake up of traffic in ideas. Ironically, it also triggered the Church’s first populist confrontations with dissenters of extant dogma and, furthermore, the first universal impetus for the general populace to learn to read; detached from that former clerically dominant arena of literacy.

Twenty-three years on, there blossomed printing presses in ‘110 towns 50 in Italy, 30 in Germany, 9 in France, 8 in Spain, 4 in Holland and so on. By 1482, Venice was the printing capital of the world. There, the busiest printer, Aldus Manutius, used to have a sign outside his shop saying, ‘if you would speak to Aldus, hurry - time presses.’\textsuperscript{7}

\begin{flushleft}
\textsuperscript{6} Tony Smith’s Home Page, \textit{Early Human Civilisation}, Online @http://www.oldciv.html (24 April 1997)
\end{flushleft}
Similarly, the proliferation of web pages and web sites has been astronomic and still growing in number and variety.

**Flatbed printing**

Flatbed printing technique had its first prodigious worldwide impact upon systematic society. The succeeding idea of computerisation materialised, and then the concept of global information broadcasting developed. That, compounded by empowered international corporate enterprises and build-up in recent times made it strategically necessary to fund research, develop and mass produce effective computer based storage and instantaneous retrieval of all forms of strategic intelligence.

There are critics who suggests that:

Equating the birth of text based computing with the invention of the printing press [...] at once smacks of the myopic enthusiasm that typically accompanies the emergence of new technologies while it assumes a critical objectivity unavailable to an observer of the present historical moment. Of course, technoclasm isn't always so eloquent. If an argument against textual computing proceeds any further than the chorus like complaint [...] 'but you can't read it in a bathtub!' it usually denigrates into labelling hypertext the bastard child of the book and the Nintendo unit. [...] An array of anxieties attends our culture's slow passage from print to electronic textuality, and, as might be expected, these anxieties have manifested themselves most noticeably in disciplines which are intimately involved with the printed word. Despite exaggerated reports of its demise, the codex book is *not* dead--but like handwriting in the age of print, it isn't likely to remain the dominant means of textual dissemination. So the question is not *if* computers will transform out notion of reading and writing, but instead *how*? 8

Human awareness results from an infinite interlocking of sanctioned and non sanctioned thoughts swimming in a sometimes mixed up affective process which cannot be mirrored in rows upon rows of books in libraries. The human "sorting of ideas" element has at any rate been partially mimed in the gradual expanding system of indexing and cross referrals, mainly driven by both the Dewey System and the Library of Congress (ASA) indexing protocols. Yet, library research is still not for the feint hearted, the general reader.

Today's computer is the nearest "sibling" progeny of mathematician Charles Babbage's (1882) "difference engine" which mimicked the *Jacquard* loom's punch hole pattern "interpreter". Babbage had the "know how" but could not muster the necessary financial resources from a sceptical establishment.

The next influential precursor of the Web stems from an idea passed onto Herman Hollerith by John Shaw Billings in 1880. Hollerith punched holes in a facsimile of the dollar note, positioned relatively to data indicating sex, family relationships, address, birth date, nationality etc. The first "computer" program for the Web derived from this. This idea was also developed from Richard Roberts, who, in 1847, had adapted the paper perforation system to control riveting machines.

An exciting age of automata - like the player piano operated by perforated "musical scores" derived from that idea by Alexander Bain - had begun, with many other inventors contributing. In 1884, Paul Nipkow invented the scanning disk, a forerunner of television. Dorr Felt produced the first Comptometer [sic] with a built-in printer in 1889 which William S Burroughs followed up with his adding and subtracting machine with printer in 1892.

But it was the organ builder Basile Bouchin of the seventeenth century who contributed foremost to digital automation through his understanding of the binary system's mathematics based On/Off current switching protocol. Without encoding this binary system into computer format the Web would not exist in its present form; nor would any other digitally dependent technological device. The concept of manipulating binary 0s and 1s as we know it (digitisation's essential elements) would evaporate. Yet this coding system is relatively simple.

This issue is the focus of full discussion is in Chapters Five and Six.

**Trails to computer networking: The knowledge maker**

From elementary seeding by such inventions as Charles Wheatstone's and William Forthergill's telegraph in 1831 - a "crude" prototype enabling a pointer to indicate alphabetical letters by distanced remote access - through to Edward Kleinschmidt's conception of the teleprinter in 1914, the information "lane" has evolved into the Information Superhighway of today; even though two world wars expedited the pressure for intelligence gathering on a global scale. Together, such contributory elements lead off the race towards what H G Wells (1866-1946) labelled, *The World*  

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9 In Australia, Percy Grainger became an enthusiastic aficionado of player piano techniques, composing many works specifically for that instrument.
Brain\textsuperscript{10} - today’s World Wide Web. There is a caveat, however that such “infinite knowledge” of itself is not necessarily the resolution to our universally incremental social problems:

Thanks to the high success of information theory, we live in a time when the technology of human communications has advanced at blinding speed; but what people have to say to one another by way of that technology shows no comparable development. Still, in the presence of so ingenious a technology, it is easy to conclude that because we have the ability to transmit more electronic bits more rapidly to more people than ever before, we are making real cultural progress - and that the essence of that progress is information technology.\textsuperscript{11}

This paradox consequently penalises present and future generations to an inflexible Santayana-like past\textsuperscript{12}, with little or no prospect of recasting a fulfilling and non materialistic quality of life for humanity. Joseph Moxley (1992b)\textsuperscript{13} identifies this in noting that ‘Productive scholars recognise that thinking is an ongoing process. Rigid thinkers, like rigid writers, are characterised by bitterness and sarcasm, failing to be invigorated by an ever-changing world’.

Fifty-six years later, the Wellsian globalised concept of the human “thinking” process and its workings was in empathy with Theodor Nelson’s objectives:

A structure of thought is not itself sequential. It is an interwoven system of ideas. None of the ideas necessarily comes first; breaking up these ideas into presentational sequence is an arbitrary and complex process. It is often also a destructive process, since in taking apart a whole system of connection to present it sequentially, we scarcely avoid breaking - that is, leaving out - some of the connections that are part of the whole. (Theodor Nelson)\textsuperscript{14}

Ironically:

Many of the problems associated with automation in present-day industry are traceable to the accomplishments of the previous century, for it was during this period that the principle of treating human labour as an adjunct to machine based process was finally established. (Mowshowitz (1976))\textsuperscript{15}

\begin{thebibliography}{9}
\bibitem{10} H G Wells (1937) \textit{World Brain: the idea of a permanent world encyclopædia}, Contribution to the Encyclopédie Française, August 1937 (online @ http://art-bin.com/art/obrain/html 3 March 2000
\bibitem{11} Roszac, Theodore, \textit{The cult of information: the folklore of computers and the true art of thinking}, Cambridge: Lutterworth Press, 1986, p 16
\bibitem{12} Santayana, George (1863)-1952, ‘Those who cannot remember the past are condemned to repeat it’ in “Reason in Common Sense” ch 12 (1905-6) pnk
\bibitem{13} Joseph M Moxley, (1992b) \textit{Publish, Don’t Perish: the scholar’s guide to academic writing and publishing}, Westport: Prager
\bibitem{14} Theodor Holm Nelson, (1993) \textit{Literary Machines} Sausalito, CA: Mindful
\bibitem{15} A Mowshowitz, (1976), \textit{The conquest of will}, London: Addison-Wesley. p 85
\end{thebibliography}
Such progress had prompted the visionary words of Nathaniel Hawthorne, the American writer (1804-64): ‘By means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time. The round globe is a vast brain, instinct with intelligence’.

The Americans were not exclusive in their discoveries, since elsewhere inventive minds were following the same structures. These Americans, however, were most astute in that they took virtual control of the evolutionary process through their patenting of exclusive ownership, which rights they then fully dominated until recent times when Japan has surpassed that electronics monopoly in further innovative areas which, in production and marketing, have given Japan a leading edge in global distribution at cost-effective levels.

It is the binary system, nevertheless, which is integral to running dynamic computer programs world-wide. By way of the harnessing of electricity, - further exploited by Edison (1881), and Bell’s discovery of telephonics (1876) - the first essential pathways of the Superhighway were laid. So, we see that the nuclear idea of the Web owes much to such an evolutionary background of creative thinking where one pioneering technology can be effectively harnessed to another and so conceive an entirely new product.

There is an adage that ‘Necessity is the mother of invention’. We should add to this ‘...particularly during warfare’ for it was in such conditions that the World Wide Web really began to come into its own as we use it today.

Academia, specifically in the USA, in coalition with its government’s bodies, was first to take full advantage of the imminent gush of information technology and take the lead in generating the Internet and subsequently, the Web. That then, was the general pattern in the West. Similar but less sophisticated developments were happening elsewhere.

Not till the Cold War era did the Americans accelerate the impetus to electronic communication, fearful that, in all out nuclear missile warfare with the USSR, the USA’s principal communications arteries would be annihilated, leaving them totally vulnerable. Out of this, was created the first electronic communications network which provided “escape route” sanctuary nodes in the event of “nuclear wipe outs” of numerous machines without affecting the network’s communications resilience. So, preserving tactical response capabilities. It was called ARPNET (Advanced Research Projects Agency Network) then, but later mutated into another open network called MILNET in the 1980s. Yet, both systems had shortcomings in the context of global,
telegraphic computer language dissemination. This was remedied by the introduction of high speed modems used within the existing telephonic infrastructure; the introduction of coaxial and/or optical fibre wiring accelerated by ever faster modems and latterly radio/satellite technology.

What is the World Wide Web?

The World Wide Web (WWW) is universe of network accessible information, an embodiment of human knowledge. It is an initiative started at CERN (the European Laboratory for Particle Physics), now with many participants. [...] It has a body of software and a set of protocols and conventions. The WWW uses hypertext and multimedia techniques to make the web easy to roam, browse, and contribute to.16

In other words, a global infrastructure of electronically connected machines have agreed to “talk” to each other about almost infinite information, instantaneously transmitted by way of the Internet as telegraphic go-between. It is the manifestation of a drawn-out, cherished notion stemming from the 1940s of creating a readily accessible global database of harvested information. The initiative taken with Hypertext was, nonetheless, the cardinal instrument for creating the Web as we know it today.

If, on the other hand, a pair of machines was mutually networked exclusively, merely to exchange files by File Transfer Protocol (FTP) they could not access Web pages; which can only be utilised by using hypertext links. In this way, the Web, rather than comprising a singular, common intranet situation has now evolved into a “global village” cognitive complex.

In 1945 Vannevar Bush17 also posited this associative thinking view in describing the mind’s workings:

The human mind [...] operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade, items are not fully permanent, memory is transitory [cf linkage “shelf life” preference settings in browsers]. Yet the speed of action, the intricacy of the trails, the detail of mental pictures, is awe-inspiring. Man cannot hope fully to duplicate this mental process artificially, but he certainly ought to be able to learn from it. In minor ways he may even improve, for his records have relative permanency. The first idea, however, to be drawn from the analogy concerns selection. Selection by association, rather than by indexing, may yet be mechanised [cf intelligent search engines now available]. One cannot hope thus to equal the speed and flexibility with

16 Quoted from World Wide Web Consortium Online @ http://www.w3.org/pub/WWW/ (28. January 1997)
17 Vannevar Bush (1945) As we may think, The Atlantic Monthly July, Online @ http://www.isg.sfu.ca/~duchier/misc/vbush/vbush6.shtml
which the mind follows an associative trail, but it should be possible to beat the mind decisively in regard to the permanence and clarity of the items resurrected from storage [cf nanotechnology that now supersedes the mind’s speed of retrieval at “impossible” speeds].

Curiously, this electronic, neurological mimicry similarly and frequently extends to disordered message/data traffic. The Web’s myriad links then befog bearings where attempting to straightaway access specifically required information.

In an address to the International Telecommunications Union (21 March 1994) US Vice President Al Gore alluded to this phenomenon saying:

> These highways - or, more accurately, networks of distributed intelligence - will allow us to share information, to connect, and to communicate as a global community. From these connections we will derive robust and sustainable economic progress, strong democracies, better solutions to global and local environmental challenges, improved health care, and - ultimately - a greater sense of shared stewardship of our small planet. The Global Information Infrastructure will help educate our children and allow us to exchange ideas within a community and among nations. It will be a means by which families and friends will transcend the barriers of time and distance. It will make possible a global information marketplace, where consumers can buy or sell products.18

Curiously, in a nation which hitherto had draconically excluded its masses access to any so-called subversive dissemination of information, particularly of western cultural origin, we now have an extreme populace turnabout in that:

> ‘Our schools are no longer 10,000 miles apart, they are ten seconds apart.’ This 1992 dedication in Beijing could be given almost anywhere today. It is now possible to contact, to collaborate with, to make friends with an unbelievably wide range of people, and at so little cost. The electronic proximity of most people in the world today is one example of the way the fastest technological revolution in this history of mankind changes the world we live in.19

This information sanction, at any rate, brings with it an electronic Janus: Will it represent a further proliferation of cultural imperialism globally or, through broadening the understanding of intercultural learning, proliferate uninhibited educational and social intercourse, to deliver that brave new world mankind has constantly dreamed of? While the issues are many and varied, this, furthermore, begs the question: In the context of information technology and, primarily, the World Wide Web as agency, what is that envisaged “utopia” prone to be, given today’s societal and intellectual perspective of self betterment mores?

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18 White House Homepage Online Online @ http://www.whitehouse.gov (31 January 1997)
19 Tony Carrucan, Tony Crew, Erica Matthews and Stephen Matthews (1996), The internet manual for teachers: access skills and curriculum strategies, Macmillan Education Australia: Melbourne Australia
The euphoria of the possibilities on offer through the Web will be more lasting among clients where infotainment is the primary source of stimulation. For those pursuing intellectual reinforcement, it will continue to be an absorbing focus for exploration despite the frustration of plucking the exact touchstone in a cosmos of some present 500 billions plus hypertext pages - in contrast to 54+ millions in 1994 - and growing by the hour; as if imitating our own ever expanding celestial universe. Minds will be able to either expand their powers of understanding or may simply atrophy through mesmeric addiction to digital mind toys.

In its enduring evolution, the Web suggests - to New Age zealots - an imminent manifestation of that fabled Star Gate through which humanity enters to become an homogeneous substratum of the universe itself; a concept perhaps pre-empted by the author of this chapter’s epigraph.

Here we should consider a condensed history of the evolution of the Internet.

Chronicle of the Internet: 1957 - 1995

1957 When USSR launches Sputnik, USA creates Advanced Research Project Agency (ARAP) within Department of Defence so create counter-intelligence technology.

1962 The Rand Corporation (a government instrument) appointed Paul R Rand, its chief executive officer, to devise an “impregnable” communications network in defence of nuclear attack. It was to be deployed over numerous delivery sites as a fail safe precaution Rand formulated a packet switched network. This would enable digitally packaging vital information deliverance on defence warfare intelligence.

1968 ARAP commissioned BBN which had implemented a Honeywell computer to build the necessary switching mechanism and the network was built in 1969. It

20 Most authorities agree that it is virtually impossible to attain accuracy and most figures cited are based on ‘guessimating’ because of a continuous flux in HTML Web publications and their links locations vagaries

21 Cf details of Star Gate openings Online Online @ http://www.ultranet.com/~chandara/index.html or e-mail: earth.link.mission Online @juno.com (13 March 2997)

22 This data comprises an amalgam of various such cited histories online
used as its imperative bases UCLA, Stanford, California and Utah universities as the network's architecture.

1972 BBN's Ray Tomlinson originated e-mail and the former ARAP became the Defence Advanced Research Projects Agency (DARPA) at which time there were some 23 hosts developed out of the prior 4.

1973 Saw the development of TCP/IP by Vinton Cerf and Bob Kahn allowing diversified interactivity between the networked computers.

1974 Vinton Cerf and Bob Kahn coin the term Internet.

1976 Ethernet is devised by (Dr) R M Metcalfe allowing greatly increase deliver speed via coaxial cable. A satellite mechanism called SATNET or Atlantic Packet Satellite Network was created by way of a consortium of nations under the aegis of the USA. Unix-to Unix-Copy was also devised by AT&T Bell Laboratories and issued with UNIX the following year. The Department of Defence acquired TCP/IP protocol for ARPANET and telephonic and satellite transmission were enabled.

1979 Steve Bolin, Tom Truscott and Jim ellis devised USENET, a quasi independent news group, (based UUCP). IBM's BITNET - “Because Its Time Networks - warehoused and delivered communications by way of e-mail and listservers”.

1981 Vinton Cerf posited an scheme to allow institutions that could not access ARPNET to be integrated with SCNET and ARPANET, which was then coopted as CSNET-ARPANET.

1983 The Internet Activities Board (IAB) was established and the benchmark protocol for delivery compelled all computers to use TCP/IP exclusively. The Domain System (DSN) out of the University of Wisconsin allowed packages to be translated into corresponding IP numbers to be interactive over servers without the need to remember series of numbers.

1984 MILNET and ARPNET divided from ARPANET where the former catered for the military and the latter accelerate research. The Defence Department continued to underwrite both activities. A series of developments through IBM as management source effected 1.5 Mbps which was 25 times faster than the existing 56 Kbps means of delivery. The number of hosts had now reached the 1000+ stage.
1985 The new transmission lines started to be deployed through NSF.

1989 The concept of Hypertext was floated at CERN.

1990 The scheme was reconsidered to become the World Wide Web co-authored by Robert Cailliau. Throughout the rest of that year the format was re-tooled and developed.

1991 Electronic delivery protocols were enhanced progressively and an unnamed telnet resource implemented.

1992 From January to September the focus was on coding developments and search mechanisms.

1993 Browsers (Tony Johnson), Viola (Pei Wei) and CERN MAC were launched. Later Mosaic (Marc Andreessen) was released at CERN. A WWW Wizards Workshop was sponsored by O’Reilly and research development continued at a growing pace.

1994 The first World Wide Web global conference was inaugurated at CERN at which only half of the numbers of willing participants could be catered for (circa 400).

1995 When the G7 meeting took place in Brussels that year, the showpiece topic was the WWW and in the same year the Web Society was established in Graz.

The World Web is essentially the brainchild of Tim Berners-Lee\textsuperscript{23,24} an Oxford graduate in system designing, synchronous communications and textual delivery software. As an employee of CERN in 1989, he devised an embryonic hypermedia coding protocol reading text only (later to become graphics supportive hypertext) enabling global sharing of information broadcast through the then Internet. Berners-Lee from his personal perspective attributes the creation of the Web to:

\[\text{[...]}\text{ a book from 1858, entitled } \text{Inquire Within: Anything you want to know}, \text{ which claimed to be a compendium of all known facts. This book, he said, provided the}\]

\textsuperscript{23}\textit{Tim Berners-Lee, “Founder of the World Wide Web” Online @ http://www.aec.at/prix/kunstler/Eberners.html, (3 February 1997)}

\textsuperscript{24}\textit{“Berners-Lee 39, now directs the World Wide Web consortium at the Massachusetts Institute of Technology, leading a team of a dozen people who are helping steer the development of the software’ (Netscape Online @http://203.158.66/news/berners.htm [3 February 1997])}
inspiration for the creation of the Web, which he envisioned to someday be a place where one could go and find any fact about anything. [...] 'It allowed you to make a link between any two things and then you could follow the links (which) I found that it was just the thing that I needed for keeping track of all the things I needed to keep track of.'

And

'It was clear that any system that would constrain people and tell them how to think would be. [...] My idea was that no matter what the structure of the information in their own mind, they would be able to express it. Hence, the Web.'

Hypertext: New Age Latin

Although the Roman Empire was destroyed by German invaders in 476 AD, its language had nonetheless become the dominant, universal means of documentation throughout the then known world. Late into modern times, some fifteen hundred years later, it was still the “official” language of scholarly communication for church and state, to the extent that its knowledge was an enrolment prerequisite for nearly all tertiary institutes until the latter part of this century. Medical prescriptions, for instance, were required to be written in Latin until relatively recently, and where the “ecumenical” Vatican now conducts its rites in base language: English in English speaking areas, French in French territories.

Paradoxically, Hypertext, the (subliminal) language of the Web has now become the pivotal, universal language of information technology in many ways; irrespective of a publication’s vocabulary of origin and whether or not text or multimedia graphics are embedded. Text has become hypertext and illuminated manuscripts become the Web’s colourful graphics. Fortunately, there are no longer those tedious Latin (“synonymous”) declensions to be learned so that the actual writing of the program does not now disadvantage an author unfamiliar with hypertext, because intelligent Hypertext-editor-applications have taken the place of Roman scribes.

The late twentieth century is the age of digital incunabula. Just as bibliographers regard 1501 as the year that printed books emerged from the "cradle" of their post-Gutenberg nativity, the first year of the coming millennium will likely serve as a convenient demarcation point for the end of the beginning of electronic textuality. Though it’s not exactly news that advances in information technology are revolutionising global culture, only recently have the changes wrought by computerisation received attention in the


26 Father of the Web, Online @ http://203.158.3.66/news/Eberners.htm (3 February 1997)
disciplines collectively known as the Humanities. [...] The fear is not that text based computing will keep students from "exercising their memory" but rather that their powers of creative association and assimilation will atrophy as they navigate around an amorphous, virtual "docuverse" via predetermined hypertext pathways.  

The overhead sinister view is more current:

After a critical reading of some recent articles in The Chronicle of Higher Education, Gary Brown verbalises a chilling thought: "In spite of boasts and hopes from many quarters, the window of opportunity for significant instructional change made possible by new technologies appears to be closing." Brown differentiates between simply incorporating technology and successfully using it to transform student thinking. As his critique suggests, educators need to remain committed to developing content and pedagogy as they employ technology, or education may be supplanted by entertainment.

Both those views tend towards an apocalyptic approach towards an increasing planetary subservience to such new technologies (the Web particularly) and apprehensions as to the beneficial cognitive resource for teaching/learning. There the suggestion infers that the human brain will wilt in a scenario where the machine will ultimately become the thinker and not the human. And that a type of sophisticated plagiarism of the Web's scholastic content will proliferate to satisfy educational standards in the background but simultaneously with access to or the downloading of esoteric substance which, although an entertaining pastime, does not necessarily lend to the intellectual stimulation needed to fully realise valid understanding of the human lot.

Hypertext has transmuted, and continues to revolutionise delivery of intelligence on an infinite level, not experienced by society since printing presses first surged some fifteen hundred years ago. And, various electronic archives preceding hypertext will still be libraries despite any loss of shelved, brick and mortar repositories.

It is widely accepted that Vannevar Bush provided the initial stimulus to machine driven information technology in proposing that, given the right mechanics, further miniaturised microfilm, could store and display a vast array of data, at will, including personalised notes. His basic idea was enveloped in a proposed device called Mimex. The notion was still-born because neither interest nor financial backing was


28From: "James L. Morrison" <morrison@unc.edu> To: "The Horizon mailing list" <horizon@listserv.unc.edu> Subject: [horizon] January-February Issue of The Technology Source Date: Mon, 3 Jan 2000 09:08:08 -0500
forthcoming from any area. However, because of his evident prescience and continuing arrays of software evolving his, “predictions” are noted here:

The owner of the mimex, let us say, is interested in the origin and properties of the bow and arrow. Specifically he is studying why the short Turkish bow was apparently superior to the English long bow in the skirmishes of the Crusade. He has dozens of possibly pertinent books and articles in his Mimex. First he runs through an encyclopaedia, finds an interesting but sketchy article, leaves it projected [the Mimex potentially accessed a library of microfilm, video, sound, microfiche film and photocopied material]. Next in a history, he finds another pertinent item, and ties the two together. Thus he goes, building a trail of many items. Occasionally he inserts a comment of his own, either linking it into the main trail or joining it by a side trail to a particular item [cf links and frames of WWW publications]. When it becomes evident that the elastic properties of available materials had a great deal to do with the bow, he branches off on a side trail which takes him through textbooks on elasticity and tables of physical constants. He inserts a page of longhand analysis of his own. Thus he builds a trail of interest through the maze of materials available to him.29

Uncannily, Vannevar Bush30 appears to have foreshadowed Tim Berners-Lee’s concept of Hypertext. In describing his brainchild, the Mimex, Bush explained that:

When the user is building a trail, he names it, inserts the name in his code book, and taps it out on his keyboard. Before him are the two items to be joined, projected onto adjacent viewing positions. At the bottom of each there are a number of blank code spaces, and a pointer is set to indicate one of these on each item. The user taps a single key and the items are permanently joined. In each code space appears the code word. Out of view, but also in the code space, is inserted a series of dots for photocell viewing; and on each item these dots by their position designate the number of the other items. Thereafter, at any time, when one of these items is in view, the other can be instantly recalled merely by tapping a button below the corresponding code space. Moreover, when numerous items have been thus joined together to form a trail, they can be reviewed in turn, rapidly or slowly, by deflecting a lever like that used for turning the pages of a book. It is exactly as though the physical items had been gathered together to form a new book. It is more than this, for any item can be joined into numerous trails.31

First launched in 1991, Berners-Lee’s original concept did not utilise hypertext because he had presumed that no one would be obliged to use HTML and URLs; that only unpolished content would be published with a facility for periodical editing of the information content, just as in normal word processing:

29 Vannevar Bush (1945) As we may think, The Atlantic Monthly July, Online @ http://www.isg.sfu.ca/!duchier/misc/vbush/vbush6.shtml


31 Vannevar Bush (1945) As we may think, The Atlantic Monthly July, Online @ http://www.isg.sfu.ca/!duchier/misc/vbush/vbush6.shtml
An analogy is with word processors. Computer users don’t have to write in all kinds of codes to format their document with fonts, margins and so on. So it staggers me that people have actually put up with having to write HTML by hand. Similarly, I had not expected people to have to work out the hypertext links by looking up and typing in those long, complex codes for addressing. URL syntax was never intended for human consumption. It was intended for machine.  

Displaying text and compatible multimedia resources in Hypertext through browsers it brings together and captures diverse data which can then be explored on the Web with contingent software known as “browsers” (such as a prototype Mosaic and evolutionary developments like Netscape Navigator and Microsoft Internet Explorer among others). ‘Mosaic was the first browser backed by sufficient resources to provide technical support and versions on different platforms, which the programming team moved quickly to produce for multiple platforms’. Hypertext’s architecture draws upon an interlocking of intelligence nodes, rather than upon a sequential indexation of information, machine stored at countless archival depositories known as Web Sites or Uniform Resource Locators (URLs)

The necessary digitised language

Berners-Lee has acknowledged that without HTML, present sophistication in electronic publishing would not have been achieved or sustained:

Our present languages are not especially adapted to this sort of mechanisation, it is true. It is strange that the inventors of universal languages have not seized upon the idea of producing one which better fitted the technique for transmitting and recording speech.


33 Mosaic is a supercomputing application whose prototype was launched by the National Centre of Supercomputing applications (NCSA) in 1993 when it first became freeshare on the Internet because it originated the “user friendly” concept of point and click. Netscape is a more sophisticated application evolved out of the original concept of Mosaic and is currently the most used browser available.

34 Cf Footnote 12 above


36 Ted Nelson coined the term “hypertext,” and along with Doug Engelbart is one of two independent inventors of hypertext on computers. Cf full text: Wake up call from Ted Nelson Online @ http://www.webhistory.org/historyday/abstracts.html#ted (7 April 1997)
Mechanisation may yet force the issue, especially in the scientific field; whereupon scientific jargon would become still less intelligible to the layman.  

**HTML (Hypertext Markup Language) used for communication is, best described as:**

a document layout and hyperlink-specification language. It defines the syntax and placement of special, embedded directions that aren't displayed by the browser, but tell how to display the contents of the document, including text, images, and other support media. The language also tells you how to make a document interactive through special hypertext links, which connect your document with other documents in your and others’ collections, as well with other Internet resources, like FTP and Gopher.

Among the problems of HTML still to be fully resolved is its not being able to footnote in the conventional way; endnote; automatically table its contents, nor index these satisfactorily, nest numerics, nor typeset mathematics. Netscape was the first to master the situation with elaborate (WYSIWYG) markup language built into their browser(s) giving it advantageous lead time. Concurrently, designer tools evolved which immensely simplified the process for the, otherwise, inexpert author.

Every such programming challenge is constantly under review and remedial accomplishments seem miraculously to result on a daily basis and according to

**John Price-Wilkin (1997)**

The Web is a complex system with great potential and serious limitations. We should use caution as we consider composing in HTML: it is a short-term coding strategy. Documents composed in HTML will have limited expressiveness, and, because HTML is not yet stable, they are likely to need continuing enhancement to be used in the Web. There is much to be excited about with the Web: it is a viable system that suggests what electronic publishing on the Internet can be. We have lacked credible, demonstrable examples of standards-based, networked hypertext in the past, and the Web has changed that. There is a great deal of untapped potential in the Web. By exploiting the Web's ability to talk to other

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37 Vannevar Bush, The Atlantic Monthly, July 1945 Online @ http://www.hcc.hawaii.edu/guide/www.guide.html (7 April 1997) It was Bush who first posited the idea of a “mimex” which could accumulate prodigious chunks of intelligence with an interconnectivity of arteries, and which inspired the development of Ted Nelson’s Hypertext language p 1


40 At the top end of HTML authoring guides there is now available Chuck Musciano & Bill Kennedy’s, *HTML: the definitive guide*, previously noted.
more sophisticated programs, we can begin to take advantage of that potential and make
tomorrow's promise real today.41

Since new technologies are always developing in keeping with natural evolutionary
processes in the sciences It would, however, be equivocal for hypertext markup
language to remain stable as Price-Wilkin implies.

That “issue” has, in many ways, been substantially narrowed in the light of “user
friendly”, recently launched authoring tools that make it relatively simple for the
uninitiated to publish highly presentable Web pages; a boon to K-12 school children.

Placing educational material on the Web in the form of static notes and assignments is a
relatively simple and quick task now given the help provided by HTML editors and
convertors. Prior to using the World-Wide-Web (WWW) as an educational tool many
educators had already created electronic copies of their course notes, or at least, hand­
written copies. The process of converting such notes to the WWW-based form ranges from
nearly automatic (for electronic copies) too tedious but easy (for hand-written copies). However, generating this kind of educational resource (course notes and assignments on
the Web), while useful, vastly under-exploits the WWW as a teaching resource. Much
more is possible.42

Indeed, there is currently a growing number of Web sites that provide interactive Web
constructing tools online and, additionally, 10-25 megabytes of personal publication
space on that site so that clients can actually launch their own newly constructed
personal web page.

A brief history of the evolution of Hypertext43 is provided below

Figure 1: A short history of the Internet

1945  Vannevar Bush (Science Advisor to President Roosevelt during WW2) proposes Memex
1965  Ted Nelson coins the word “Hypertext”
1967  Andy van Dam et al build the Hypertext Editing System and FRESS

41 John Price-Wilkin, What does the Web Offer Libraries, Systems Librarian for Information Services,
Alderman Library, University of Virginia (E-mail: jpw@virginia.edu Online at http://info.lib.uh.
edu/pr/v5/n3/pricewil.5n3 (21 April 1997)
42 Murray W Goldberg (Ed) Badrul H Kahn (Pub) 1996 Educational Technologies Press (July) “Using a
Web-Based Course Authoring Tool to Develop Sophisticated Web-Based Courses” online @
http://www.webct.com/library /tool.html (16/1/01)
43 Online @ http://sss.bilkent.edu.tr/pub/History
1969  *Doug Englebert* demos NLS system at FJCC

1975  ZOG (now KMS) at CMU

1978  Aspen Movie Map, first hypermedia videodisc, MIT

1984  Filevision from the hypermedia database for Macintosh

1985  Symbolics Document Examiner, *Janet Walker*

1985  InterMedia, Brown University, *N Meyrowitz*

1986  OWL introduces Guide, first widely available hypertext

1987  Apple introduces Hypercard, *B Atkinson*

1987  Hypertext87 Workshop

1990  ECHT (European Conference on Hypertext)

**How does its evolved structure work: mechanism of the Web?**

The technology of information transmission within the Internet/Web may be briefly described as a synthesis of the binary coding with that of HTML, noting that all computers "talk" to each other via On/Off pulsations or indicators. These messages can comprise word-for-word anything and everything that can be so encrypted: two pulse levels of voltage, a perforation existing or a not existing one in a card, magnetic tape, indented areas of disks magnetised or not so, and the grooves and diametric plateaux of laser-read CD-ROMs.

The pre-eminent core of the Web is machine translation of HTML information en masse. This allows users instantaneous accessing of chunks (or tidbits) of applicable literature, so enabling a universal enrichment of knowledge growth. Its most significant feature is the interactive planetary current of information from author to user; something which can be instantly changed at will to favour a needed progression of that asset. But 'Information is valuable only if someone wants it.'

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transmission/reception mechanism for this information exchange is effected in this way.

The two extracts below illustrate the information in plain language and its counterpart in hypertext language (HTML):

Plain Language Example

"The promise that cable television's world-wide networks would ensure high-bandwidth and faster delivery has defaulted, so the text and unadorned graphics will continue to be the accepted for general Internet consumers rather than transit of movies. It is an area, nevertheless, constantly under "road repairs", and technologies advances will prevail. Some growth statistics are revealing: A Gartner Group study promised 150 million Internet users by 1998 at the same time as a Network Wizards analysis of domains located 9,472,000 host computers; an increase from 1995's 6,642,000. Interestingly e-mail users are expected to grow to 200 million by 2000 in contrast to 152 million Web consumers." 46

Hypertext Markup Language Counterpart

<HTML>
<HEAD>
<X-SAS-WINDOW TOP=42 BOTTOM=477 LEFT=4 RIGHT=534>
</HEAD>
<BODY>
<P>The promise that cable television's world-wide networks would ensure high-bandwidth and faster delivery has defaulted, so the text and unadorned graphics will continue to be the accepted for general Internet consumers rather than transit of movies. It is an area, nevertheless, constantly under "road repairs", and technologies advances will prevail.</P>

Some growth statistics are revealing: A Gartner Group study promised 150 million Internet users by 1998 at the same time as a Network Wizards analysis of domains located 9,472,000 host computers; an increase from 1995's 6,642,000. Interestingly e-mail users are expected to grow to 200 million by 2000 in contrast to 152 million Web consumers. 27
</BODY>
</HTML>


46 Further data on this 14 pages survey is too comprehensive for inclusion here, but readers are urged to subscribe to NUA INTERNET SURVEYS Online @ http://www.nua.ie (6 January 1996) as a most useful resource.
Browsers: delivering the data

Berners-Lee suggested that to maximise efficiency *browsers* should have the following essential features.47

- A consistent mouse-driven graphical interface.
- The ability to display hypertext and hypermedia documents.
- The ability to display electronic text in a variety of fonts.
- The ability to display text in bold, italic, or strike through styles.
- The ability to display layout elements such as paragraphs, lists, numbered and bulleted lists, and quoted paragraphs.
- Support for sounds (Macintosh, Sun audio format, and others).
- Support for movies (MPEG-1 and QuickTime).
- The ability to display characters as defined in the ISO 8859 set (it can display languages such as French, German, and Hawaiian).
- Interactive electronic forms support, with a variety of basic forms elements, such as fields, check boxes, and radio buttons.
- Support for interactive graphics (in GIF or XBM format) of up to 256 colours within documents.
- The ability to make basic hypermedia links to and support for the following network services: ftp, gopher, telnet, nnntp, WAIS.
- The ability to extend its functionality by creating custom servers (comparable to XCMDs in HyperCard) so that otherwise incompatible computer digital languages could be interpreted by cross platforms.

The ability to have other applications control its display remotely.

The ability to broadcast its contents to a network of users running multi platform groupware such as NCSA’s Collage.

Support for the current standards of HTTP and HTML.

The ability to keep a history of travelled hyperlinks.

The ability to store a list and retrieve a list of URLs for future use.

Soon after Bernners-Lee conceived the prototype of the Web (1990) he was joined by Jean-Francis Groff who gave impressive support in fine tuning the architecture of the Web and inaugurating the first interactive mailing list and Virtual Library.‡

Progressively, the first USA Web site (SLAC, SPIRES, and MIDASWWW) became fact at the Stanford Linear Accelerator Center in 1991.⁴⁹ And, in 1991, Kevin Hughes pioneered the first educational web site at Hawaii.⁵⁰ Evolved from that concept, O’Reilly and Associates originated its Global Network Navigator it being “one of the first sites to offer ‘one-stop shopping’ for news and information”.⁵¹ This was quickly pursued by Netscape, which had enlisted the major players from the Mosaic team, but not before lengthy litigation over “plagiarising” Mosaic’s architecture. Netscape has subsequently had free reign until Microsoft launched its Internet Explorer browser.

The corporate sector had readily succumbed to the fact that information and captivating graphics could revolutionise their marketing strategies by way of electronic merchandising catalogues which were far more cost effective than conventional hardcopy ones.

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‡ Jean-Francis Groff (Director and Founder, Infodesign, Geneva, Switzerland Building the Web, Online @ http://www.webhistory.org/historyday/abstracts.html#ted (7 April 1997)

⁵⁰ cf Kevin Hughes, Hypermedia Engineer, Verifone Internet Commers, Pioneering Sites: The Hawaii Site Online @ http://www.webhistory.org/historyday/abstracts.htm#tim (7 April 1997)

⁵¹ cf Online @ http://www.webhistory.org/historyday/abstracts.htm#tim (7 April 1997)
Realising this, also, the former developers of Mosaic became independently involved in the creation of Netscape Communicator and its superior, effective browser Netscape 1.00; later evolving into a series of progressive, innovative, updated presentation prowess. The principal browsers now have updating downloading facilities on their various sites either cost free or otherwise.

In order to transmit any such information, a dedicated/direct telephone line is required. Speed is paramount to this procedure (speed measurements are referred to as bauds) ranging from a minimum 9600 bps to 56K and even more bits per second (bps). The standard modem in 1995 normally performed on 9600 bps, but there have been modems with massively increased capacity in recent times. A problem is that time worn copper wiring can only cope with a maximum of 56 k traffic, not because of conductivity but bandwidth constrains limiting numbers of online transmissions running concurrently. Optical fibre conduction increases call “passenger” transmission in minute “packaging” and in exponential volume all at the same time. So, when it comes to graphics, moving pictures and sounds, information can now be transmitted by various programs that can condense to almost infinitely minuscule byte sizes, which, in turn, the machines, conversely, permit the recipients to receive/transmit data extended to normal optical dimensions automatically.

The more serious problem, nevertheless, is bandwidth capability, one which can cope with hundreds/thousands of different paths simultaneously. Optic fibre rewiring therefore appears to be a resolution, but an expensive one, initially. An alternative, being earth orbiting satellite broadcasting where digitised signals are picked up by satellite dishes, instead of conventional aerials. Unconfirmed media reports suggest that, in fact, there were some 37,000 such satellite transmitters in constant orbit around the globe distanced at between 35-30 kilometres with no universal controlling legislation.

**Browsing facilities**

Web pages cannot be read without the imperative browsers, their technological facilitators. Such software applications were formidably propelled by Douglas Englebert’s inventing the mouse\(^{52}\) (contemporaneously with one of the most proficient of the earliest e-mail systems). Without this utility, it is arguable that the WEB’s

\(^{52}\) cf *Lunch with Doug Engelbert*, Online http://www.webhistory.org/historyday/abstracts.html#ted (7 April 1997)
usefulness and ease of linkage access - without its being subsequently energised by the mouse - would not have developed and been globally embraced as a research tool with the “user friendly” ease in the way it is currently so.

**Separating the concepts: Internet and the Web**

At this point we should return to the beginnings in order to distinguish the components of this information/communication relationship. It was a “de facto” marriage of information technologies, where (happily) each partner (generally) shared mutual good fortune but nevertheless enjoyed a special “identity”, as it were.

During World War II the race for domination in electronic computation began in earnest, with each of the combatants focusing principally on predictable, precise, gunfire targeting by means of electronic *predicting* computation. Out of this grew research and development into the science of ballistic reckoning in the field of global warfare; resulting in almost gargantuan contrivances comprising masses of wiring and radio-like valves (upwards of twenty thousand in each prototypical *Colossus*). For the greater part these devices were neither reliable nor cost-effective.

The concept of encryption soon became a greater priority, and with it the vision of miniaturisation so that cybernetics and teleprinters were initially used for coding highly sensitive communications. In Germany the first real “lap top” machine of that order was the notorious *Enigma* that, for very decisive reasons, baffled and outwitted the Allied Forces’ strategies till a machine was smuggled out of Germany, dismembered, analysed, and further exploited. The Germans, however, had already achieved stunningly great strides in electronics, first “toyed” with in the early 30s with various unprecedented electronic weaponry concepts for naval and air warfare tactics and primarily focused on space propulsion engineering for planes (later jet propelled) and rockets (later rocket propelled buzz bombs).

Later, in the 1980s, the NST (US Science Foundation) began underwriting the Internet so that universities were also connected exponentially from 100 machines in 1981 to 2.25 million in 1995. At any rate, business interests joined with private individuals keen to exploit the new “wonder” medium in the 1990s; facilitating the evolution of that immense growth industry which has come about today.

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53 Vannevar Bush (1945) *As we may think*. The Atlantic Monthly July, Online @ http://www.isg.sfu.ca/duchier/misc/vbush/vbush6.shtml p2
Concurrently, the technique of E-mail (electronic mail) developed and burgeoned as an almost universal information technology generator. In its wake USENET was then launched, providing messages to be simultaneously passed onto connected people globally.

At this point, the researcher recapitulates the evolutionary process applicable to the Web so far. First, there was the historic advent of oral language and with it the sense of civilisation and primitive sovereignty, graphics and writing. This was followed by a transferring of collective information to manuscripts; principally illuminated and archived by the clergy or courtly scribes in minimal quantities and quality, and accessible only to an elite. Now it is almost universally available at the touch of a power switch, a computer and a modem access to an internet service provider of choice.

In terms of the evolutionary process, and as simple analogy, one can envisage binary based Hypertext filling a similar role as DNA does to an amoeba (single celled aquatic protozoan, perpetually changing shape) developing in cyberspace. With nanotechnology the rate of development has accelerated to an Nth degree such that the perennial question ‘How many angels can fit on a pinhead?’ will very soon become ‘How many information grand scales can you fit on an electron?’

**Listservers: Dedicated partners**

A prevalent means of inter-communication - are generally under majordomo scrutiny for illicit material, however, from time to time, renegade material can come through. The researcher has only once experienced such a case, and that was where an obscene solicitation was wired through a normally innocuous listserver to a campus bookshop. The sender offered a service in child porno movies still photography and graphic sound. Not only that, but a subscription of the correct amount would result in the buyer having his christian name ‘ecstatically moaned’ by a child being visually sexually invaded. The correct government authority was immediately warned and, action was initiated. All information has been historically, and probably always will be, a vehicle for the socially unacceptable transmission.

**How the turmoil is tamed**

Cyberspace, in its present condition, has a lot in common with the 19th Century West. It is vast, unmapped, culturally and legally ambiguous, verbally terse (unless you happen to be a court stenographer), hard to get around in, and up for grabs. Large institutions already claim to own the place, but most of the actual natives are solitary and independent, sometimes to the point of sociopathy. It is, of course, a perfect breeding ground for both outlaws and new ideas about liberty”

(John Perry Barlow, *Crime and Puzzlement*)
The cardinal constituents of this online universe are to inform and to communicate, and, within this macrocosm, patrons, trading establishments and specialists mine their resources in that environment. These may be out of Information-only systems; Communications-only systems; The Big Five consumer online systems; Bulletin boards systems (BBSs) and the Internet.54 55

There is an osmosis between the expression Internet and the World Wide Web and where we use either, it is a given that the other is included as comprising the sense of being online since they are interdependent components of Information Technology as we know it. Here “The Big Five”, “Bulletin Boards” and “The Internet” are focused on.

A majority of USA-based online clients are serviced by America Online, CompuServe, Delphi, Genie and Prodigy. But there is an growing number of geographically localised servers. In Australia, for instance, among now more than the embryonic service providers of 1995 the principal online commercial caterers, appears to be Ozemail; that is to note the exclusion of academic and government dedicated ones. The greater number of these provides Mail, News, Telnet, FTP, WWW, PPP, SLIP and BBS - another booming resource - not all of which are inexpensive to use. Then there is the Internet as totality:

The Internet is not the “Information Highway” that the experts envision. At best, it is an early prototype. And although we long ago got sick of highway metaphors, there is one that remains valuable. Think of CompuServe, Prodigy, America online, and the rest as Disney Worlds. These companies control everything you see once you enter their little magical “towns”.

The Internet, in contrast, is not a town at all, it is the high-speed interstate highway that runs by the towns’ front doors - and the front doors of tens of thousands of other computer systems. It was built by taxpayer dollars, so, at this writing [1995], there are no tolls or entrance fees. The Internet, in short, is the transport mechanism that makes it possible for people to “visit” a location and to ship information from one location to another.57


55 ‘Unlike many bulletin boards the WELL does not guarantee anonymity; a member may invent a quirky user ID, but anyone reading a post can find the real name and e-mail address of the person behind it with a single mouse click. This central fact, which can intimidate the shy newcomer, bestows an inescapable sense of responsibility, admirably summed up in the WELL’s motto: ‘You Own Your Own Words’. Start Reading, Online at http://home.microsoft.com/reading/features.asp (16 April 1997)

56 Getting Connected, Internet Australasia pp 105-111 (July, 1995)

57 Getting Connected, Internet Australasia pp 105-111 (July, 1995) p 41
No particular entity owns the Internet today although the government of the USA continues to fund it in the majority. However, if those funds were to dry up overnight, the Internet would still continue “open for business as usual” because the networked system status quo would survive by its manifesting the principles for which it was originally designed -- failsafe provision for (such) a national disaster, and so other countries like Australia would still be able to operate independently.

The Internet in partnership with electronic Newsgroups, dedicated subscription discussion groups etc and the Web are interrelated, though autonomous, factors of the World Wide Web or, more popularly called, the Superhighway or the Net. Through a common arterial structure, almost any one can participate in interactive communications with diverse computers and multicultural peoples throughout the globe.

It has facilitated an incredible planetary interchange of resources channelled through a wide range of delivery platforms and applications on the Web.

It disperses knowledge concurrently linked to multifarious concepts which is broadcast by means of the World Wide Web, a virtual cosmos where boundaries do not appear to exist.

The Web permits authors to express kindred scholastic means in many different ways whilst opening avenues for material that would otherwise remain unpublished.

Through multimedia imaging (now supported by do-it-yourself tools) formerly textually restricted material, which can reinforce knowledge retention is now visually enriched.

The Web makes it achievable to accelerate responses to involved questions through resourceful clarification.

This has been principally enabled with the initiative of high speed, digital modem delivery techniques; but only since circa 1993 when the Web really blossomed as a dynamic, information disseminator, world-wide. It had been “adopted” by approval from out of military hands by the academic traditionalists - who conventionally trade professional information - which was central (covertly or otherwise), to the USA government’s intelligence gathering potentials. Academics and research institutes benefited mutually with the intellectual and strategic benefits to be gained thereby as is evident today.
The real precipitation for the Web arrived out of the National Center for Supercomputing Applications (NSCA) where a team of students put together a software program called Mosaic (cf p 28), a practicable prototype internet browser. This was still a textually based platform for retrieving archival files, which application was shared freely in the Internet and giving access for retrieval to the masses.

A growing library of software applications now make it possible to author on the Web, whilst not actually on-line, by downloading and saving the required material on one's computer system(s); a resourcefulness to be discussed subsequently. From this, clutches of students can be taught information manipulation skills as an intranet practice in classroom situations, without the expense of additional ongoing real time connections.

Here it is convenient to overview, briefly, survey data for the year 199658

NUA's 1998 INTERNET REVIEW

(Abbreviated)

The Internet doubled client usage over 1995 or (50%) relative to the surveying sources used. NUA had best-estimated there being some 45 million people using the facilities; a composition of 30 million in the USA and Canada, 9 million Europeans and 6 million in the Asia Pacific Rim. Europe's clientele was increasing, as was that of the Eastern European states and Russia. South America has yet numerous problems to overcome and, excluding South Africa, Africa was not in the running 59

It had been anticipated in 1995 that commercial entities would figure highly in the development of Internet and consequently the Web. Despite a healthy Christmas sales input, figures of 350 million to 1.2 billion dollars (US) were unsound, with the score more likely to have been in the 500-600 million dollar bracket.

This arose from lack of fidelity in electronic funds transfers in the merchandising arena; which ever improving encryption has resolved. (It is now possible to open a consumer dedicated “envelope” on the Web from which secure “documentary” transactions, either retail or banking, may be carried out by means of encrypted passwords. Once the EFT (electronic funds transfer) business has been carried out, the

58 Provided by: NUA Internet Surveys, a free monthly e-mail on what’s new in surveys on the Internet Online @ http://www.nua.ie (E-mail - web Online @nua.ie). This referral: http://www.nua.ie/surveys/1996review.html (6 January 1997)

59 Permission has been given to reproduce this survey data acknowledging that it was produced by Network Wizards Online @ http://www.nw.com/ (Monday 10 January 1997)
“envelope” will self-seal and remain completely tamper proof till a further interactive accord is wanted.

1997 was seen to be a real growth potential area for merchandising software and general retail goods, which would embrace tourism, book and magazine publication, and music products, interactive banking and a thriving outcome for educational assets. Online publishing, however, fell short of expectations. The researcher suspects that inoperable international (intellectual property) copyright law was, and will remain, a deterrent until compromise and rationalisation join forces which is implied by already developing changes.

Outstanding growth has come from a prolific “creative hype” bombardment, sparked by the introduction of Java and Perl software; where ingenious “plugin” add-on techniques enable HTML compatible home page publication of embedded, miniaturised, self-sustaining programs. These introduced creative on-running “mobiles”, “ticker tape footnotes”, and innumerable, eye-catching graphic formats (often superfluously).

It had been anticipated that the infrastructure of the Web would self-destruct in 1996 due to user traffic fatigue and, in some instances the, crises seemed imminent. The same prediction had been made for 1997. But it was felt that where one window closed another would open, and that the natural process of homo sapiens imaginative evolution would ensure either its longevity or eventual regeneration by even more efficient mechanisms if necessary, by mutational evolution.

**Who are the World Wide Web’s principal players?**

As noted above, the Internet was first devised for military intelligence transmission out of E-mail, which, in turn, was developed from the notion of teleprinting and complimentary electronic expertise in the information technology sciences. Given, that academia has historically contributed to the development of trailblazing concepts (whether for military or civil beneficiaries), it may be appreciated that governments would seek to amplify those benefits to the maximum. Hence the end result was the networking of universities, first in the USA then gradually world wide, to arrive at today’s staggering bandwidth of electronic information delivery.

Governments are among the top players in their contributions, by way of publishing almost everything that is not quarantined by relevant Freedom of Information Acts. The USA government was the first to take that initiative. Now, users can tap into the majority of such unclassified material pertinent to most nations. Notwithstanding, that
same government was recently defeated by its own judiciary when it attempted to implement legislation requiring all encryptors to give a copy of their codes to the CIA.

There is little doubt, however, that governments covertly monitor web pages euphemistically based on need for national security and civil rights, or any other conveniently euphemistic semantics. Hackers, of course, can go beyond that. That is another grey area where privacy is covertly invaded and often "massaged" to alter data for nefarious reasons.

Figure 1.1

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Users (thousands)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>United States</td>
<td>54,675</td>
<td>54.70</td>
</tr>
<tr>
<td>2</td>
<td>Japan</td>
<td>7,965</td>
<td>7.97</td>
</tr>
<tr>
<td>3</td>
<td>United Kingdom</td>
<td>5,828</td>
<td>5.83</td>
</tr>
<tr>
<td>4</td>
<td>Canada</td>
<td>4,525</td>
<td>4.53</td>
</tr>
<tr>
<td>5</td>
<td>Germany</td>
<td>4,064</td>
<td>4.07</td>
</tr>
<tr>
<td>6</td>
<td>Australia</td>
<td>3,547</td>
<td>3.55</td>
</tr>
<tr>
<td>7</td>
<td>Netherlands</td>
<td>1,586</td>
<td>1.39</td>
</tr>
<tr>
<td>8</td>
<td>Sweden</td>
<td>1,311</td>
<td>1.31</td>
</tr>
<tr>
<td>9</td>
<td>Finland</td>
<td>1,250</td>
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<td>10</td>
<td>France</td>
<td>1,175</td>
<td>1.17</td>
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<td>767</td>
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<td>Top 15</td>
<td>89,720</td>
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<td></td>
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</tr>
<tr>
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<td>Worldwide</td>
<td>99,960</td>
<td>100</td>
</tr>
</tbody>
</table>

Courtesy Geographics: Top Ten 15 Countries for Net Usage 1998

The World Wide Web and Scholars

It is in the academic arena that players have offered one of the most substantial advances in distance learning and universal dissemination of information leading to better understanding of educational practice as such. In recent times there has been a pedagogical paradigm shift resulting from a flow of trailblazing “liberated” thinking, more appropriate to changing times, and to method application. Graeme Hart\textsuperscript{61} sums up the situation quite nicely in:

\textbf{SCHOLARS ARE CURIOUS TYPES.}

Perhaps something of an anachronism in the modern world of all encompassing economic rationalism. Centuries ago, when Monasteries were physically remote repositories of knowledge, scholarship was the privilege of a select few in splendid isolation. From the Gutenberg press to the modern day, technology has challenged and changed the way humans learn about their planet and about themselves.

\textbf{COMMUNITIES OF SCHOLARS HAVE always existed both in the secular sense of the monastic monks and internationally through writing and traditional older communications methods. With Internet technology we now have an opportunity to create the virtual community of scholars, or should I say we have an opportunity to join this community because it already exists.}

\textbf{The ONLINE-ED mailout is but one small example of this.} Ever developing Computer Mediated Communication allows us to more and more easily communicate with colleagues and students internationally. Do we want to do this? Do we have any choice? .

\textbf{THAT THE TECHNOLOGY EXISTS to facilitate virtual scholarship is indisputable.} Whether the current generation of scholars will embrace this is debatable. That future students and academics will see this as the norm is inevitable.\textsuperscript{62}

In the same paper, Hart makes an incisive observation that ‘...virtual education appeals to mature age, and part-time students for the convenience offered’.

\textsuperscript{61} Lecturer in Systems Management specialising in Management Statistics and Business Computing:

Faculty of Education, University of Melbourne (ghart Online @ edfac.unimelb.edu.au) in The Virtual Scholar, Online @ http://hector.edfac.unimelb.edu.au/ (15 March 1997)

\textsuperscript{62} Lecturer in Systems Management specialising in Management Statistics and Business Computing:

Faculty of Education, University of Melbourne (ghart Online @ edfac.unimelb.edu.au) in The Virtual Scholar, Online @ http://hector.edfac.unimelb.edu.au/
Whilst K-12 students apparently have little or no inhibitions in grasping the concept of education delivery by the Web it is the “mature” learner (and particularly a large number of academics themselves) who initially display technophobic rejection of this new medium. Nevertheless, they embrace the concept with considerable warmth as soon as they appreciate that they need not feel any embarrassment at what they perceive to be betraying personal ineptitudes with the technology.

Young people are very rarely inhibited by initial “fumbling” because the exploration process is the most exciting part of their learning approach. They prefer their own cognitive experience to the voice of experience that canon ingrains in later life as part of human habits.

Information and knowledge can be conflicting terms of reference. Hence the Web attracts many other players, which may not be conducive to improving quality of life on a universal scale. Commerce is well represented and with it a seemingly irresistible consumerism, whether by merchandising material goods or spiritual offerings. Online banking has become synonymous with spending.

The Web also has an infinite menu of entertainment, games, theatre and movie news, holiday highlights, hobbies and so on. Also, well represented are forums and chat spaces where “you too may have your say”. These cover voluminous topics.

Explicit “in-the-raw” sexual voyeurism has also come to the forefront, as has persuasive cultism. Much is relatively harmless; indeed therapeutic in many instances A dangerous conditioning of unsophisticated minds in that environment does exist nevertheless. No one has suggested to the researcher a responsible, yet democratic, total freedom of expression that does not entail a specified censorship based on the mores of the day. This then fortifies both the enigma of human intellectual appetite and the perennial argument itself.

Summary

The adage that “Travel broadens the mind” is well founded. Setting out from a narrow footpath of self exploration of the Web and ending up in its Superhighway had convinced the researcher that there on the horizon of that highway, but still some distance away, was a portal to formerly unimaginable treasures of the mind.

Today’s hunters and gatherers now have inspirational tools whereby the World Wide Web could lead to a brave new world. If only virtually so. the biblical Tree of Knowledge to be found there is real nonetheless.
The remaining questions on the history of the Web - **What is its place today? Who best gain by its use? What of tomorrow?** - will be subsumed in the chapters following. Threaded into other areas of this study will be further references to what has already been said here. Such comments are not intended to be repetitive, merely a broadening of perspective in the process of writing; bearing in mind that the foregoing overview, and the expectations, do not comprise a strict account, an inside view of the technical intricacies of the Web, nor review the entirety of its thirty or more years existence.
World Wide Web: Its engines of creation

What is a house, what is a city, without walls? The Internet needs walls, not simply for those tired of searching, but also for those keen to create and live life to the full.

Gerry McGovern¹

Earliest humankind wandered the then known globe in nomadic hunting and gathering food for physical sustenance. Evolution, particularly in the complex technologies, has created prolific cerebral changes since then. Now, the metaphysical nutriment sought for is of the inspirational intellectual kind, the hunting and gathering of information, the production of knowledge: an infinite searching for answers.

Our source and icon as perceived portal to a gaining of infinite knowledge today, is the World Wide Web where the structure of the Web simulates the mythical Tree of Knowledge with all its ramifications. A perspective for successfully reaping its fruit is the subject of this chapter. It further reflects an imperative for would-be creators of knowledge to, first of all, assume the role of explorer in oceans of information.

In 1995, the researcher considered himself one such inexperienced navigator. His strategic navigational tool was the search engine, of which there already was growing number and variety - some good, some not so good. It was a random harvest at the outset, but hands-on perseverance convinced me that the Web could be much more than a crutch insofar as bolstering knowledge. Today there is an infinity of those engines, and they now range from the very good through to excellent and indispensable to the avid researcher.

From flint stone to computer: a prologue

When our forebears established the Agrarian Age in a shift from the Nomadic, the need for flint stone harvesting tools became a necessity. These were as primitive as the minds that first created them, but nevertheless inspired the need for clan and, later, tribal collectivity. As that concept of “society” was established - even though rudimentary - it brought with it the nutrient Agrarian

¹ Gerry McGovern. New thinking: Searching. Online @ new thinking@lists.best.Co (10 July 1997)
collectivity As that concept of "society" was established - even though rudimentary - it brought with it the nutrient Agrarian Age and an incremental population through natural growth resulting from healthier life quality. This gradually generated interchanges of tribal resources, first through primary bartering, and in time, the full-blown commerce of the Mercantile Age.

The ever broadening horizon of cultural riches opened by those now distant discoveries was the spearhead of the Industrial Revolution that subsequently carried its own societal malaise as well as greater strides in the quality of life. Today's sophisticated "flint stone" is the personal computer, the gathering tools, its search engines; geared with the potential of further improving mankind's intellectual journeying to satisfy the need to know.

With burgeoning technology, where society is once again in a state of intellectual transmutation, information technology is an irresistible currency of today's society. Its hunting and gathering is becoming obsessively perceived to be this era's fundamental amphitheatre for survival of the fittest, in academia, the world of commerce, church and state and all competencies historically affecting our vicarious quality of life; much more universally than any other has done.

Life style changes are as inevitable as evolution itself. Whether for the better, information technology depends on the new breed we call Netizens\(^2\) and how they exploit the World Wide Web to their best advantage. The 1997 Price Waterhouse Consumer Technology Survey had already noted that 43% of Internet time accessed from home is dedicated to research, 34% for e-mail. Ironically, the marketing of consumer goods was forecast to move from 24% to 35% and its dependent advertising revenue rose 18% to $129.5 millions in the first quarter of 1997.\(^3\)

The World Wide Web is revolutionising the manufacture and production of knowledge. Its framework is of such promiscuous vigour, however, that its users can easily be swamped by an overkill of realisable information.

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\(^3\) NUA Internet Survey, Online @http:www.nua.ie (13 July 1997)
Acknowledging this, today’s hunters and gatherers have developed more sophisticated harvesting tools, the primary being the **Search Engine**. In 1995, these were already inadequate in confronting the deluge of “information” being published on the Web.

**Search Engines: what are they?**

Reflecting back to the Mercantile Age, none of its resources could have been achieved without the intervention of the compass and the sextant as ships travelled the oceans and people everywhere explored newly found landfalls. Similarly, the Web (as Superhighway) could never be exploited without providing complementary navigational instruments en route to contemporary discovery.

**Figure 3.1**

<table>
<thead>
<tr>
<th>Web Search Fill-In Forms</th>
<th>Newest Engines</th>
<th>General Search</th>
<th>Multi Search</th>
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<td>Arts</td>
<td>Automotive</td>
<td>Business</td>
<td>Classifieds</td>
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<td>Computers</td>
<td>Dictionaries</td>
<td>Directories</td>
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<td>Home Pages</td>
<td>Images</td>
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<td>International</td>
<td>Internet</td>
<td>Java</td>
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<td>Kids</td>
<td>Legal</td>
<td>Listservs</td>
<td>Macintosh</td>
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<td>Music</td>
<td>News Links</td>
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<td>Search Secrets</td>
<td>Software</td>
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<td>Subject Index</td>
<td>Travel</td>
<td>Web Reviews</td>
<td>Yellow Pages</td>
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research. Undaunted, you wander around expecting a Library of Congress or Dewey type layout of resources. But the stacks give no clues for targeting your objectives. That is not all. When you stop to examine the stacks, you find that there are no titles, no author sources, no referencing enumeration printed on the book spines; nothing by way of a title page when opened; no contents display; no indices.

In other words, you would have to start reading from the first page and (possibly) most of the remaining pages to access the deepest meaning of all the writing contained between the covers. Much information may be gathered on the way - but predictably little knowledge - that is, if the library's closing bell has not, by this time, started ringing and you are obliged to postpone your undertaking.

This would be an intolerable situation in the circumstances. It was a problem that librarians, archivists and information technology computer programming had to overcome. It is of little use in a desert oasis if there is a deep well with its lowest ebb depth still promising water, but you cannot get to it without that missing long rope and a bucket. If you try to reach in too far you will surely fall into the well and drown. The analogy holds for the Web. Without logical indexation of its referrals, its hyperlinks, any attempt at resource retrieval would have you drowning in information.

Linkages, as such, are not new in books of reference, say, where you will often find citations strategically embedded in bold font within the text of the writing, and in its index and sub-indices, if it is to be at all useful. These refer you, if you wish, to further resources of similar value, in the context, to be found elsewhere in the book. They generally serve to offer additional peripheral resources that do not of themselves radically alter the context.

Indices at the back of the book, say, offer a scanning latitude that may possibly save a great deal of time, in addition to the essential contents page which generalises the substance of the work. Search engines are an ever-improving mechanism serving that end within the Web's maze of hypertext.

The World Wide Web is a virtual universe expanding like that of the real one. No one can give a true audit of its guesstimated number of pages, claimed by some to double in number every few months at innumerable pages daily and, perhaps, many being billions online by the year 2002. Were it not for the typical browser search engines, the information hunter-gatherer would truly become lost in Cyberspace.
How do search engines work?  

*Ordinarily, there are two models of search engines* the first of which is the “skimming” type, which is based on an alphabetical, sequential, global or topic-set order or its permutations. The second species makes an effort to collate and catalogue the resources of the Web in a less convoluted way, aimed at much quicker access. It tries to riddle out the chaff from the grain, as it were.

**Figure 3.2**

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All search engines have two elemental briefs: seek and correlate data. This operation is often referred to as robotised wandering, reaping or grazing. Likeness to spiders is simulated by Lycos where: ‘Lycos comes from Lycosidae, a cosmopolitan family of relatively large active ground spiders that catch their prey by pursuit, rather than in a web. They are noted for their running speed, and are especially active at night.’

Factors of value are weighted by the extent of their roving territories against topical significance and time of entry, pace of penetration and the general “easy to handle” access architecture.

Retrieving resource materials

Search engines retrieve Web page contents and are classified as either/or a combination of “active” agents, which collects data on its singular base, or a “spider” (“robot”, “wanderer” or “crawler”). Most of the “spider” variety run twenty-four hours a day hunting and gathering and updating material as it finds it. The passive variety only recognises Web pages (URLs) as information details are regularly supplied to it. It is basically a discerning repository for registering submitted pages at the time of desired publication.

Home pages (the “literature” is subject to minute-by-minute updates or obsolescence - or should be - as well as their graphics (book covers and illustrations) and these are culled on a regular basis - or should be - to ensure the latest material is made available.

There is, nevertheless, often considerable time lapsing in this process. Some engines are naturally more adept at harvesting resources than others, which is why a dependence on any one search engine is not a practise to be encouraged.

A third type is labelled “meta-search” engine. Queries by clients are broadcast to other engines within the Web. As these are responded to, the “meta-search” engine will collate these by priority of “hits” (quest relativity) as a percentage scaling benchmark, and identify the search engine primary source, which can thereafter be further referred to if wanted.

Sometimes unproductive information tops a Web’s home page detail. Often the user scores hundreds (thousands) of hits, and, paradoxically, some results totally ignore

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otherwise important items of resource such as Gophers and FTP sites. The *active* type has a more comprehensive catalogue but can retrieve gratuitous and superfluous hits.

The *passive* engines are perhaps better organised but have a smaller menu which indexes co-ordinates in unusual zones.

*Meta-Searcher* can circulate a query over a universal arena, although this may take some unwelcome time to retrieve.

The choice of search engine is subsequently a persuasive primary consideration for the end-user, and it will pay dividends in coming to terms with their individual capabilities as quickly as possible.

**Intelligent Agents**

Before that typified above, much debate had been given over to searching the Web mediated by an “intelligent agent”, a “cyberbutler”, a “cyber-faculty librarian” or a comparable generic utility, “instructed” to hunt and capture a prescribed catalogue of prerequisite documentation by “crawling the Web”. It would be drilled to: fetch ‘this, but not that; with a few maybes; but no more, no less than’.

A time for harvesting and delivering could be pre-set, along with a personally preferred prioritising formula. The user would then merely access specifically arrayed, otherwise dormant material, responded to by e-mail ad lib, and, ‘Hey presto!’, all the information would be retrieved, catalogued - no more no less.

Such a futures already available for every day e-mail archiving and would become more sophisticated. Find Mail is such a current application. Daily, programmers are introducing more of these.

One of the problems that these kindred agents would bring, was an ability to search *newsgroups, online discussion groups and chat spaces* for morsels of information; even where password protection applies. This is often achieved by the “prowler” e-mailer creating a spurious identity and going through a secondary anonymous server. At that point the browser user will only recognise the *false identity* if the full header checking is not carried out.

This leads to covert “spying” on numerous occasions. Trashed items can also be retrieved during non office hours (through an unambiguously elaborated, customised Dr Norton-type application). Items like passwords or confidential documents are relatively easy prey, now that *phantom images can be retrieved* surreptitiously from hard disks.
and hard drives whether dormant or switched off for any reason (as long as the cabling is still attached to power and modem lines). Government undercover entities like America’s CIA or Australia’s ASIO (and doubtless many other countries) already engage in such tactics.

This is possible to be countered by encryption actually encrypting the “delete” process which, in turn, merely leaves an encryption after-image on the hard drive. As long as cultures are haunted with their “need to know” philosophy.

**Figure 3.3**
means will always be developed to read the mind of perceived physical or intellectual opponents irrespective of damaging consequences. Electronic, so called, barriers (such as Fire Walls) being merely another challenge. 

The most recent "butler type" engines can be configured to access one's dedicated set of engines. Mac OS 9 system has an inbuilt search engine (Figure 3) which, not only searches the Internet but can be configured to index

Figure 3.4

The USA Federal government is desperately hoping to force Web publishers to surrender a copy of their encryption codes, supposedly in the "national interest". In Australia the trend is towards such Big Brother legislation, citing electronic currency exchanges as a like target for potential marauders. Civil libertarians, globally, will counter attack this invasion of privacy in favour of the encryptors so that deciphering of sensitive material remains unimpaired.
and download on instant or programmed timing as well as creating an ongoing catalogue of archived hardisk substance and materials stored on peripherals like floppy disks or Zip disks. And more!

The most recent "butler type" engines can be configured to access one's dedicated set of engines. Microsoft Explorer 4.5 has an inbuilt search engine which, not only searches the Internet but can be configured to index and download on instant or programmed timing as well as creating an ongoing catalogue of archived hardisk substance and materials stored on peripherals like floppy disks or Zip disks. And more!

**Figure 3.5**

![Sherlock 2](image)

<table>
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<tr>
<th>On</th>
<th>Search Sites</th>
<th>Kind</th>
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<tbody>
<tr>
<td></td>
<td>Aladdin Systems</td>
<td>custom</td>
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<tr>
<td></td>
<td>Aladdin Systems: Frequently Asked Questions</td>
<td>custom</td>
</tr>
<tr>
<td></td>
<td>Alta Vista</td>
<td>built-in</td>
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<td></td>
<td>Alta Vista-English</td>
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<td>CNET</td>
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<td></td>
<td>CNET Download.com</td>
<td>built-in</td>
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<tr>
<td></td>
<td>Direct Hit</td>
<td>built-in</td>
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<tr>
<td></td>
<td>Excite</td>
<td>built-in</td>
</tr>
</tbody>
</table>

Such typical engines evolved out of much less sophisticated ones existing at the time of the WIP study. Today they have embedded "intelligent agents" as described. There are
reportedly some 2300 search engines now available online. This includes corporate
dedicated search engines within the business and government agency arena.

The search engines used by the informants in this study were limited to the browsers
available in 1995. They still had to wade through masses of information distinctly more
unsieved and appraised. But this is not to say that the quality of their performances were
diminished as a result. Indeed, and in retrospect, they might actually have achieved
better insights into the capricious nature of mining the resources of the Web, despite
their technologically available stone age implements than those using current “butlers”
which have, to a much greater degree, so many more digitally friendly, archaeological
tools.

**Leading search engines may not lead**

The long and short of it is that search engines can't be bothered indexing the other 90
percent of the Web for the simple reason that it's not commercially viable for them to
do so.

The sites most likely to be found on a search engine or a directory are US-based,
commercial and highly trafficked. These are the very sites which spend millions on
their marketing budgets and are least in need of the additional endorsement of being
listed on a search engine.

If a huge organisation like Yahoo! can only get it together to index 7.4 percent of the
Web then isn't it time we stopped referring to it as a search engine and start thinking of
it as a members-only commercial online country club. If you've got the cash, you're in.

In fairness to Yahoo!, they never call themselves a search engine or directory and in
their press material they describe what they do carefully: "Yahoo! contains organised
information on tens of thousands of computers linked to the Web".

Two scientists from the NEC Research Institute in Princeton carried out a study on the
Net's loudest search engines and found that not only do they not index the best part of
the Net but they are most likely to index commercial over educational, US over
European and popular over relatively unknown.

The irony here is that large US-based commercial sites are the very sites which don't
depend on search engines to index them in order to be heard above the noise of
competing online merchants. It's the smaller non-US non-commercial
sites with low budgets who depend on search engines to index them, otherwise they really don’t exist. You might as well set up a shop in your garage and not tell anyone about it. Is mise le meas, Sorcha Ni hEilidhe.


Not all of the Web pages of the particular engines replicate that of the others, but their “motivation” is similar. And if you consider that there are now some 2230 (circa) public property engines online the number of possible strikes becomes astronomical. This is the reason for developing personalised agents or butlers out of the progress of evolving artificial intelligences.

Directories

Another category of searching tools is Directories. These tend to be “manually” catalogued at source in conventional library mode and classified accordingly. Because of the human touch, these tend to be better correlated and, more reliable. Yahoo supports such a “preferred” one, and increasingly so since it formed a partnership (June 1996) with Alta Vista.

Multiple searches

Although not common knowledge in most areas, it should be noted that compatible browsers will “comfortably” allow the user to run up to four searches simultaneously; any more running concurrently would impede all but the most powerful machines. All that is required is to mount a new page for each search agency. Four different topic searches can be run concurrently, or the same topic can be “tested out” for quality of retrieval on the four separate engines. (These may be window shaded to run in the background). This can be a considerable time saver. There is a precaution: the end-user should check time zone differences and run the searcher online to coincide harmoniously with those factors.

Ranking within Web Pages

In the process of searching, the engine will deliver those pages among the millions of them that “it” considers best match your needs. This presentation is not always accurate and extraneous data is included; especially when “wild card” search mode is used. But mostly, the engines of today are far more sophisticated than their prototypes in that capacity, and the searchers’ targets are hit within the first of the pages offered. Hierarchical “hit” ranking by percentage is now a general provision on search engines;
Hierarchical “hit” ranking by percentage is now a general provision on search engines; but there is usually a substantial variation of such “scores” between the numerous engines due to subjective, search-programming bias.

This is where the docile “intelligent agent” should be coming to the fore, as the mechanisms for retrieval and delivery get to be more “discerning” and tractable, and be able to “divine” the required data almost instantaneously. Engines are becoming more and more compliant to finely tailored personal requirements where a mandatory tract prerequisite is directed in the search field instruction command at time of entry. Currently, this conceptual refinement has already been embedded in the superior engines, where they will (as a measure of implied accuracy) codify and indicate disclosures by appending a weighted percentage calibration of “hits” to each related abstract as previously indicated above.

Much like present librarianship, search engines function primarily by keyword indicators so that those Web pages that have such a keyword within their respective titles will be selected first, and the priority hierarchy begins where nearer that keyword is placed at the beginning of retrieved titles. If the keyword is not actually in the page title itself, the contents, from first sentence through paragraphs, are scanned for the same purpose.

Another benchmark indicator for the engine would be the number of times the keyword is repeated in a particular page, or pages. The higher the number scored would suggest a predilection, which as we will see below is a “flaw” exploited by a number of Web publishers in order to counterfeit ongoing statistical performance and thereby “justify” a then accredited popularity rating by user pings.

Engines like WebCrawler lean to celebrity targeting, prioritising those pages with greater flow of generic linkages embedded in them. This tends to lift the profile of the engine itself since its apparent (but deceptive) popularity is thereby evidently highly rated on the Web. There are some vehicles that publish reviews of affiliated listings, concluding that being reviewed by “It” is sufficient to validate the page’s contents.

The “smart” publisher who repeats a keyword in rapid succession throughout a home page, thinking that this will have it rated over others, is generally outmanoeuvred by the better engines and consequently relegated to a more merited ranking. If it should have inadvertently overlooked this ploy, there are many online client protesters ready to prompt the particular engine’s human mentor, the particular Webmaster.
required and contextually available to the user from within the myriad niches of the Web.

**All-in-One Search Page**

**EZ-Find at The River**

**Find-It**

**The Internet Sleuth**

**MetaCrawler**

**SavvySearch**

**Starting point**

**Web Search Simple Search**

There is now a developing sequence of searcher home pages that provide “seek” fields that “match all words”, “exclude words”, “search by phrase”, by “proximity”, by “wild card” (good for when your spelling is not your forte). Added to this is a capacity “find-by-medium such as sounds or graphics. There is an abundance of searching skills tutorial references on the Web which lead to best practices for the keenest thinker. (Note references section.)

Some of the best and most useful features of a number of the above search engines are:

*Alta Vista*: Results can be customised from standard, compact or detailed fields; where *Usenet* provides the field in place of the Web to retrieve the more mundane items. A further option of narrowing of the groups eases the searching. "If you want to find out if there are any postings about German shepherd [dogs] in the rec.pets.dogs.behaviour group you search that group only, rather than all newsgroups by adding "+NEWGROUPS:PETS.DOGS.BEHAVIOUR" to your search, or you can search all groups except a certain one by adding "NEWGROUPS:PETS.DOGS.BEHAVIOUR". Its “Rank the Results fields” assist your accessing by entering selected words or phrasings. Those pages most relevant will be provided in a hierarchical points scored manner. A multitude of free services is now provided such as e-mail, Web page space of around 20 mgs, voice mail etc.

*DejaVu*: Permits you to time-frame your needs through *Power Search options* which posts items current or retrospective to three-months-past issues. Selecting to “Only” option lets you enter further archived data. Again, this initiative will perform single or dual searches if instructed to ‘search for, how many records you want, how you want theme rated, and so on’. Clicking “Show Expanded Query Filter from examples” allows the filter to widen and coach on how filtering fields can best be used by example, and refers you to www.dejanews.Co/help/dnfilter helphtml#dnsetfilter exp for comprehensive guidelines. There are many more advantages, the best being that a subscription to Dejanews will note your preferred newsgroups’ labels which can then be bookmarked.
ERIC : This assistant will return results entered by phrase. It will suggest likely wherewithal based on those simplistic entries; which simplifies and substitutes the proviso of entering specific keywords. This locator is especially relative to scholastic searches, but not entirely dedicated to such.

Hotbot: Can refine your requirements via its ‘Formenu all words, any of the words, the exact phrase, the person, the URL, or the Boolean expression’ fields. If the “Choose the Full Descriptions” is your command, a brief summary of the HotBot pages found is provided. With its “Cyberplace”, specialised Internet addresses and suffixes, such as EDU for instance, which would then restrict those targets to schools, universities and education information. The Media menu will throw up a whole range of multimedia resources and there is also provision to restrict the searching to “must contain”, “should contain” or “must not contain” conditions. This engine has a Super Search mechanism which can harvest specific environs, captures by time slots; regulating the depth of Web site tiers is a feature. Added to which, countries of (anticipated) publication can be targeted as primary sources, File types wanted can be designated and culled from the vast array of the Web in submitting some 100 possibilities for your initial perusal.

Infoseek: uses Ultraseek for specialised searching ‘including Imageseek(for finding logos, pictures, and to other graphics). It can also be used to count the number of pages using the descriptive keyword(s)’ by accessing special options. For languages other than English, there is accented character provision , giving better still results. The Netscape Navigator Browser Window may be further enhanced by installing the Infoseek application, a copy of which can be downloaded from guide.infoseek.Co/iseek?pg=seek.html: prompting immediate contact . Your searches can be scheduled or tailored for your particular wants and ‘It loads up your browser when you tell it to and conducts your search,’ via its built-in URL: guide.infoseek.Co/iseek?pg=seek.html.

Lycos: Is another engine providing personalised search formats including reviews and PeopleFind, TopNews and City Guide (www.lycos.Co/software.html. Further related sites are button provided for , as are fields for music and pictures etc. Once more, this particular engine lets you personalise searching to a substantial extent. Its ‘search only the “top 5% of all Web Sites” does just that from a reviewer link to www.pointcom.Co/.

Magellan is a top-of-its-class resource for teachers and scholars alike and if you check the provided for box, you will be shown only those sites that have been reviewed and rated (G, usually). It was among the forerunners to list a topics range at the left hand side of its pages, abutting the general textual contents, so creating speeded-up access. Subtopics are arranged better than in the conventional Dewey system.

WAIS (Wide Area Information Server) accepts raw routine language input and is organised for quick retrieval monitoring. This exhibits results based on applicability as a prompt to finer tuning if required.

Webcrawler: has an interesting feature gained through its Web Crawler SearchTicker Java applet. You can eavesdrop on what pages are being concurrently accessed by other users online on a ticker tape image on your screen .It also provides details of who has been linking to your site as well as preferred URLs. Search summaries can be as brief as you feel necessary (for first-time, exploratory hits) and its engine will find further related items on demand.

Yahoo: is probably one of the most used engines because it finds people and limits the age of your wanted lists. The uselink will extend newsgroup areas and, like the others, will supply a personalised home page showing those items you elect as wanted.

An added feature here is its “Search only on Computers and Internet”, thus saving a lot of time ruminating the full index on its holdings. National and regional arenas can be targeted as well as linking to the other engines like those above.
The number of search engines and their various online attributes entering the Web daily is myriad. Here the researcher has only given a “thumbnail” picture as it were. But for the devoted end-user, the whole range can be catalogued by seeking “list search engines” in most search engine fields. However, so many of these duplicate information that it is unwise to do anything more than ascertain what ‘best works for me’ and confine your toolbox to no more that the top echelon; which does not always mean the most popularly used. The merit of the Web, like a book, is, unfortunately, not always revealed by its covers.

**Mindmapping as a searching aid**

With the aid of mind maps, and taking up the key issues, those informants had been able to translate their flow chart structuring so that building a Web map prior to accessing it put them at an advantage. They had been drilled to determine a predetermined use in assessing if the contents were suitable targets for themselves as future trainers. They adopted their own styles of comparisons within sites available and discern the “credibility” of the authors located. Learning to refresh pages became elemental to them in their searching; in order to filter “use by dated” contents. And most importantly, they had skilled themselves in looking closely at the architecture of the various sites, noting benefits and potential delinquencies such as downloading time and storage volumes required.

**Cookies may be bad for you**

An indigenous development in covert information assemblage, infiltrated by a growing number of Internet service providers, is the *cookie*, a lesser form of intelligent agent which is subsequently proliferating inside of many browsers.

These can be activated whilst online or machine dormant. These can be (and usually are) outcomes from nano-technology researches all the time underway in the development of miniaturisation of computer technology components.

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7 Remarkably, Sue Scott (1998) has alluded to those skill requirements in *Mapping the internet: applying reference skills to tame the Web*, in LASIE, Vol 39. No 3 (September), New South Wales: State Library. (Cf Library and Information Networking @ http://www.uklon.ac.uk.metadata/desire/classification/)
A closer look at this background suggests further invasion of privacy in its milder form or, conversely, a potentially gross invasion in the context of commercial and, by association, national espionage.

The irony is that these little “bugs” generally ask your permission to enter, similar to the vampire which must have your invitation before possession. The difference being that, even if you decline, the “bug’s” friendly question you cannot be sure that it enters anyway. And if you refuse access whilst online it will invariably cause the connection to drop out - a virtual blackmail of sorts.

What happens is that this minuscule electronic spy may be implanted in your hard disk whenever an “interested” URL is accessed by you for the first time. A useful- to-user outcome is that whenever you visit an online shopping location (say, a bookstore like Amazon Co.) your virtual shopping basket may contain goods you do not purchase, although (impulsively) chosen by you whilst window shopping. When your purchase is, in fact, carried out: not only are your actual buys registered under your given identity, but those secondary books, at this point first rejected by you, are put on virtual “lay-by” so that when you next visit that store, these are automatically “dropped” into your basket. Your buying profile has been automatically archived and you may be blitzed with unsolicited product publicity to your taste. Compulsive shopping has evolved into a hazardous new significance in this technology age!

However cookies can be removed from your hard disk by way of the browser preference itself (or an application like Spring Cleaning™). Its preferences documents can be activated so that triggering the ‘cookies’ indicator allows you to edit out the unwanted cookies implanted either singly or collectively. The URL then has a single access “ping” in its detection archive but no longer has the capacity to report back that your machine has accessed that address and its links in an established series. That is one theory, but, realistically in today’s technological clime we are unlikely to ever detect covert intelligence activity on our browsing travels.

Grazing the Web: “Surfing”

Search engines have in-built tuition to enhance advanced searches. All you ever wanted to know but were afraid to ask is there for the asking - and much more cost and time effective than investing in instructional textbooks which are outdated before the ink is dried properly. FAQs (Frequently Asked Questions) are generally adequate for day-to-day use. In the same context their so-called Web site address books being published in
growing quantity. Ignore them for the greater part. The so-called URLs are invariably outdated and, in any case, takes the “rush” out of your personal searching discoveries.

The next few years will be interesting in that environment. Will the evolved artificial intelligences (research assistants) then have vested intellectual proprietary rights to sue their human mentors for plagiarism, say? Science fiction perhaps. Nonetheless, science fiction has always had an historical element of self prophecy as well as wishful thinking. On the whole, it appears that cookies, as such, may well serve the routine end-user well. Nevertheless, the caveat emptor caution for privacy invasion through downlands applies here too.

Search engines, as suggested previously, are metaphoric ropes and buckets. Sometimes the ropes are too short, often the buckets are holed and much is lost. Nevertheless, the reservoirs of data are becoming more readily accessible.

The bucket-rope retrieval notion is in the process of being replaced by a sort of “intelligent electronic siphon”, which can be turned on and off at will - although the technique still requires fine tuning - so that you are replenished with exactly the right quality and quantity of (intellectual) refreshment requested: in this case, information browsers have since been developed that let you save an accessed page of statistics (stock exchange, demographics, commercial, and so on, data) directly onto your desktop. Even when you are “offline” subsequently, these little “applets” will remain on your desktop and the previously targeted source will update 24 hours a day to keep you continuously au fait with any changes to the information data.

The World Wide Web

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8 ‘For further information about cookies, try visiting Andy’s Netscape HTTP Cookie info page ainaus.Co/cookie, [Where] a link to a “cookie cutter” is provided - a freeware program that cuts out cookies for browsers that don’t have such screening options.’ Copyright: Computer Choice. Cookies: spies from the Internet., Marickville, Sydney-Australian Consumers’ Association, Sep/Oct 1997 pp 6-7
growing quantity. Ignore them for the greater part. The so-called URLs are invariably outdated and, in any case, takes the “rush” out of your personal searching discoveries.

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\textbf{Web marketing}

Marketing on the Web is similarly aggressive, but more manipulative than at your local shopping centre. Agencies like Double-Click and Alta Vista and so on presently exchange data with each other on your predilections; whether in seeking basic (cost attractive) resource outlets or investing in material goods. This data then transforms itself into targeting you, sporadically with merchandising “come-ons” focusing on

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acquired patterns of your acquisitions. This inroad can be aggravated without the aid of cookies however.

Everyday “pinging” on a Web server automatically redirects to itself details of your Internet address, commercial and technical identity of your particular browser, and facts on the last URL visited by you. Those online users who have succumbed to the variety of FlyBuy schemes introduced by credit providers, should recognise that such pointages acquired are not of themselves gathered by cookies but through information gleaned from your banking account’s translated debits. This collective agency collation eventually becomes a virtual demography, undeclared and incognito, challenging the capacity of any national census and “push-pull” commercialisation of the Web.

Newsgroups, as such, are generally derived from “postings” through the Internet rather than Web specifically, although browsers (with e-mail provision) have an access option for that area of information. Such is the number of subscribers, that these newsgroups can be a morass of trivial pursuit, lots of pornography, radicalism and generally off beat topics - as well as highly informative areas. There are boards with substantial specific dedicated news over the widest possible spectrum; buying, selling; developments in technology and so on. It is the tedium of finding the “right source” that annoys many academic and professionist users.

Archie will tell you exactly where to find a file for downloading out of a vast array of such focal point resources. There are some specific drills to learn, but these are provided for as tutorials. (http://hoohoo/nca.uiuc/ed/archie/html is typical)

DejaVu : Permits you to time-frame your needs through Power Search options which posts items current or retrospective to three-months-past issues. Selecting the “Only” option lets you enter further archived data. Again, this initiative will perform single or dual searches if instructed to ‘search for, how many records you want, how you want them rated, and so on’. Clicking “Show Expanded Query Filter from examples” allows the filter to widen and coach on how filtering fields can best be used by example, and refers you to www.dejanews.Co/help/dnfilter helphtml#dnsetfilter exp for comprehensive guidelines. There are many more advantages, the best being that a subscription to Dejanews will note your preferred newsgroups’ labels which can then be bookmarked.

ERIC: This assistant will return results entered by phrase. It will suggest likely wherewithal based on those simplistic entries; which simplifies and substitutes the proviso of entering specific keywords. This locator is especially relative to scholastic searches, but not entirely dedicated to such.

Hotbot: Can refine your requirements via its ‘Formenu all words, any of the words, the exact phrase, the person, the URL, or the Boolean expression’ fields. If the “Choose the Full Descriptions” is your command, a brief summary of the HotBot pages found is provided. With its “Cyberplace”, specialised Internet addresses and suffixes, such as EDU for instance, which would then restrict those targets to schools, universities and education information. The Media menu will throw up a whole range of multimedia resources and there is also provision to restrict the searching to “must contain”, “should contain” or “must not contain” conditions. This engine has a Super Search mechanism which can harvest specific environs, captures by time slots; regulating the depth of Web site tiers is a feature. Added to which, countries of (anticipated)publication can be targeted as primary sources, File types wanted can be designated and culled from the vast array of the Web in submitting some 100 possibilities for your initial perusal.

Infoseek uses Ultrasseek for specialised searching ‘including Imageseek (for finding logos, pictures, and to other graphics). It can also be used to count the number of pages using the
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*Infoseek:* uses Ultrasen for *specialised searching* including Imagesen (for finding logos, pictures, and to other graphics). It can also be used to count the number of pages using the descriptive keyword(s) by accessing special options. For languages other than English, *there is accented character provision*, giving better still results. The Netscape Navigator Browser Window may be further enhanced by installing the Infoseek application, a copy of which can be downloaded from [guide.infoseek.co/iseek?pg=seek.html](http://guide.infoseek.co/iseek?pg=seek.html); prompting immediate contact. Your *searches can be scheduled or tailored for your particular wants* and 'It loads up your browser when you tell it to and conducts your search,' via its built-in URL: [guide.infoseek.co/iseek?pg=seek.html](http://guide.infoseek.co/iseek?pg=seek.html).

*Lycos:* Is another engine providing personalised search formats including reviews and PeopleFind, TopNews and City Guide ([www.lycos.co/software.html](http://www.lycos.co/software.html)). Further related sites are button provided for, as are fields for music and pictures etc. Once more, this particular engine lets you personalise searching to a substantial extent. Its 'search only the "top 5% of all Web Sites" does just that from a reviewer link to [www.pointcom.co/](http://www.pointcom.co/).

*Magellan:* is a top-of-its-class resource for teachers and scholars alike and if you check the provided for box, you will be shown only those sites that have been reviewed and rated (G, usually). It was among the forerunners to list a topics range at the left hand side of its pages, abutting the general textual contents, so creating speeded-up access. Subtopics are arranged better than in the conventional Dewey system.

*WAIS* (Wide Area Information Server) *accepts raw routine language input* and is organised for quick retrieval monitoring. This exhibits results based on applicability as a prompt to finer tuning if required.

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**Auxiliary search conduits**
Newsgroups, as such, are generally derived from “postings” through the Internet rather than Web specifically, although browsers (with e-mail provision) have an access option for that area of information. Such is the number of subscribers, that these newsgroups can be a morass of trivial pursuit, lots of pornography, radicalism and generally off beat topics - as well as highly informative areas. There are boards there with substantial specific dedicated news over the widest possible spectrum; buying, selling; developments in technology and so on. It is the tedium of finding the “right source” that annoys many academic and professionist users.

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Gophers These evolved out of the earliest file exchange mechanisms and are text-based. They will transfer innumerable data files from specific archives and generally can provide an historic progression of information whether technical or everyday which other engines have not catalogued. In principle, they dedicate themselves to academic centred literature, lots of press releases and significant articles in the press. Since there are hundreds of such servers, a common interface has been established which greatly simplifies interaction and downloading time. As an early search tool to principally a scholarly literature a search field merely requires “gopher: subject” under the “titles” it offers. Veronica (accessible at gopher://veronica.scs.unr.edu) is one of the foremost sources.

ftp (File Transfer Protocol) acts similarly to gophers and is processed through Telnet for retrieval of data laden files principally focused on text-based, academic substance; and specifically libraries and such archives world wide.

Whois as searcher will quickly access people (normally the more prominent) and provide details of their access base or related activity and, where published, their Web page(s) (eg whois: InterNic This is a clever device for contacting domains by name and may be searched by a keyword as such. It does not, however, capture domains denoting country of origin as a final suffix.

Virtual and Realtime Libraries Before browsing the Web extensively, it is a good move to explore these libraries, both types are now interactive, with campus genus intranetted for archival and CDROM publications. From this first step, sequentially updated Web resources can then augment the search in up-to-the-minute stages which compensate for quite standard, “dated” library holdings.
IRCs (Internet Relay Chats), MOOS, MUDS, and so on, and Aural/Video conferencing are further sources for exchanging ideas and commentary upon dependable areas of mutual interest. However, caution should be used in subscribing since, like all media, there is a fringe element in subscribers which, if not useless, can also be offensive and threatening in some cases.

Interactive Conferencing and Debating Groups. This, once more, is an arena where like-minded subscribers can find useful support, the greater being the multicultural origin of much of its context. It is more ordinarily professionally committed than the above.

Other agencies

Quests need not (and should not) be confined to search engines as principal means of research. Often other areas of the Web yield supporting resources, although many may not quite carry the weight of scholarly commendation within the resolute IT priesthood.

Group Discussion The principal arenas for finding resources within the Web, apart from search engines, are (dedicated) Lists and Newsgroups. With the Lists, people of like interests subscribe and receive up-to-the minute information on the topic of their predilection, usually by frequent, if not daily, e-mail communication. A feature of these is pre-empting awareness for the recipient of new Web pages which may not yet be annotated in search engines. Generally the list creates another reliable source of valuable bookmarks. At least, considerable valuable time is saved in the search mode and most of the Lists archive material retrospectively for some months.

Listservers (normally accessed by something like “listname@host”) might moderate the discrete topics because communications are first of all mediated through the arbiter who then decides whether to forward contents in blanket style to all subscribers, be particular to specific subscribers or, in some cases, exile suspect material. The process is normally activated automatically, but not all mailing lists use servers to do so. Individual listservers provide a passport for cost-free subscription and unsubscription and procedure for transmission to compatible subscribers.

Newsgroups on the other hand are enhanced bulletin boards provided by Web users and easily accessible for dedicated information by keyword(group title/topic). But the extent of these submissions is vast and the user must contact the bulletin board(s) directly. Many Lists gather information from Lists and Newsgroups simultaneously. There are some disadvantages. A subscriber signing in to a group does not always remain totally incognito (although pseudonyms may be used) and expressed views are open for global debate once launched. This can often be harrowing in the sense that people can be “flamed”, that is virtually abused online and for all to read. Harassment can follow where opinions conflict, to the extent that even virtual “stalking” can follow. The adage buyer beware fits nicely in this context.

E-mail

The advantages of e-mail (as an heir to the teleprinter) in the setting of information gathering are well established. Here, the would-be searcher endeavours to make contact(s)

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10 [A comprehensive glossary of Internet terms is located within the appendices section of this study.]
with the expert(s). This can be done by way of e-mail address-finding-tools or, more regularly by “getting to know” that particular someone through word of mouth from peers, colleagues, literature reviews, bibliographies and so forth, and by noting addresses most often appended to Web pages, and similarly in specialist texts (books, publications). In most cases expertise is shared liberally and warmly and there is the knowledge that the recipient(s) share views in privacy or by mutually agreed extension to kindred concerned researchers. (Persons are sometimes accompanied by ordinary postal address (“snail mail”) if patience is the norm.) Today, e-mail traffic supersedes normal telephonic contact. It can translate your material into the mother tongue of the recipients and counter wise return the facility in its response. Attachments of all kinds can be trafficked with the greatest of ease, and your e-mail can now “talk” to you in your own language if so desired.

**Mass e-mail Connection**

A measure of the evolutionary developments of information technologies in this decade is the focus on e-mail delivery. Many governments have facilitated online communication, but not to the “revolutionary” extent that (Socialist) Sweden has. There, ‘every Swedish citizen over the age of six is to be issued with an e-mail address by the country’s post office. Some one million citizens will be online by the end of 1997’. The move is not entirely altruistic since it was conceived out of the need to make government controlled postal movements much more cost-effective in the light of a decreasing demand triggered by growing online access. Personal computer owners will have the usual access provisions. Others will be issued with a personal address (@Post) available at their nearest post office, which, in turn, will forward a hand carried printout to the home address. Multimedia cubicles are to be set up in post offices where end-users may access the Web and e-mail for a fee. The fee(s) will be offset where ‘Users of the system will buy electronic micro stamps, which will be stored on their smart cards. Each time e-mail is sent, a stamp will be deducted [A] secure micro payment system based on Netscape’s CommerceXpert technology’ enables this transaction. ‘Users wanting to access @Post from their own PC will firstly have to use the smart card and password to download some client software from Sweden Post’s central servers, and from then on the system is very easy to use.’

Doubtless, governments, internationally are monitoring this scheme as a priority in assessing its informative values (and probable fiscal benefits deriving). Before being swallowed up in the river of e-mail that you might have inadvertently (unanticipatedly) triggered by “over use” the user who really needs this outlet/resource should invest in a

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filtering system which acts as a pseudo intelligent butler; of which a good number is now available, some even freeshare. Such filters are already part of configuration preferences.

Publicly Accessible Mailing Lists

The Web incorporates many “List(s) of Lists” among which this one provides access to hundreds of selective URLs. Alphabetically listed from “abuse” to “youth” to “zygotes; not quite an alpha omega catalogue, but more than ample for the dedicated researcher.

Useful pre-searching evaluation guides

It is a time saving expedient to familiarise oneself with a skill for evaluating search sites within a good number of reliable aids for such tooling.

Some appropriate engines

There is a developing number of advanced research tools the most rewarding (at the time of writing) include:

*Sherlock* (previously referred) which in addition, publishes a fortunately innovative search strategy. Its resources are archived and, should you give them a “fresh” problem, it will seek out best resolution(s).

[http://www.intermediacy.Co/sherlock/]

*Sink or Swim* [http://www.okanagen.bc.ca/libr/connect/search htm] has cues of value in explaining Boolean good sense whilst monitoring the superior search engines.

*Netskills* is better at providing tools more so than strategies, but is nevertheless a good starting point.

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12 *Suggested internet research strategies for printing*. Online @

Figure 3.6

The World Wide Web Virtual Library

Evaluation of information sources

This document is a part of the Information Quality WWW Virtual Library

This page contains pointers to criteria for evaluating information resources, particularly those on the Internet. It is intended to be particularly useful to librarians and others who are selecting sites to include in an information resource guide or curriculum. It refers to the qualities they should use in evaluating Internet information. Feedback and suggestions of other sites for inclusion are welcomed by the site transmitter, Alastair Smith.

- General selection criteria
  - Bibliography on Evaluating Internet Resources/ Nicole Rue. Virginia Polytechnic Institute and State University
  - Criteria for Assessing the Qualities of Health Information on the Internet http://www.cdi-mc.nche.com/healthcare/documents/quality.html. The purpose of this paper is to provide a set of criteria that can be used accurately and reliably by the general public (consumers) to assess the quality of health information on the Internet.
  - Critical Evaluation of Resources/ Margot Philips, UC Berkeley Library. Suggestions for evaluating a range of resources, including books, articles and websites. Covers validity, authority, other national reference sources, and provides links
  - Criteria for evaluation of Internet Information Resources/ Alastair Smith
  - Critical Evaluation of Sources/ Kathleen Schrock - criteria for elementary, middle, and secondary school levels.
  - Data base quality criteria. This list is based on Rena Brach's article in October 1990 Database Review. 
  - Evaluating the Quality of the Data and Databases particularly to online bibliographic databases

The search engine in the classroom

Already, it should be self-evident that the Web is a frontrunner in the evolving potential of learning aids and that search engines offer a rewarding collateral for classroom teaching at base.

With such an aid, students can instantaneously retrieve and be selective in infinite cognitive resources in order to enrich their information base and, ideally, their knowledge manufacturing inventory. That knowledge storehouse will be acquired by critical evaluation measured by teaching the student how to think and no longer merely what to think. Before considering critical evaluation, though, we should not overlook
the overriding principle that critical thinking must go hand-in-hand with critical evaluation. Shapiro and Hughes (1996)\textsuperscript{13} presuppose the concept in their statement that:

Information literacy has been defined recently as ranging from tool and resource literacy to publishing literacy (communicate electronically), emerging technology (understand and incorporate new technologies, and critical literacy (the intellectual and social value of information). The last three literacies require creating, decision making, and synthesising other literacies into an understanding of the potentials and limits [my emphasis] of information technology\textsuperscript{14}.

Arising from this, a simple formula to contemplate would be that contributed by Debra Jones\textsuperscript{15} listing the important benchmarks.

Look for reputable resources.

Differentiate between fact and opinion.

Stay focused on the whole picture, while examining the specifics.

Be aware of fallacious arguments, ambiguity, and manipulative reasoning.

Be flexible and open minded as you look for explanations, causes, and solutions to problems.

Examine the assumptions, including your own.

The critical evaluation ploy begins by asking, ‘Why should I evaluate a Web site’s content before taking that resource as “infallible scripture” merely because it is published universally on the Web?’ It is logical to consider that your validity as a researcher may often be sorely tested if you take on board material that later does not stand up to the acceptable test of critical appraisal. The first maxims should be:

Is the creator upstanding?

Everything on the Web is not necessarily dependable.

\textsuperscript{13} J J Shapiro and T M Duffy (1996), Information technology as a liberal art: Enlightenment proposals for a new curriculum. Educom Review 31(2) 31-35

\textsuperscript{14} Debra Jones, Untangling the Web: Critical thinking in an online world, Online @ http://www.library.ucab.edu?Untangling/jones.html (26 November 1997) p 3

\textsuperscript{15}Debra Jones, Untangling the Web: Critical thinking in an online world, Online @ http://www.library.ucab.edu?Untangling/jones.html (26 November 1997) p 5
How does the authenticity of the reference stand up to universally acceptable standards?

Together with others, William A Katz\textsuperscript{16} has posited, a benchmark method for testing credibility, which, although it has been an offspring of accredited librarianship principally \textsuperscript{17} is a technique in similar vein that can be readily applied to Web literature. It is rare that Web literature provides the searcher with \textit{background notes on the writer/publisher} (although academic contributions more frequently do so). This missing element surrenders the document to a need for careful checking of such background: something which, if not initially cited at source, leads to a waste of valuable time and probably fruitless effort. Worthwhile pages should, as a matter of course, provide hot linkages to further supportive material in the frame of original authorship.

A most important measure is the \textit{currency of publication submissions}. There has been a recognition of this principle in that Web pages are beginning to endorse this point by \textit{alerts of revision dates} as these arise on documents.

Another point to be noted is that of \textit{distinctiveness}. Is the material available from supportive areas like CD-ROMS, comparative Web sites; via Gophers, listservers or conventional hardcopy? Are the benefits of the resource an enhancement to research of the chosen topic or merely reiterative? If other (electronic) media is used, is it enriching, more sweeping as resource and more current than complementary print sources?

Linkages cited should always assure appropriate currency and factual relevance to the principal issue. The user should be made aware where such further citations are not themselves limited by the page(s) being read, and that some other URL page may be accessed to that end.


\textsuperscript{17} Alistair G Smith, Testing the Surf: "Criteria for evaluating Internet Information resources", \textit{The public Access Computer Systems Review} 8 No 3 (Refereed article) Online @ http://info.lib.edu/pr/v8/n3/smit8n3.html (26 November 1997) Note: This article is copyright C 1997 by Alistair Smith All rights reserved. \textit{The Public Access Computer Review} is copyright C 1997 by the University Libraries, University of Houston. All right reserved. Copying is permitted for non-commercial, educational use by academic computer centres, individual scholars, and libraries. This message must appear on all copied material. All commercial use requires permission.
None of these primary precautions can be effected if the pages referred to render them in any way difficult to access. They must, of course, be user friendly and be published in a format that can be read by the principal web browsers, and in a format that is not "tinsel decorated [...] whistles and bells magnetic" to hook the eye rather than the intellect. Unfortunately, aggressive commercialism tends to sustaining pitfalls in that context.

Whilst all or most of the conditions may be met generally, a decisive evaluation will be lifeless if the writing style is weak. It should be readily understood, as far as possible, by the lay person as well as the professional. And this element should be applicable to graphic(s) input, which should not be capricious, zany, distracting, but, nevertheless, able to carry the message intended in an assertive way of reinforcing the dialogue.

Financing such published resources can be difficult and, for that reason, the more resourceful authors will first publish beta versions of initial output which the consumer virtually evaluates, so providing valuable feedback before moulding the ingredients as universally reliable. This is the greatest value of Web references: they can be in constant flux as to updating, whereas hard copy has to be withdrawn frequently and amended constantly (in today's electronic, impermanent climate) and is therefore very much more costly, nowhere nearly as functional to the masses.

The lesser value of the Web is that a constant flux often frustrates the reader as URLs seem to evaporate into Cyberspace, or move unannounced to sites that must trigger the whole search process again. Thus the strength of subscribing to dedicated listservers, as previously noted, because they invariably now advise you of such Web eccentric shortcomings.

There is a growing class of Web site that appraises home pages as an ongoing feature. But these might be measured as the vogue flavour most enjoyed by the provider believing the strength of self generated access "pings" and are accordingly so biased. Those, on the other hand, that input from accomplished librarianship - such as the Argus Clearing House and Ask Eric - evaluate available resources in a more commendable way.
Rules of thumb in summation

A researcher can improvise on a personal appraisal routine but this should always be based on criterion keywords like:

Parameters; Substance; Authenticity; Currency; Differentiation; Hot linkage; Complexity of writing; Overall page architecture; Multimedia/Interactivity features; Intent; Patronage; Commentary; Can-do-ability; User friendliness; Machine compatibility; Quality of search aids; Instantaneous accessibility and User payer cost pitfalls.

A checklist template for that sort of test would then ask the following questions:

Who is the author and is the writer the originator? Does the author state “credentials” and if so do these weigh in favour of credibility?

From what source does the information come? A commercial source, or one with with the author has a commercial “vested interest”? Is the Internet provider reputable? Is the source nationally or internationally based? Has the original writing been filtered in any way by bias?

When was the last update, and does it appear to ‘inform, explain, persuade’?

Finally: Does the information gleaned constitute a ‘piece of information appropriate for your topic’ and not merely further add to infoglut?

Some sites explaining on evaluation techniques

Currently the sites below are some of the more dependable resources in the field of evaluation of Web URLs (proviso: subjected to ongoing daily revision):

The Argus Clearing House (http://www.clearinghouse.net)

Cyberhound (http://www.thomson.co/cyberhound/)

The Internet Public Library (http://www.ipl.org/)

Magellan Internet Guide (http://www.mckinley.co/)

Site Grade (http://www.sitegrade.co/criteria/)

Stevie’s Web Site Ratings (http://www.steview.co/cgi-bin/Stevie/rat.home)

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18 A reliable hypertext on Web page evaluation is that published by Ester Grassien, Thinking critically about World Wide Web Resources, at URL:
http://www.library.ucla.edu/libraries/college/instruct/crit.cal.htm (as at 26 November 1997)

19 Ann Scholtz, Evaluating World Wide Web Information, Purdue University Libraries (Last update February 1996) Online @
http://thorplus.lib.purdue.edu/research/classes/gs175/sgs175/evaluation.html
WWW Virtual Library Maintainers: Criteria Used to Select Links for Resources’ Catalogues (http://www.vue.ac.oz/~agsmith/evalu/evalu.htm)

Summation

The foregoing propositions for targeting greater accuracy in researching the Web for resources may be used to best advantage where users build their individual inquiry criteria using the keywords cited as prime benchmarks. It should be noted that: 'while graphic design is important, browsability and organisation are widely used as criteria along with more “traditional” criteria such as currency, authority, and audience. There is scope for future research on evaluation criteria to establish attributes that users regard as important in Internet information sources'.20

Knowledge will no longer be bounded by instinctive cultural paradigms. Students will be able to interact, in its true sense, which is to say: communicate with peers and colleagues world wide in exchanging ideas, and, in discussion, have the prospect that these thoughts mutate into better qualities of life. Lack of foreign language skills will no longer be a barrier. The Web is already dedicated to having coexisting Web page translation in multilingual texts. Today, e-mail transmissions can be received synchronously by the targeted end-user, machine translated in the mother tongue; although this was first driven by government and corporate sector expediencies it is now a free resource.

A problem arising out of an increasing overflow of information is that Web users might be seduced in to compulsive searching in an arena where there is a parallel plethora of banality. This, it is posited, will tend to abrogate a person’s thinking prowess and therefore clone a breed of “mindless” addicts which, subsequently, can be readily manipulated by power seeking entities of government, corporate sectors or so-minded dispositions. And academia is not immune from that state of mind as history confirms.

The sometimes ennui of burgeoning information dissemination can, if not rationalised more effectively, disable its very reason for being. This is where teachers at the

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elementary stage of learning must endeavour to instil a disciplinary methodology to ensure early acknowledgments of that possible danger. The perils of similar frustration can be observed in the way television has historically altered individual and collective lifestyles universally, much to the detriment of clear thinking. It tends to a resignation of spirit, a "Well this is a good as it gets!" attitude to learning. The inquisitive mind switches itself off - not the source. So nothing is gained.

To retrace:

The locating ploy adopted is primary.

Simple queries will invariably return masses of data from disparate but, most often, immaterial sources.

Get to know the strength of the search engine(s) you use.

When searching for a specific topic use a high-recall engine such as Alta Vista, Yahoo, Lycos or that type.

Use a subject tree for assembling best grade data.

For depth in searches, Boolean, truncation and vicinity evaluators are best.

Confine your searches to off-peak periods.

Utilise engine options given in searches.

Weigh up value by the hit-value-prestige of search results.

Using phrases (if allowed) brings best results.

Choose words that can only be interpreted one way, as far as possible.

Some machines will only recognise a language specific spelling. For instance: “colour” and colour. Search as “colour or colour” which the engine will then interpret correctly.

There can be confusion with synonymous words like motorcar, motor vehicle, motor repairs. Here the “or” should be used as controller.

Search for the singular where possible since some engines have problems sorting Wednesday, 26 January 2000 this variation in command.
Avoid the use of plurals as some engines will not accept these. Most engines have a "help" tutor embedded. It pays to look at this before searching begins. To ascertain if it will accept whole phrases like, French Champagne or if it will hit for proximity (spumante, bubbly etc). Check to see if it picks up data from "anywhere", "either", or, in some cases, by perception.

A most useful tool is Spelltool, particularly with e-mail (where browsers do not include), because it normalises spacings; removes or adds "<" or ">"; changes upper and lower cases; capitalises selections; word counts; finds and replaces text; creates "stamps" etc.

The first principle, therefore, would be to look at the search options available. This should cover most of the operators noted above such as advanced, syntactic, Boolean, and other pointers for using specific search management within the selected engine’s known capacity. It takes considerable practise to come up with a precise formula. All that a first search hit failure suggests is that your semantics are probably wrong (the machine functions on digital cybernetics, and cannot (yet) read minds after all. In such cases, rephrasing or "testing" on another engine resolves this.

As noted elsewhere above, up to four browsers pages can successfully search (comfortably) by diverse operators whilst you get on with the rest of your work.

If still in a cyber-limbo, the user can resort to FAQs or Usenet relevant to the topic. The important ingredient is in understanding the mechanisms available and how best to exploit these.

In essence: In order to initiate a Web site scrutiny sphere, the prescriptive elements would be (a) choosing the desired motif and (b) the best possible seminal keyword(s) for search fields that the diverse engines specifically provide for. Care should be exercised lest a predisposed patronage of any one or more engines preclude evaluating search capacities of a wider range; particularly when improvements are being assertively implemented at today’s technological pace.

Believing the information

In searching, the first step on finding responsive resources is to skim their presentation in order to measure the scope of disclosure served. This is because the Web more often

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than not publishes pages only endorsed with a graphic title leading to a multitude of associates and, especially, in the case of file transfers, only a file size indication. Consequently this can be a waste of valuable time. A good maxim is: “Glitz means Blitz”.

The browser’s page(s) should be initially scanned for buttons (or icons) that will return the reader to a home page or directly shortcut to required links. There should also be a continuity in presentation and inbuilt supporting tools. Texture and pigment, fonts and illustrative media should not vary from page to page.

A most important feature is that explicit copyright(s) policy should always be included. Educators are generally exempted from typical restrictions to reproduce material, provided the reproduction does not attract any benefit other than scholarly enhancement. That statement, as such, should be carried on all material thereafter reproduced for that reason. Commercial sites generally have the same tolerance, but one should be quite sure of this before reproducing and, if in doubt, e-mail the publisher or otherwise seek permission. It is a mistake to assume that everything on the Web is copyright free.

**Controlling the floodgates**

Man has achieved many promotions in the life hierarchy. Each promotion thus far - from tree dweller to caveman, to fire lighter, to flint knapper, to stone polisher, to bronze smelter, to iron founder and so on - has increased his prospects of survival as a species.23

When we talk of survival in the Information Age we, as species, reduce our chances of survival in the setting of widening our knowledge base if we do not take some precautions against being drowned in the flood of information data now available and increasing by almost astronomic intensity. Search engines can assist in gradually taming oceans of information into becoming manageable ponds of data collection, or caches. But the real manager is the competent end-user; a competence which derives, in the main, from considerable practice.

**But do we really need all this infoglut?**

Every updated computer model carries a proportional increase in data storage requirement. This, however, is often negated by the reciprocally expanding factor of resources in multimedia format on the Web. Movies, music and games etc. A frustrating

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obstacle for many whose hard disk is already filled to capacity at 4GB; but who, nevertheless, rush out to upgrade. For what?

This need not be serious threat to the non-compulsive data collection though, because there are many applications available now (like Stuffit and FreeSpace) which will “pulp” the incoming data and, in some cases, appropriately partition off the hard drive by sectors to cope with an infinitely growing supply of data. Which is to say: really rewarding data.

But some caution is needed and, prior to saving in a compressed state, the disk drive itself should be backed up, and regularly so. As should the desktop be rebuilt every other day. Nevertheless, the real question one should ask is: “Do I really need all this particular data, after all, or am I merely intoxicated with information technology?”

Hunters and gatherers need to acquire extensive searching skills as an imperative. Such skills would include an understanding of how to rapidly interpret the real value of targeted URLs and the substance of its accessible links. In other words, they must be self-assured that their goals do not become lost in a morass of otherwise distraction, if not totally useless, information.

Equipped with the facilities that the World Wide Web has on offer and promises, the hunters gatherers can today access a hitherto exclusive wealth of information upon which to build knowledge that will equip them to be at ease in this digital era. Search machines are an indispensable element in harvesting information but we should always be generally mindful that: The question is the answer.
The computer is not an advanced calculator or camera or paintbrush; rather, it is a device that accelerates and extends our processes of thought. It is an imagination machine, which starts with the ideas we put into it and takes them farther than we ever could have taken them on our own.1

The literature suggests that there is a scarcity of significant research within the sphere of technology education and aims at the spread of its research as a means of invigorating the practice. Waetjen (1992) promotes the notion that "...the plea is to use experimental research as much as possible"2 to acquire quality research in cognitive technology.

We should consider that the apparent lack of relevant literature in 1995 and that: "Since the Levy (1998) case study of the University of Arizona, there has been little literature relating to the pace of acquisition of information technology at institutions of higher education".3 Three years after the Web Inquiry Project (WIP) undertaking, Levy (1998) was to become a front-runner in pointing to the lack of studies in Information Technology within the coexistent literature4.

That factor was an inhibitive issue in visible CAL evaluation procedures within a localised scene at the outset of the WIP. Zuga (1994)5 reviewed some 220 items in cognitive technology and observed that only 16 submissions had implemented

2 W B Waetjen (1992), "Shaping the future of a profession, Scottsdale", AZ. In a paper presented at the Camelback Symposium of Technical Foundations of America
3 Winston Tellis (1997) "Application of a case study methodology, Vol 3 No 3, September (online @ http://www.nova.edu/ssss/QR/QR3/tellis2.html)
4Winston Tellis (1997), "Application of a case study methodology", Vol 3 No 3, September (online @ http://www.nova.edu/ssss/QR/QR3/tellis2.html)
5 K F Zuga (1994), Implementing technology education: a review and synthesis of the research literature, Columbus OH: Center on Education Training and employment
qualitative methodologies, most of which were conducted outside the USA. And Johnson (1995) conveys that: educators in that field should "...engage in research that probes for deeper understanding rather than examining surface features" and that qualitative research methodology has attracted "...increasing acceptance in recent years" since it enhances perceptions in education.

Reflecting on research methodologies as such, Mumford (1991) posits that information systems are a derivative of natural sciences standards. Stemming out of American business school systems, traditional functionalist and positivistic approaches had become the norm (Orlikowski (1991) and Galliers and Land (1987) as did (Blackhouse et al (1991) that conventional science laboratory characteristic models had been promptly subsumed within information technology research to become acknowledged as authoritative.

This deep rooted tradition has been interpreted as: “Another example of this kind of institutional constraints are the doctoral programs which follow the American model”

There is certainly a divide between America and Europe in terms of the emphasis on traditional research methods in doctoral curriculum. Much debates have surfaced about the virtues and shortcomings of this [American] model. [...] Alternative approaches such as action research, critical research, interpretivism and semiotics are rare. [...] However as Mumford (1991) quite rightly pointed out, we should avoid creating a situation whereby researchers either take the quantitative route for its own sake, or undertake qualitative research simple to avoid handling numerical data”.

6 E Mumford (1991), Information research: leaking craft or visionary vehicle, in Information Systems Research: contemporary approaches and emergent traditions, H E Nissen, H K Klein, R Hirscheim (Eds) North Holland: Amsterdam
7 Orlikowski (1991), "Relevance versus rigor in information systems research: an issue of quality”. In panel discussions chaired by J A Turner (Information research systems research: contemporary approaches and emergent traditions, H E Nissen, H K Klein and R Hirschheim (Eds) North Holland: Amsterdam
8 R D Galliers & F L Land (1987), “Choosing appropriate information systems research methodologies”, in Communications of the ACM, 30 (11), 900-902
Of itself, the term *qualitative* research means: “any research that produces findings not arrived at by means of statistical procedures or other means of quantification”. This recourse then became the underpinning model for the WIP study because it sought enlightened perceptions and comprehensions from speculations within comparable issues in an area about which relatively little was known in 1995.

The WIP study supports the proposition that: ‘If you want people to understand better than they otherwise might, provide them information in the form in which they usually experience it’ (Lincoln and Guba (1985).\(^{11}\) In the researcher’s exploration here, however, it had also been supposed that an undertaking had been made to demonstrate and represent the human phenomenon component, in an effort to be clear about biases, assumptions and understanding, notwithstanding elements of subjectivity encountered. It implies that ‘Central to qualitative research is gaining the emic, or insider’s perspective, that is, the perspective of the participants in the research study’\(^{12}\).

There were two approaches, in the main, assisting the eventual evaluation of the WIP study which Scriven (1967)\(^{13}\) labelled *formative* and *summative*. The former term implies advancement and consequence of the continuing project where the *formative* appraisal element permits modification in prospect of possible snares. The formative rationale was, as Beyer (1995)\(^{14}\) describes: ‘ongoing, in that it occurs repeatedly at various stages throughout the development process’; whereas the summative principle seeks to illustrate the whole outcome and whether that suggests extension of the project favourably. In substance, the problem-solving configuration of the WIP was to focus on specific problems related to the project in acquiring the most suitable assessment pattern.


\(^{12}\) Karen E Winegardner (1999), *The case study method of scholarly research*, The Graduate School of America (online @ [http://www.tgsa.edu/online/cybarary/case1.html](http://www.tgsa.edu/online/cybarary/case1.html))


\(^{14}\) B K Beyer (1995), *How to conduct a formative evaluation*, Alexandria VA: Association for Supervision and Curriculum Development
The Web Inquiry Project: Case study

Having navigated the Web within its "oceans" of accessible information, the researcher perceived the Web as delivering a momentous social effect in the years to come. One that would test the creativity of its Netcitizens if properly engaged. In this instance that creativity was not to be hindered but the necessary tools had to be provided. However, in this learning mode all the informants had to familiarise themselves with the many pitfalls likely to impede their respective "seafaring". Such hindrances were: video games, tempting advertising, shopping online and other material generally felt to be inappropriate in this setting.

Historically, schools have been "cells" where a single teacher would directly instruct groups of around thirty children. Unfortunately, but too often, this simply became a transference of knowledge built in the likeness of the teachers' perception of such values inherited from their prior personal experiences as student teachers. The expression of "teaching as telling" was the outcome of such thinking. The scholars had no means of constructing their own view of the world and the meaning of knowledge as best harnessed to their individual intellectual performance enhancement. So the WIP was seen by the researcher to be a practical means of deconstructing entrenched pedagogical mores and opening up the minds of those who would use the WEB as an interactive mentor - a fresh ideas stimulator that was not difficult to master.

The WIP was considered to be an innovative, but effective, means to creating opportunities for the student teachers to take on board reflective scrutiny of their teaching practises in a new environment of information technology as it was developing. At the same time, they would engage in more collaborative resolutions of issues, and coequal coaching, where supportive tactics in learning and teaching were to become the norm.

The riches of intelligence to be accessible on the Web was to be a testing area for student focused learning but there were questions to be probed. Was the Web a really useful cognitive tool, what learning tasks might most effectively be pursued in its use and how would first time users react?

It had not been initially anticipated that the children informants were, in fact, to be a group which had been inducted from local schools as students selected for their being "gifted" and who were being being "groomed" as such as part of an ongoing project entirely independent of the WIP's. But this did not in any way encumber the project since they were to be tutored in a manner likely to be encountered in common everyday scholastic systems with no particular focus on their above average student status.
The aim had been to equip them with tools that would be generally available throughout the national education system, if not immediately, then soon forthcoming as national schooling policy. In other words, their particular giftedness did not become an unduly attributable consideration since the researcher had not purposefully planned to weigh up the difference between the norm and the exception in academic abilities in the context of the study.

In substance the class(mates) would interchange freshly acquired Web knowledge in their journeying and, in several cases, do so by exchange of their “findings” or “views” with extra- mural peers by way of e-mail as practice.

Individual or group assignments of research projects were not specifically supplied, but self devised as such; a practice aspiring to give as much latitude as possible with their prospective endeavours.

The student teachers were nevertheless obliged to fulfil their course requirements as in normal circumstances so that their critical appraisals of issues and outcomes could be assessed as academic requirements.

In the procedure, the researcher would encourage the student teacher informants towards developing on-screen, individual final presentations and stage their findings to their participating co-partners as a finalising session. This philosophy was to be applied to the school children informants with the added feature of having their respective parents (and print media) present at that “premier”. The teacher students were to present their findings to a number of faculty teaching staff. Its dual purposes was to exhibit what they themselves had achieved as learners and to introduce the technology to staff members.

Accordingly, there were to be three intrinsic factors in the WIP case study: The perspective of the researcher as passive pilot in the learning voyage and an engagement of continuous introspection; the similar accumulative experiences registered by the student teachers in their respective roles and the learning curves confronted by the school children individually and collectively.

The WIP’s adopted methodology provided a variety of characteristic profiles where the informants displayed choices of perspectives which gave valuable insight into how creative and/or lateral thinking could be advantageously stimulated by using the Web as a cognitive tool. It allowed for a relatively small group of informants to be studied in more breadth than would otherwise obtain in normal classroom conditions [Guba and
Lincoln (1981). But this was an adjunct to and not a specific of the (qualitative) approach adopted.

**Discovery: The Researcher**

The most profitable outcome for the researcher was the interactivity between himself and the student teachers firstly. It also awakened the researcher to matters previously taken as obvious in theory, but not so easily effected in practice. One of the informants, in particular, had been more technologically knowledgeable than his peers - and, indeed, the researcher himself. So this was to be an interesting challenge rather than a possible embarrassment for the researcher. It was the sort of challenge that “techno-buffs” would subsequently deliver during full blown IT courseworks.

One has to be sufficiently confident - but, at the same time taking advantage of the fact that one never knows enough in this technological age. That any such gratuitous observations from student “techno-buffs” would become an investment if taken at face value and not presumed to be a remonstration.

This is not to say that any of the student teachers were otherwise entirely passive. Argument and debate was neither restricted nor discouraged. That was to be the real catalyst for a successful outcome; and an intended feature of planning. The researcher had acquired much more sensibility to the needs of the informants as paramount to his own.

In the case of the schoolchildren, it was a delight to observe them in clusters with their particular student teacher mentors as they planned their lessons together. To them, the machines were another run-of-the mill part of the New Age Technology and the Web: a freedom of self-expression. Their was no excess baggage in their minds. And when they finally publicly displayed their new found skills it was done so with their expressed, obvious pride.

The total effect for the researcher was one of self-learning through introspection which was felt to be a much appreciated investment in his own hunting and gathering of knowledge, rather than mere information.

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Discovery: The student teachers

The student teachers' underlying task was to find an appropriate method for engaging reliable outcomes in their own learning skills and subsequently applying these to their respective mentoring-groups of schoolchildren to best perceived effect. The strategic planning for this was done at those times when they collectively focused on interactive discussions preceding their own hands-on activities; with the researcher as contributing factor. The researcher was able to assess the value of this “working mode” by observation, face-to-face discussions and more conclusively with their consequent writing(s) and their unique home pages reflecting the Web Inquiry Project as a whole. The student teachers had readily adapted to this environment and had grasped the philosophies of constructivism, self-learning, collaborative teamworking and introspective meditation in the course of their various journeys as such.

Discovery: The schoolchildren

It had been a mutually exciting project for the schoolchildren, the student teachers and the researcher. The childrens' capacity for absorbing the requirements of their mentoring was surprising and, at the same time, inspirational. The researcher had found that the collective spirit was not so much fired by questions like: “How do the search engines work?” but “When can we make our own homepages?” and not “How do we make our own home pages?” This suggested that their respective student teacher mentors had begun their tasks in a clear cut simple formula for induction to the Web. However there was a substantial atmosphere of group chagrin that their experiences had come to an end. “Please, sir, can we come back again soon?” was a distinct signal that the project had achieved the essentials of its purpose and that the schoolchildren had benefited from their experiences. It further suggested that the scope for further research in this learning mode promised to yield fruitful investment were it to be pursued.

Determining ongoing status

The WIP was a learning process for the instructor(s) as well as the informants. The questions: “So how are we going so far?” and “What do we know about our respective
shortcomings?" were continuously put. That gambit aligns with the thinking of Wilde & Sockey (1995)\textsuperscript{16}.

Ongoing measures of progress will determine the successful features of the program, the shortcomings of the program, and whether program implementation and the participants are progressing in the expected manner. Measures of progress allow staff to determine whether the program is working and allow participants to see their own growth. The basic questions are "How much change has there been from the beginning of the program until now? At this rate of change will we meet our objectives and goals by the end of the program period? What else is 'going on' about which we should be aware?" [...] Without the opportunity to learn meaningful material in a meaningful manner, an assessment system has little value.

By incorporating the described perceptions interactively put by the WIP informants and participants became the norm throughout the study itself.

**Concept Mapping in the methodology of WIP**

From the outset and progression of briefing/debriefing sessions, the student teachers were encouraged to apply concept mapping as individuals and "whiteboard brainstorming collectively". This tool, essentially enhanced their "curriculum" design(s) in achieving individual goals.\textsuperscript{17} Concept mapping graphically exposed weaknesses and/or strengths in organising their knowledge and highlighted interesting ligatures between ideas. Typically, these maps integrated words and links providing the "big picture" in accord with prior knowledge continuously evolving into the acquisition of enriched cognitive perceptions.\textsuperscript{18}

**Figure 1** represents a typical WIP briefing/debriefing session where the collaborative team discusses the various topical factors arising from their respective interaction(s) stemming from their formative experiences with the Web. This activity yresulted in a

\textsuperscript{16} Judith Wilde PhD & Suzanne Sockey, *Evaluation handbook*, Evaluation Assistance Center-Western Region, New Mexico Highlands University, Albuquerque, NM (Online @http://www.ncbe.gwu.edu/miscpubs/eacwes t/evalhbk.htm#IQualitative)

\textsuperscript{17} Walker TRC (1999), *Concept mapping and curriculum design*, (online: http://www.utc.edu/Teaching-Resource Center/concepts.html)

chain reaction which, by consensus, generated the cognitive tools to effectively proceed with the study as it developed.

An inquiry carried out by D J Martin (1994)\(^\text{19}\) aptly sums up the utility of having used that procedure within the WIP: “Our students view concept mapping as giving teachers a more comprehensive understanding of what they are preparing to teach, eliminating sequences of errors, and enabling teachers to develop lessons that are truly interdisciplinary” (p 27).

**Figure 2** typifies the sort of questioning that the synergetic learning procedure encourages\(^\text{20}\) in the process of developing a qualitative study. Modified versions were to be progressively used by the undergraduate informants in their tutoring during the primary school children’s first hands-on workshops.

**The Research Question**

How will taking advantage of the architecture and resources of the Web be of benefit to teacher students and primary school children as a formative schooling medium in innovative production of knowledge into the next millennium?

**Constraints and limitations of the method strategy**

It is important to understand that: the decisions taken about how to proceed in new technological environments, must be considered not only in the context of

> The mere use of technology to deliver instruction does not imply that this instruction is high in quality. That is, it is not necessarily effective nor efficient. Using technology to

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\(^{19}\) Martin D J (1994), *Concept mapping as an aid to lesson planning: a longitudinal study*, Journal of Elementary Science Education, 6(2), 11-30

enhance instruction means that some value is added to the instruction due to taking advantage of the characteristics of the technology. Florini²

There is a wanting, furthermore, of satisfactory affirmation, that advantages possibly favouring a singular cognitive conduit have imparted a weakening of significance on such category of media correlated studies in linking with an adjustment from behavioural to affective orientation³. However:

The Internet is [now] part of the "way of the future", but how does it fit with the media of the past and present as a support for teaching and learning in schools? How can its use help students to reach beyond the school walls, to bring in resources, to engage in productive and enriching dialogue, and to publish their finest work? In what sense does it serve an instrumental purpose and in what ways is it expressive of modernity and concern for the future (Olson, 1988)⁴

Such factors were among those considered and leading to the WIP in 1995 when Australian educators were already taking seriously the implications.

As indicated in the preceding 1995 setting described, the WIP study undertaken was done so in circumstances aptly described in this following citation, and it outlines the pedagogical values and routines predominant at the time of the WIP study, and those circumstances affecting that study, and its inferences themselves:

Along with other applications of computers, the Internet has been seen by many people as a vehicle for teachers to carry out major changes in how they teach students. Obviously, having students use the Internet is by itself one level of change—a change in the information resources that students examine. But it may also be that the Internet enables teachers to follow a whole new approach to teaching based on a different theory of how students attain understanding or new perspectives on what it is important for students to know.⁵

In those preceding circumstances, the issue was how to overview a clutch of informants who were to be introduced to working, collectively and individually, with the Web as an innovative learning and teaching tool in order to ascertain its potential as such. In the process, this study was to:

1 Investigate undergraduate and primary school student informants’ perceptions regarding the innovative cognitive effects of utilising the Web as a teaching and learning resource.
2 Investigate, describe, determine, clarify and, where practical, credibly evaluate those issues studied within the evolving context of the WIP.

Significance of the WIP

In the researcher’s exploration, it had been supposed that an undertaking had been made to demonstrate and represent the human phenomenon component, in an effort to be clear about biases, assumptions and understanding.
As a pilot study, notwithstanding its limitations, the WIP had been perceived to provide further "food for thought", as it were, at a time when the Web had become a significant focal point for exploring innovative cognitive tools.

The data resulting pertained to a small set of undergraduates (and primary school children informants), however, the generics may cut across campus infrastructures. Whilst not of itself anticipated to have created "benchmarks" in that context, because of its limited scope, it had, nevertheless, provided its teacher-undergraduates with a significant introduction to the Web, as such, in anticipation of their being better equipped when prospectively faced with the burgeoning growth of the Web as teaching/learning method in the field. The school children, also, would have been provided with "advanced" skilling significant to their scholastic preparation for the future.

It had been perceived that, at the conclusion of the project further, more conclusive, research would be attracted and implemented in consequence of the project.; whereby propagating a learning environment that would result in more lasting dividends.

**Organisation and procedure of the WIP study**

*The Sample*

The study had comprised six student teachers in the primary class teaching course and a complement of twenty-three primary school children, deemed to be "gifted", assembled from various regional schools. This cluster was considered advanced computer literate in regard to the student teachers and the school children had been sufficiently computer literate to derive perceived benefit from the WIP Procedure for consent had been followed and the student teachers briefed at the first group encounter. In the case of the primary informants, the responsible class teacher had secured unencumbered individual and collective consent from the respective parents and DSE authorities. The class teacher had, moreover, maintained her status of being *in locus parentis* throughout campus visits required by the project and in keeping with her status.

The various relationships between principal and informant(s) had been formulated to derive a mutual sense of neutrality for the principal observer-participant, and a high standard of objectivity had been targeted in an entirely collaborative understanding.
Components of Subject requirements

The principal devices for proceeding with the WIP were essentially based on the subject outline which embraced those benchmarks perceived to be most strategic to the study.

EDUT432 - INQUIRY PROJECT IN EDUCATION

EDUM212 - INFORMATION TECHNOLOGY DEVELOPMENT

(Collectively known as WIP - WEB INQUIRY PROJECT)

Subject abstracts and evaluation requirements

The goal of this subject is to cultivate in students an active comprehension of interactivity with World Wide Web in order to design a computer-based curriculum project in joint venture with some local schools.

You will have the opportunity to browse through the available regional and international web sites gathering information and data and compiling your personal directory of those sites most amenable to your particular needs. You will have the opportunity to create and write documents for publication on the World Wide Web and design "Home" pages which will be accessible world wide to 30 million (and ever growing) Internet users; particularly students with whom you will have reciprocal response through email. You will be able to develop a software-based curriculum project through the stages of needs assessment and evaluation. You will find out what curriculum resources are available through the Internet and be able to design curriculum in key learning areas for use on the World Wide Web.

By the end of the semester, students will be able to: describe the role of the Internet in learning; develop WWW pages which would be suitable for curriculum implementation at an Australian school; evaluate the learning processes required to effectively employ the Internet in personal and curriculum based information strategies; apply these processes to a curriculum area with which they are familiar.

Students will be assessed on:

1. A paper evaluating Internet as learning tool resulting from exploratory research. (30% of final grade 2500 words max) Date Due: 18/9/95

2. A curriculum project with the goal of producing a WWW document and an evaluation of it. (40% of final grade 3500 words max) Due at the end of the session 10/11/95.

3. A reflective piece of writing on the journey for the project including ideas generated about learning from the Internet. (30% of final grade 2500 words max. Date Due: Due in three instalments on 18/8, 22/9 and at the end of the session 10/11.

Method

A flexible curriculum was implemented. What the researcher had attempted from the initial meeting with the team was to instil a sense of collective input and free exchange
of problem solving communications. In the process, this had led to round tables brainstorming and concept mapping. Interestingly, one or two of the informants were not familiar with concept mapping, despite a working familiarity with Edward de Bono’s writings.

Figure 1

Synergetic Learning - Coaching Schema

Instructor

Learner

Learner

Learner

Learner

Learner

Technical Support
In essence, the methodology adopted had been fluid throughout the study. In as much as in my role of instructor, the participants collectively had also accepted a "preempted understanding" as it were, with Heron (1996)\textsuperscript{21} where he interpreted:

Qualitative research, using multiple methodologies, is about other people studied in their own social setting and understood in terms of the meanings those people themselves bring to the situation (Denzin and Lincoln,[1994:2.]) To say that it is about other people in their own setting is to say one central thing: the researcher in mainline qualitative research does not involve informants in decisions about research methodologies, about the design of operational procedures. He or she only seeks to negotiate, with the people studied, (1) access to their setting, (2) issues involved in ongoing management of the research and (3) the interpretations arrived at. [...] Cooperative inquiry by contrast does research and

\textsuperscript{21} John Heron (1996), \textit{Cooperative learning and related forms of research}, An extract from Chapter 1, "Cooperative Inquiry", London: Sage
become involved in operation decision-making, and is committed to this kind of participative research design in principle, both political and epistemological. The co-enquirers are fully involved in decision about research contents, that is, about the focus of the inquiry, what it is seeking to find out and achieve. Other people, who are invited to be full conquerors with the initiating researcher.

**Concept Mapping in the methodology of WIP**

From the outset and progression of briefing/debriefing sessions, the student teachers were encouraged to apply concept mapping as individuals and “whiteboard brainstorming collectively”. This tool essentially enhanced their “curriculum” design(s) in achieving their individual goals. The concept mapping graphically exposed weaknesses/strengths in organising their knowledge and highlighted interesting lineages between ideas. Typically, these maps integrated words and links providing the “big picture” in accord with prior knowledge continuously evolving into the acquisition of enriched cognitive perceptions.7

For the benefit of all participants a procedure for making concept maps was revisited along the general principles that:

- The undergraduates informants should jot down free fall thought flow ideas on topic(s) of choice
- From that, these should then be focus-prioritised and suitably highlighted, freehand or fluorescent marker
- The developing “map” should then be examined for compatible “idea trails” and linked linearly by perceived genres, annotating these with concept labels
- Finally, the maps would be subject to ongoing updating
- The interactivity between informants and mentors(s) so illustrated was able to effectively balance the subsumed and original goals set below.

**Week 1**: Introduction to project based development. Exploring the web resources. Creating a map of what it is

**Week 2**: Workshop 1

Helper Applications review. Creating pages with HTML

**Week 3**: Workshop 2

Creating pages with HTML

**Week 4**: Workshop 3

Developing Curriculum Ideas for the Web

**Week 5**: Workshop 4
Curriculum and the Web

**Weeks 6 to 10:** Independent study and practical sessions.

**Weeks 11 through 13:** Workshops with class of gifted children.

**Week 14:** Demonstration of final product and evaluation

As a case study the WIP had not been a prototype exploration, it had been done to optimise what could have been determined in the time within reach for that exploration. I had taken-up a many faceted reflection where the input of the informant(s) and their interactivities had become the integral factor. The project had been intended to represent an actual environment evolving in order to assay the learning facilitation the Web had suggested at that time; where no clear-cut set of eventualities had been predictable.

**Data collection**

The procedures had provided for face-to-face contact in three-hourly sessions. At each session there would be briefing and debriefing/wash-up opportunities of approximately thirty minutes each, at which time, the informants, the technical supporter and myself would interact freely; except for those times when the NetKids were on *in situ* location. At those sessions the researcher would step back as observer, making brief notes that then became the basis of my electronic journal observations subsequently incorporated into first draft writings. His own observations and notes reinforced analyses of the extensive data provided by the participants.

During the hands-on elements, both with the Players and the NetKids, the researcher would circulate unobtrusively, from time-time sitting alongside the Players - and in due course the respective Player-NetKids groups - in that same “observer-participant mode”. He would input relevant suggest ons and respond to questions stemming from the work in hand.

There had not been test/post-test requirements implemented because the design of the course work had been perceived to produce a sufficiently qualitative amount of required data material within its frameworing. In the case of the NetKids, their respective archived inputs sufficed to indicate a worthwhile measure of competency.

The wash-up response of their responsible class teacher, along with the numerous parents who had been invited to the “Premier” of the NetKids’ presentation, and the
local Press had indicated a pleasing appraisal of the work of the Players, the instructor, and the technical supporter(s).

Additionally, the Players finally had implemented their personal presentation(s) to a sizable group of academics who had been interested in the procedure and the possible benefits to themselves in utilising the Web as innovative cognitive element.

The journals, essays, and web pages authored by the players-informants had been an invaluable source for interpreting their individual and collective thoughts; an individuality of thought that had been enlightening indeed.

Home Pages of the Players had been of exceptionally high standard at a time when the WIP was, so to say: experimental. The standard of cognition displayed by the Players was to be mirrored in the level of the lesson plans they had produced, and also the reflection these had on the Home Pages of the NetKids themselves.

There had been no tape recorded or visually recorded data procedures because the researcher had felt such to be intrusive and, most likely, inhibitive for the participants of the WIP, particularly the school children.

In addition, considerable research-asset email traffic had been interacted between the Players and myself throughout the course work, at which time online “solutions” had been initiated when face-to-face contact was not practical. This had been an encouraging facet of the study.

Anecdotal contributions had finally indicated that, occasional glitches removed, the Web Inquiry Project had achieved the purposes intended; that the Players and the NetKids had mutually benefited.

**Data Analysis**

In Chapters 5 and 6, the journals, essays, lesson plans and web pages authored by all the informants (including the children) have been extensively cited and explored. In each instance the informants had progressively archived all of their respective findings in portfolio context on their respective master floppy disks - a primary requirement - submitting copies to the instructor for assessment and analyses purposes. Additionally
extensive hardcopy was provided throughout there (s) of the WIP. The perceptions of Garcia & Quek (1997) reflect the spirit of the study in that:

Using qualitative methods implies that more attention should be paid not only to multiple narratives that give voice to and allow the construction of multiple worlds, but also to the role of the researcher; interpretations etc of his understanding, insights, experiences[ ...] In the final analysis, there is probably no such thing as a single, simple and clear road regarding research methods in information systems [ ... ] A better approach would be to use them as suggested frameworks, or guidelines, rather than as dogma (Baskerville, 1996)

It is within those chapters that the methodology used in the WIP study becomes more explicit than at this point because it graphically unwinds the actual route taken and narratively enlivens the appropriate characteristics required of a research approach in a wider sense of: “This is how we did it as a collaborative experience”. The approach was in empathy with: ‘Writing the results of qualitative research involves determination of the right balance of description and interpretation and use of a style which integrates them in an interesting and informative narrative.’ (Miriam, 1998).23

Interpretations of the data resources resulting from the subject requirements and augmented by the actual procedures of progressive collaborative developments which had been gleaned from this study were the foremost resources for data analysis. They had in practise become the major artefacts for evaluating the Web Inquiry Project.


If you are playing a game according to certain rules and set the playing-machine to play for victory, you will get victory if you get anything at all [...] the machine will not play the slightest attention to any consideration except victory according to the rules [and] at any cost, even that of the extermination of your own side, unless survival is explicitly contained in the [way] you program the machine.

Norbert Wiener

Part One

In Part 1 of this chapter two factors which were to have notable effect on the outcome of the WIP (Web Inquiry Project) are discussed. The time was 1995 when the Web had already been widely touted in Australia as somewhat of a panacea for teaching methods incidental to the climate obtaining for in the field teachers. At tertiary level, velocity had been taken up in the evolution of the Web following its dynamic payload effect in the USA, and to a lesser extent, in Europe. Hence the sustained focus of implementation and perceived value of studies like the WIP which had then been initiated at the University of Wollongong.

Teachers at the coal face had already been ambivalent, if not adverse, to the new technologies developed on the platform of CAL and its similarities. Many were concerned, and not a little stressed, at the pace with which attitudinal changes had been accelerated by a national bureaucracy determined not to be left behind in New Age information dissemination. A common feeling among those teachers, however, was in keeping with comments made at a professional development seminar by primary teachers: 'I just can't hack it anymore. I've changed - I've seen it all and I can't take it a second longer. I can't touch stuff the same old way

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1 Norbert Wiener (1964) God and Golem Inc: a comment on certain points where cybernetics impinges on religion, Cambridge Mass: The Mit Press, pp 59-60
- that's not who I am anymore. There's got to be a better way, one that lets me be me [...]
maybe I should just quit teaching altogether.  

The other factor influencing dramatic changes in educational method had been an interest in Constructivism which was gathering momentum and credibility in an off-line environment.

Constructivism is not a theory about teaching. It's a theory about knowledge and learning. Drawing on a synthesis of current work in cognitive psychology, philosophy, and anthropology, The theory defines knowledge as temporary, developmental, socially and culturally mediated, and thus non-objective. Learning from this perspective is understood as a self-regulated process of resolving inner cognitive conflicts that often become apparent through concrete experience, collaborative discourse, and reflection. [...] Rich examples of classrooms are painted where teachers encourage and accept student autonomy, where raw data and primary sources (rather than textbooks) are used in investigations, where student thinking drives the lessons, and where dialogue, inquiry, and puzzlement are valued. 

The shift towards educational method reform has been of predominant awareness in society for some several decades. It recognises that student learning and comprehension is much more of an intricate process than formerly perceived to be. Constructivist knowledge acquisition and lateral, or “creative”, thinking has been broadly acclaimed as a better way of ensuring healthier exploitation of human intelligence for the individual. Rote learning is now obsolescent.

Conventional textbooks and “chalk and talk” teachers are the endangered species of academia, as also are, what are labelled, “smokestack schools”. In contemporary context textbooks and journals as we have known, them are virtually outdated as scholastically authoritative almost before they are published and distributed. Information technology, with its instant dissemination, will soon administer a coup de grâce to an anterior type hardcopy, replacing it with electronic, digitised text and, multimedia enhancements. Conventional libraries will not, however, disappear as a result. They will, on the contrary, continue to take prodigious leaps into the presentation and delivery of burgeoning information, leading to human consciousness of hitherto unsurpassed magnitude. This vision is the probable result of method:

[Beginning] to make a difference in how students learn by encouraging student-to-student interaction, initiating lessons that foster cooperative learning and providing opportunities for students to be exposed to interdisciplinary curriculum. Most importantly, students must understand that they are ultimately responsible for their own learning and within a learning atmosphere that includes all the aforementioned strategies. 

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'There is, though, a competitive, parallel, but negative position about constructivism which perceives it as being innately subjective, even suggesting that ‘anyone’ s constructions are as good as anyone else’s and where we are unable to judge the value or truth of constructions with any degree of certainty'. But ‘Educational reform must start with how students learn and how teachers teach, not with legislated outcomes. After all, the construction of understanding is the core element in a highly process underpinned by what appears to be a simple proposition’. 

The researcher’s understanding, though, is that Constructivist education using the Web as a likely vehicle for dissemination will bring that human consciousness earlier expressed above to fruition very much sooner than anticipated even by the Constructivists.

[...] Traditionally in instruction, we have focused on the information presented or available for learning and have seen the activity of the learner as a vehicle for moving that information into the head. Hence the activity is a matter of processing the information. The constructivists, however, view the learning as the activity in context. The situation as a whole must be examined and understood in order to understand the learning. Rather than the content domain sitting as central, with activity and the “rest” of the context serving as a supporting role, the entire gestalt is integral to what is learned.

It would, nonetheless, be capricious to suggest, that rote or drilled learning be completely jettisoned in the process of conditioning schooling to constructivist models. Clearly, such a proposal would undermine the memory reinforcement mechanism where “practise makes perfect”, where not learning times tables at an early age would otherwise fatally affect mathematics and subsequently relevant sciences; where keyboard skills (piano or computer, say) would become a rarity rather than the common place.

A method of instruction should have the objective of leading the child to discover for himself. Telling children and then testing them on what they have been told inevitably has the effect of producing bench-bound learners whose motivation for learning is likely to be extrinsic to the task – pleasing the teacher, getting into college, artificially maintaining self-esteem. The virtues of encouraging discovery are of two kinds. In the first place, the child will make what he learns his own, will fit his discovery into the interior world of cultures that he creates for himself.

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Equally important, discovery and the sense of confidence it provides are the proper reward for learning.\textsuperscript{8}

This constructivist thinking will reverse the worst effects of the Industrial Revolution and the damaging effects of its Pavlov-dog-like “learning” patrimony.

In turn, it will hopefully short circuit an otherwise Orwellian fate - the worst eventuality of fiscal and corporate demigods degrading a burgeoning technology of seemingly infinite capacity.

There are problematic issues where this innovative production of knowledge must ensure that cognitive tool designers, multimedia technicians, Web editors \textit{and} educators ought to come to terms with each others’ problems \textit{collectively}. To succeed, it has to be recognised that the students’ interests are paramount and that, in the process, defensive “closed minds” have to be sublimated to those of enhancing a mutual quality of life presently and for the future. Hedberg and Perry\textsuperscript{9}, for instance, claim, that: ‘Open ended designs have no value under the control of closed minded instructors!’\textsuperscript{10}. Whilst that position was in reference to CAI generally, their further prolific writings since, suggests that the sentiment is a given with the Web in mind.

With its virtually infinite capacity for disseminating incalculable resources on demand on land, sea, and air, without geographical limitation, the Web has created a new dimension in teaching and learning, not least of which is its developing potential to translate those resources in an increasing number of languages instantaneously (Alta Vista: \url{http://babelfish.altavista.digital.com} will now translate text and Web material in several languages, straightaway online and translation machines are leaning towards perfection). Lack of language fluency will very soon no longer be a barrier to untrammelled, digitised, interactive resource transmission, or audio/visual dialogue exchange. The only deterrent to exhaustive planetary access is the irresistible bête noire of political and fiscal intrusive constraints. The shape of things to come suggests that those latter constraints are not inviolable however.

\textsuperscript{8} J Bruner (1971) The relevance of education, NY: Norton (pp 123-124)


\textsuperscript{10} Georgina Hawley & Chris Spice (1990) From the mountains to the sea, Open Learning and New Technology Conference Proceedings (Eds Roger Aitkinson & Clare McBeath], Proceedings of a conference by the Australian Society for Educational Technology WA Chapter at Curtin University of Technology, Perth, Western Australia on 29-30 June 1990.
In that light, this chapter explores constructivist theory and implementation, and possibilities where the Web could be used as primary catalyst for constructivist method in refining the traditional learning process to achieve the best ends.

How do we know what we don't know?

Instructors regularly dispense “learning” and, ordinarily, count on students to identify and reproduce the range of “learning” dispensed. A histogram of a classroom exchange would show that the greater part of the pointers focus on or deflected from the instructor. Pupil originated queries and pupil-to-pupil interactions are uncharacteristic.11

Premise One

I contend that even when school appears to be successful, even when it elicits the performance for which it has apparently been designed, it typically fails to achieve its most important missions. Evidence for this startling claim comes from a by-now overwhelming body of educational research that has been assembled over the last decades. These investigations document that even students who have been well trained and who exhibit all the overt signs of success - faithful attendance at good schools, high grades and test scores, accolades from their teachers - typically do not display an adequate understanding of the material and concepts with which they have been working.12

Premise Two

Having accepted the basic constructivist premise, there is no point in looking for foundations or using the language of absolute truth. The constructivist position is really post-epistemological, and that is why it can be so powerful in inducing new methods of research and teaching. It recognises the power of the environment to press for adaptation, the temporality of knowledge, and the existence of multiple selves behaving in consonance with the rules of various subcultures.13

conference by the Australian Society for Educational Technology WA Chapter at Curtin University of Technology, Perth, Western Australia on 29-30 June 1990.


rules of various subcultures” is emphasised because recognised multiple intelligences of the individual,
the constant flux of information and those subcultures together comprise the quintessence of the Web’s
capacity, and consequently its potential for learning and teaching the constructivist way.

Premise Three

[And] one reason why immensely prolific, vivid, imaginative, and inventive brains like
Leonardo’s [da Vinci] failed to make any impact on the body of science was that there were no
colleagues. There were colleagues in painting, and they undoubtedly had an influence which
produced more and better paintings. [You know] Shakespeare and Goethe were just as trouble
some to their teachers at school as Leonardo and, say, Rutherford. The creative personality is
always one that looks on the world as fit for change and on himself as instrument for change.
Otherwise, what are you creating for? If the world is perfectly all right the way it is, you have
no place in it. The creative personality thinks of the world as a canvas and of himself as a divine
agent of change.14

Premise Four

Participation in the increasing flow of information means more than having more powerful
computers or cheap, easy access to terminals. Competence in innovation is being redefined in
terms of the ability to solve problems by selecting relevant data and skills and organising them
appropriately. When information is plentiful, perhaps too plentiful, competence does not derive
from being able to generate yet more, but from the insight gained by arranging what exists in
novel ways. Increasingly, this means connecting series of previously independent data drawn
from different databanks. The notion of competence may come to define ‘imaginative’. If this
interpretation is correct, a new cadre of specialists will emerge as the problem solvers and
problem identifiers...15

Premise Five

The ways in which adult educators have thought about and practise their craft is framed in the
texts they have written. Therefore, your analysis is extended to the documents you read - books,
articles, conference papers, monographs, videos, mission statements of good practice,
association bylaws - all of which embody and perpetuate practices with the field. Your task is to

14 Jacob Bronowski (1978) The origins of knowledge and imagination, new Haven: Yale University Press
p 123
15 Michael Gibbons, Camille Limoges et al (1994), The new production of knowledge: the dynamics of
science and research in contemporary societies, London: Sage Publications Chp 2 p 64

Page 106
make sure that those texts are critiqued for the ways in which they legitimise and perpetuate unjust practices.\footnote{16}

Thus we may deduce that information is not knowledge: knowledge is not wisdom. That is a given. Further, in acquiring, information, knowledge and, in the end, wisdom, 'It is not the destination that is important, it is the journey itself'\footnote{17}. But I do believe that, with a catalytic distillation of the above premises, together with constructivism’s philosophy and the Web’s \textit{potential}, we are bringing ourselves nearer to acquiring both knowledge \textit{and} wisdom and, eventually, emancipation from the daily perils we face as an interactive human society.

\textbf{Distance Learning and the Web}

One of the major affective “genes” in the body of the Web is that inherited from correspondence courses, and “shortwave schools on the air”, in widely scattered rural regions, such as Australia’s and rural America and Canada. This was a first step into extended education access to otherwise isolated adults and children. A drawback (except, perhaps, for the radio tailback participation) was the lack of interactive, viz à viz dialogue, and the long time lapses required for coursework to be corrected and returned to the student. There was also a disincentive in the recurrent “insecurity” and loneliness, aggravated by that factor.

While correspondence courses still exist today it is discerned the Web will bring about its complete obsolescence and demise very soon, because, despite initial setting up, the Web will prove to be a more cost-effective and intellectually productive venture.

Naturally there is, and will continue to be, wide debate on the fors and againsts of the possibilities available in implementing online (distance) tuition. The gravamen of my study is still \textit{sub judice}, as it were, however, a sample of these perceptions follow:

\begin{enumerate}
\end{enumerate}
For

Time and resilience
Capacity to reach global patrons
No trouble about computer congruency and working systems
Brisk progression time relative to videos and CD-ROMs
Effortless refreshing of substance
Usually lower progression and running costs, matched to satellite broadcasting costs for instance
Carefully structured Web courses can enhance interaction between instructors and students
The possibility of being incognito online releases impediments to those reluctant to speak, otherwise
Contributions, as anonymous, can counteract any possible biases
Self learning is readily induced where online conferencing needs novitiate motivation, self-control and responsibility

Against

Restrictions of bandwidth and modem delivery speeds
Reliance on novitiate initiative for those dependent on more framework
Lack of specialised computer skills and Web penetration
Contending with specialised situations
Volume of information and its proper culling

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19 ERIC Digest 168 online @ http://coe.ohio-state.edu/cats/ericva/docs/dig168.htm (30 January 1998) p 2
E-mail traffic handling can be time waster if student is not competent to deal with it

The numerous databases and resources require initiative and great skills in management control

Fiscal and logistic difficulties are still prevalent in rural areas

Physically disadvantaged still face problems in handling computers in this context

Social isolation can be a drawback in many cases. The Web can become a passive crutch rather than mentor, like television

As negative as the “Againsts” may attempt to influence the outcome, it is clear that such deterrents are by no means insurmountable. Indeed, those that still appear to remain, perhaps covertly, are being vastly outweighed by a continuing global scrutiny of best ways and means to remove such obstacles.

The Superhighway: Constructivism at the crossroads

The time has come to broaden our spectrum of talents. The single most important contribution education can make to a child's development is to help him towards a field where his talents best suit him, where he will be satisfied and competent. We've completely lost sight of that. Instead we subject everyone to an education where, if you succeed, you will be best suited to be a college professor. And we evaluate everyone along the way according to whether they meet that narrow standard of success. We should spend less time ranking children and more time helping them to identify their natural competencies and gifts, and cultivate those. There are hundreds and hundreds of ways, and many abilities that will help you get there.

The production of knowledge in recent times has reshaped itself significantly, if not dramatically, with the advent of computer science and its effects on information collation and dissemination. In the domains of education, the accompanying phenomenon has seeded one of the most important revisionist principles: it questions the real meaning of pedagogy itself, described in its generally accepted meaning as the science of teaching. This is really in conflict with the other generally accepted notion that it is the only valid conduit for the act of learning as a life length human capacity. The (interchangeable) term for the growing advocacy for effecting remedial change in philosophy, as a globally accepted strategy, is Constructivism.

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20 B Filipczak (1995) Putting the learning into distance learning, Training 32 No 10 (October):iii-118 (EJ 511253)


A following well rounded interpretation of the term(s) lends itself to the possibilities of exploiting the Web - because of its learning and design instructional architecture - as a formative schooling medium in innovative production of knowledge into the next millennium:

Constructivism is both a theory of learning and a strategy for education. It builds on the "constructivist" theories of Jean Piaget\textsuperscript{23}, asserting that knowledge is not simply transmitted from teacher to student, but actively constructed by the mind of the learner. Children don't get ideas; they make ideas. Moreover, constructionism suggests that learners are particularly likely to make new ideas when they are actively engaged in making some type of external artefact - be it a robot, a poem, a sand castle, or a computer program - which they can reflect upon and share with others. Thus constructionism involves two intertwined types of construction of knowledge in the situation of building personality meaningful artefacts. ..."Evolution equipped humans to learn by solving problems therefore learning in the context of problem solving was optimal."\textsuperscript{24} [Piaget premediated that the child's predilections and attributes were the derivative of Darwinian evolution.]

But, in other terms more in keeping with current constructivist thinking, and with the Web as analogy of instructional "hybrid":

You may borrow ideas from various approaches and construct your own hybrid. The approach you finally arrive at should make sense to you on an intuitive basis. Don't let someone impose his or her teaching style or disciplinary approach on you. Remember, what works for one person (in the same school, even with the same students) may not work for another person.\textsuperscript{26}


And that

In essence the student's 'needs' [...] guide the selection and sequences of educational experiences. Accordingly Dewey's curriculum was comprised of [sic] the subject matter and experiences that fit the unique pursuits of the individual. Knowledge of formal subject matter was purely incidental to the educational process. (Dewey, 1938/1963) 27

So, in that sense and given that embryonic stratagem, we should look at the conjectured constructivists' thinking, even if in a much abbreviated showing here, to assay, in some measure, the potential for that philosophy to be a viable, successful co-partner of WEB instructional design and delivery in current and future cognitive ambiances.

Exercise and Connotation of Constructivism28

Genesis

Whilst Maria Montessori's (1870-1952) first triggered the creativity enrichment process within primary and pre-school ambiences, it was from an anthropological purview rather than a pedagogical scenario. Her works in promoting a "liberation" of free flow cognisance and removing the constraints of antecedent, inflexible classroom situations became the palimpsest upon which front runners like Jean Piaget (1896-1980) wrote a completely innovative game plan alluded to by Papert (1980, p 7):

'I take it from Jean Piaget a model for children as builders of their own intellectual structures. Children seem to be innately gifted learners, acquiring long before they go to school a vast quantity of knowledge by a process I call "piagentian learning", or 'learning without being taught'. For example, children learn to speak, learn the intuitive geometry needed to get around in space, and learn enough of logic and rhetorics to get around their parents--all this without being "taught".29

Montessori had taken a clutch of disadvantaged children from the derelicts of Rome and although scoffed at by her peers for her unconventional methods, those children experienced a blast of enrichment that became the blueprint for her works. The a priori drudgery of scholasticism was slowly transformed into a type of "interest arousal challenge"; where empathetic cognitive acquisition was converted from hide bound pedagogical mandates in the then existing curricula.

http://seamonkey.ed.asu.edu/epaa/ (as at (1997))


Israeli Reuven Feurenstein took up the burden of Holocaust survivors in his role as cognitive psychologist some forty plus years ago and included disadvantaged North Africans in his plans. The result was an inestimable contribution to the purging of traumatic experiences by them and a development of hitherto unexpected cognitive manifestations. The pursuit of accelerated learning, and non-linear acquisition has highlighted the position of psychologists in the field. The cadre is extensive and growing.

Yale’s Robert Sternberg first posited the concept of cerebral “caches” of inherent intelligence in humans and published an innovative assessment ploy (1992) suggesting new pedagogical routes for teaching. Harvard’s David Perkins picked-up the theory, focusing particularly on reflective intelligence. But Howard Gardner, also of Harvard, was the energetic propellant of multiple intelligences in children that ‘...reflect it, teach test and reinforce, and reward primarily verbal and logical-mathematical abilities’. Gardner recognized seven cores of intelligence which are discussed in Part 2 of this chapter (The Players) in their being relevant to the WIP.

More recently, a potent (motivational) type has been explored by Daniel Goleman, that is emotional intelligence. His thesis is based on “Aristotle’s Challenge” that:

Anyone can become angry -- that is easy. But to be angry with the right person, to the right degree, at the right time, for the right purpose, and in the right way -- that is not easy.

Aristotle, The Nicomachean Ethics

Understanding of individuals’ emotions and moods is an integral element of the teaching/learning process so that ‘Learning doesn’t take place in isolation from kid’s feelings. Being emotionally literate is as important for learning as instruction in math and reading’.

The method of Constructivism had already been initiated from Montessori through to current focus, which has made considerable inroads into curricula changes in Australia as elsewhere. It was first seen to benefit the Sciences and Mathematics fields, where it had apparently been successfully, and widely, used before consideration was given to generalisation of subject matters.

Not only have there been sweeping changes in technological delivery of information, the construction and production of knowledge itself was then, and presently, very much associated with applied psychology. Initially, this combination had a turbulent reception in the classroom;

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30 Dee Dickenson, Positive trends in learning: meeting the needs of a rapidly changing world @
http://www.newhorizons.org/positive trends.htm/universities (17 November 1997)

New York: Basic Books


especially in the intransigent “smoke stack” arenas. Bureaucracies, however, had attached themselves to computer aided teaching, and the Web was seen as its ultimate enhancement in that setting.

Nevertheless, whether or not Constructivism affects teaching generally, the Web, as resource, is here to stay; and there is not a foreseeable limit to its evolutionary course, given technological predication for the new millennium. I believe that to be a reliable forecast, although the nature of its dynamic architecture is still at the drawing board state.

The Web assists the Constructivist mode, principally because of its resources potential to build upon a priori data niches. Manipulating those resources in a creative “enlightenment” must broaden the field for individual and collective self development towards happier self-determination at a time when global society continues to ask: “There must be something better to living than this, surely?” Shank and Cleary’s (1995) Engines for Education is a principal primer to that end. JG and MG Brooks’ (1993) In search of understanding: the case for constructivist classrooms, has already provided a realisable blueprint for the Web’s, future role.

Philosophy, psychology, sociology and education generated the principles of Constructivism. Its influence on historic, current and future scholastics now need to be accepted both by teachers and learners. As a result, the notion is languishing that “learning is the passive transmission of information from one individual to another [is] a view in which reception, not construction is the key” and that:

Constructivism represents one of the big ideas in education. Its implications for how teachers teach and learn to teach are enormous. If our efforts in reforming education for all students are to succeed, then we must focus on students. To date, a focus on student-centred learning may well be the most important contribution of constructivism.34

In effect, constructivism allows learners to shape new perceptions using what they already understand from preceding instruction environments derived from aforementioned know-how; that prior awareness sways what new or qualified awareness they will devise from the unfamiliar learning means.

It ensues, therefore, that educators generally should have to relinquish the “sage on the stage” scenario, acting instead, as “guides on the side”; principally devising balance methods to measure the competency of their learners’ ongoing comprehension. But this implies a comfort problem facing educators equipped with an implicit expertise for designing and developing

professional cognitive tools for learning. David H Jonassen\(^3\) (et al\(^3\)) is such a pioneering practitioner, for instance (cf bibliography).

Nonetheless, and despite the burgeoning evangelism currently espoused by constructivists at global level, seemingly, it should not at any stage of development be presumed that here “at last we have the answer to our problems”. In a later chapter I will refer in more detail to the media of instructional design in the distinctive environment of constructionism.

The essence of Constructivism relies substantially on tapping into life experiences by way of lateral thinking and, especially, creativity. These are acts of ongoing affective, perceptive development, primed to prospect energising perspectives and means of cognitive interpretations which foster innovative, but plausible options towards challenging resolutions. But If we now set the constructivist doctrine in concrete, as it were, we would, actually be pulling back from the very reason for persistent scholastic and philosophic shifts -- the need to move forward from the smokestack to the powerhouse of dynamic (irrepressibly mercurial) advancing technologies.

We should be vigilant that its values not merely become yet another panacea, that we begin to understand an inherent, overwhelming human need to “know” that depends more on shaping the future than relying on the past. Notably, if we are not to repeat the mistakes of history, we should be vigilant in ensuring that the means to the end be in capable and altruistic hands.

The merit of constructivism as (universal) learning primer suggests that the jury is still out because the data is still somewhat ambivalent and insufficient given the relatively short “gestation period” it has had as theory and practice. Up until this point I have only alluded to constructivism without presenting its apparent “credentials” as singular mentoring facility in today’s educational ambiences.


What follows is what might be termed a researcher’s perceived “good cause” for considering it as likely candidate for incorporating in the Web as a vigourous learning tool. My interpretation must be basic, however, in the light of the numerous writings and debates still ongoing within the academic publishing arena. An important interdiction, however is the dictum that: despite today’s information saturation through technological achievements, pressing a button will not, of itself, create wisdom. The Web has an oversupply of such “buttons”.

Constructivism’s fulcrum, generally accepted, is that it ‘...emphasises the careful study of the curricula that match (but also challenge) children’s understanding, fostering further growth and development of the mind”37 In that sense, it is the learner as a persona-regulated originator of knowledge. For that outcome, in favour environments have to be provided, wherein they can develop their own ideas as individuals or as a collective. The term CDLE (child-driven learning environment) is an appropriate acronym defining that process.38

Intelligence Tests

There is an increasing scepticism about the realistic value of so-called intelligence tests. High IQ score resulting from these do not necessarily measure innate intellectual values. Many serial killers have scored Mensa-type results. If Albert Einstein had undergone such testing in his school days he would probably have scored average or just above average “measurements”. Anecdote tells us that young Albert hated mathematics, for instance.

On the other hand, aptitude tests are more valuable in that they can uncover hitherto unexploited cognitive capacities (often left behind by socially environmental situations). Not all socially disadvantaged people are “dumb” as well as being materially impoverished. Not all well heeled individuals are “bright” as well as being materially well endowed. But instructors have to differentiate between aptitude and aspiration. There is little reward where a learner aspires to be a Placido Domingo, but, unfortunately sings like Donald Duck. The aspirant may, however be “refocused” towards a career choice that is still empathetic to ambition: becoming a song writer, orchestral arranger, entrepreneurial producer of musical works, say, where music may still be valueds by the aspirant for music’s sake.


This is an indication that those perceived “Gardner’s Intelligences” should be targeted and
developed in the best practicable way towards knowledge betterment. The technological
architecture of the Web foreshadows an ideal vehicle for that.

Piaget, a foremost psychologist of his day, was more engrossed with integrating biology with
good sense. Language skills, the reaction of children to objects, their “interpretations” of
symbols and interactive behaviour in given situations, were the principal focus of his attention.
In the process, he had added empiricism to furthering the dimensions of cognitive experience.
His dedicated credo: that the child must be her own broker in learning throughout schooling;
that reaction to existing early environments are a prelude to an original cognitive
reconditioning, but one not yet fully resourced until adolescence. Piaget, it appears,
underestimated society’s proclivities and cultural influences, however. Generally, he also shed
the niggardly conjectures of the phenomena he described in his endeavours.39 40

It was Piaget’s seminal theories that were to lend themselves to the constructivist movement in
common with his observation:

Now comes the moment when the child looks at his hand which is moving. On the one
hand, he is led, by visual interest, to make this spectacle last—that is to say, not to take his
eyes off his hand; on the other hand, he is led by kinaesthetic and motor interest, to make
the manual activity last. It is then that the co-ordination of two schemata operates, not by
association, but by reciprocal assimilation. [...] Intelligence is assimilation to the extent that
it incorporates all the given data of experience within its framework. 41 [...] Assimilation
can never be pure because by incorporating new elements into its earlier schemata the
intelligence constantly modifies the latter in order to adjust to new elements.42

The method of teaching and learning the constructivist engages in is likened to a recasting of
the learner’s cerebral schemata by comparable assimilation with a two way exchange of
dialogue (actual or machine generated) thus: Teacher > < Learner.

Piaget saw the practice of reciprocal assimilation as mandatory in consequence to the code of
scholastic progression. Constructivists have adopted that fundamental thinking where:

The teacher, in this sense, is the organiser of learning situations in which old experiences
can be accommodated to new, and these learning situations are forward looking. The
teacher’s aim will be to encourage the child to apply his knowledge to situations hitherto

the Mind (1987.) Oxford: OUP

Judgement and reasoning in the child, London: Routledge & Kegan Paul Ltd; (1966) The origin of intelligence in
the child, London: Routledge & Kegan Paul Ltd


unknown, and, at the same time, to encourage him to use familiar actions in unfamiliar contexts.\textsuperscript{43}

In that meaning, within the Web, kindred “situations hitherto unknown” are more than substantially at hand for teacher and learner to challenge.

**Engines for Education\textsuperscript{44,45}**

Roger C. Shank and Chip Cleary have front run excellent Web page strategy as a result of first analysing and predicting probable progression resulting from each quintessence raised in the writing. Almost every possible query provoked by their line of thinking has been embedded and designed to raise further questions as they are answered. These and their species are hyperlinked (hot linked) to myriad links and relative pages. Intelligent (machine) agents are predicted to be able to scan pages of text (and graphics in context) so they, themselves can formulate such questions that will lead to further exploration; the designs of such instructional tools will naturally become more and more sophisticated.

Instructors generally still have a predetermined schemata as end game in their teaching. It is an inflexible one implying that the teacher knows all the answers and these are beyond question by the learner. That may be all very well for an authoritarian administration, but not in situations where the teacher is the definitive evaluator

**ACOT\textsuperscript{46}**

The first inclination was to saturate schoolrooms with computers and priming teachers in their most effecting use over various workshops (mistaken in the belief that administrators would ensure that the logistics of supply and demand would meet with universal requirement as a given). This wash over, however, did little to remove entrenched didactic in the teaching arena; to a no-gain position for learners. That position was relinquished in one favour the constructivist theme of ‘supporting collaboration, communication, inquiry and knowledge construction’.\textsuperscript{47}


\textsuperscript{44} Roger C Shank and Chip Cleary (1995), *Engines for education*, Hillsdale NJ: Lawrence Erlbaum associates

\textsuperscript{45} The full text of this work has become the subject of one of the earliest educational “cyberbooks” @ http://edweb.cnidr.org/web tutor.html (28 May 1997)

\textsuperscript{46} The Apple Classroom of Tomorrow for designed for the development of educators where constructivist paradigms were promoted as project based learning of the coming decade(s) [cf http://www.the journal.com/special/1196pdefeat13.html (12 June 1997)

\textsuperscript{47} The Apple Classroom of Tomorrow for designed for the development of educators where constructivist paradigms were promoted as project based learning of the coming decade(s) [cf http://www.the journal.com/special/1196pdefeat13.html (12 June 1997)
Drilling Holes

A piquant analogy by Geoffrey H Fletcher is appraised here in the context of the foregoing commentary. (Fletcher is associated with the Texas Education Agency, National Governors Association Task Force on Technology):

When you go to the hardware store to buy a drill, you don't actually want a drill. Instead you want a hole. They don't sell holes at the hardware store, but they do sell drills, which are the technology to create holes. We must not lose sight that technology - for the most part - is a tool and it should be used in applications which address educational concerns or problems.

Implications

The setting for the constructivist teacher is well imagined by J G & Martin G Brooks (1993) and cited in further amplification below because it aligns in clear terms with what has been written in the above endeavour.

Becoming a teacher who helps students to search rather than follow is challenging and, in many ways, frightening. Teachers who resist constructivist pedagogy do so for understandable reasons: most were themselves not educated in these settings nor trained to teach in these ways. The shift, therefore, seems enormous. And, if current instructional practices are perceived to be working, there is little incentive to experiment with new methodologies -- even if the pedagogy under girding the new methodologies is appealing. [...] Robbing students of the opportunity to discern for themselves importance from trivia can evoke the conditions of a well managed classroom in the experience of a transformation seeking classroom.

The researcher's continuing dialogue with academics and teachers in the field have highlighted an interesting phenomenon. Those “first-time” users of the Web as instructional tool have, without exception, volunteered that they themselves, as instructors, have unexpectedly learned more from the exercise(s) than they could have anticipated at the outset. This suggests, that a mutual learning process (instructor>> learner) takes place in that situation.

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50 Jacqueline Grennon Brooks & Martin G Brooks (1993), In search of understanding: the case for constructivist classrooms, Alexandria, Virginia USA: Association for Supervision and Curriculum Development, p 103
Apparently, in those instances many of the committed instructors had not energetically utilised the constructivist theories beforehand in their own CAD domains. This further suggests that combining constructivism theory with Web learning should deliver much enhanced cognitive development possibilities. In the following pages I recount the outcome(s) of the WIP as an observational anchor on hands-on working with teacher students and primary schoolchildren comprising the focal point of this study.

Part 2: The Players

‘Connectivity’ - the technical aspect of message exchange - can never substitute for connection - which is the living and continual dialogue shared between people and the landscapes that surround them. If electronic networks are allowed to become the dominant conduits for human interaction, and if the narrow priorities of those who are now seeking to assert control over their architecture are successfully imposed, then the reservoir of inherited continuities, of evolved relativities, and of general civil stability - all fed by those wellsprings of shared principle that unite places in all their diversity - may well be drained off in order to satisfy the slash-and-burn expediencies of a distant and uncountable elite. ... We are cast adrift on electrified tides of increasingly random and inconsequential noise.\(^{51}\)

Introduction

This part of the chapter reports the initial experiences of pupils in exploring Web environments in WIP (Web Inquiry Project). The project had attempted to support pupils in conceptualising information in unexplored new forms that offered new insights to information 'hunting'. It will also explore the initial attempts of pupils in restructuring knowledge in these new formats as well as the reactions of teacher education, students as mentors and co-learners in this new environment.

Human awareness results from an infinite interlocking of sanctioned and non sanctioned thoughts swimming in a sometimes mixed up affective process which cannot be mirrored in rows upon rows of books in libraries. Hypertext has now transmuted, and continues to revolutionise delivery of intelligence on an infinite level, not experienced by society since printing presses first surged some five hundred years ago. In that context, this chapter, reflects initial experiences of detecting some possibilities and probabilities of accelerating the teaching/learning process using a select group of primary school children with a number of undergraduates as “Players” in a scenario of a jointly hands-on-experience of newcomers to the Web. In subsequent writing, I will refer to the primary school children as “NetKids”.

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In Chapter Six the outcomes (or “wash up”) of the WIP project will be examined, illustrating facets of the work generated by the Players and the NetKids; how this was achieved by what was done; what might have been better done and possibilities for efficient use of the Web as a learning tool.

The present global technological gyration, has generated an omnipresent drift, where communication and information technology delivery has had, and continues to have, a growth of unprecedented magnitude affecting education in Australia. This online swell, with increasing computer use and the World Wide Web, has generated a territorial and worldwide competitive stimulus in the tertiary education arena; although a majority of academics are still ambivalent as to its merits as a teaching and learning tool. In that circumstance there is an analogy in the discipline of economics and its practitioners. Ormerod (1994) alludes to this in observing that:

Sociologists and psychologists have documented many case studies concerning the reactions of groups when views that they hold about the world are shown to be false. In such situations, far from recognising the problem, a common reaction of individuals is to intensify the fervour of their belief (p 5).

The positive side is that Australia, a late entrant in the game, is now a front runner in the field, surpassing *per capita* even the American use of information technology. It does not necessarily mean that online curricula will become homogeneous nor that quality will consequently suffer by species. The implementation of the Web by universities does not constrain them from distinguishing themselves from each other; even under consortia agreements for online delivery. Nor does it straightaway suggest that face-to-face interaction will succumb to a *virtual* online traffic, which these technologies buttress with the intent of enriching learning, teaching and research. It does mean that academia will have to be constantly aware of the flux, ensuring that, from the flexibility and choice that the inception of these techniques offer, optimum opportunism flows to its administrators and collective clientele. Nonetheless, and moreso, the unpalatable possibilities of seriously undermining sovereign ideologies through a global *cleverness* being clandestinely imposed by a headstrong cultural imperialism must never be discounted.

This speaks of acceptance of institutional changes affecting the entire spectrum of *education* as conventionally perceived. Much of this perspective became evident when (in late 1995) an elective, developmental, case study was initiated to audit a number of already recognised possibilities of the Web as a teaching and learning tool. The project was known as the WIP (Web Inquiry Project). Putting a pilot programme of this nature into practise has to be elastic in concept.

In 1995, the Web had already been saturated with “information caches” and so-called courses. These were not purpose customised, merely the result of a spontaneous profile enhancement for institutions. The courses were merely a retrofitting favouring the technology. That scenario still obtains in measurable excess. Even today, the difference between assembly and *construction* of knowledge remains a semantic riddle to the mass of Web publishers in the discipline of
teaching and learning. Still in the didactic mode of the medieval monastery, the priests of information technology use the Web to illustrate and illuminate their manuscripts as if assiduously writing and overwriting their collective palimpsests.

In that setting, Ian Forsyth (1996) summarises the position as: 'At best formal education could be described as a haptic [sic] activity housed in a rigid time-serving framework established for administrative convenience rather than an outcome for the learner' (p 15). The WIP project, therefore, had been primarily designed to observe novitiates exploring the possibilities of the Web as a pioneering teaching and learning tool (behaviourism) in tandem with tacitly exploring the Web's innovative mechanism for the production of knowledge (constructivism).

Underpinning the speculation was the interwoven thinking of Shank (1995) expressed as:

> Sometimes students can be their own best teacher if they just have someone around to listen to the ideas they are coming up with. Of course, schools tend to allow very little time for such student reflection and even less time for teachers to just listen. Students rarely try out their thoughts on teachers because they know there is no possibility that the teacher would have the required time, the patience, and ability to reserve judgement. But when students are allowed to devise and pursue activities in which they are interested, they naturally generate ideas, hypotheses, and questions. They are ready to learn from their own ideas if we can find a way to help. (p 106)

Counterbalancing that: teachers will still remain integral to the overall production of knowledge, but more as coaches than teachers as such. (Rogers, 1969).

### The WIP Project

As an undergraduate elective subject the proposed study curriculum had to be couched in conventional instructive terms and, for the greater part, that engagement was adhered to. But, as the delivery relaxed in the spirit of discovery, the methodology became increasingly fluid, in that its participants became incrementally aware of the self-evident meaning of 'interaction and collaborative improvisation:

Such a selection allows me to comment not only on the particular achievements of a group of talented persons but also on the ties that formed them, and that they in turn helped define. (p

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52 The key to the Web's success lies in its ability to present information in a non-linear format. Though a user may begin with a given starting point (often known as a home page), where to go from there depends is up to the whim of that user. Order becomes irrelevant, at least in the traditional sense of reading a book from one end to another. Because the Web allows you to click your new subject, you can skip over entire sections of information while nesting through others in great depth. This ability to "surf the 'Net", exploring the Internet with no defined end point or order, is known as hypernavigation and the form in which it appears on the Web is commonly referred to as hypertext.'

[Andy Carvin's Home Page @ http://edweb.gsn.org/web.hypertext.html (2 July 1998)]
7) As outcome, this cohesiveness did not at any stage appear to impair the individual's creative bent for the players; despite the sense that hitherto uncharted tracts of introspective cognitive schemas were being subliminally redrafted in the process. Although it had not been brief-specific, the case study, as it progressed, suggested that Howard Gardner (1993) was also on track in filtering out the various (7+) intelligences (characteristics) of learners.

There is an identifiable and interesting catalyst in the characteristics of each of the examples where the early youth of these people are focused in the light of anecdotal, biographical commentary. In each case, the subject evidently gave no premature indication of future "genius". This was to develop gradually out of an individual, inherent instinct for creativity, lateral thinking and an attitude of doing things their way.

Constructivism v Instinctive Talent

Although constructivists lean towards a sort of "freewheeling" learning mode favouring the instinctive skills of the pupil in computer aided learning, educators have to be wary of nurturing so-called hidden talents. That practice could prove detrimental to the student, as de Bono (1993) suggests:

> Sometimes there is a sort of 'talent trap'. A youngster is good at maths at school so he or she gets channelled into a career that uses mathematics. But that youngster may have been almost as good at organisation and might have become a chief executive of a major corporation instead of a professor of mathematics. Talent in one direction does not always mean that there is no talent in any other direction. If you are suited to a slow-moving-field, it is only too easy to feel that you will not be able to shift to another field that is growing more rapidly. Far too many youngsters who showed some aptitude for art at school have had their lives ruined by that small talent which has lead them into a field so difficult even for the most talented. (p16)

The Web allows the instructor to overview pathways that the student has explored while information-searching as a basis for constructing knowledge. A pattern generally results in the exercise, whether the gathering is linear or "non-linear". This should yield a truer indication of where the most interest lies and subsequently how it can be developed to best advantage.

The use of "non-linear" in that sense is perhaps misleading. Simplistically put, the brain's synapses spontaneously react to fresh information by taking it on board, flashing around its conduits to see if there is any similar information already "stored", in which case they lay down a freeway to prior information. Where the intelligence is unique, the brain uses its "connections" to store it for later use, analyse it in conjunction with existing information and/or synthesise it into new "knowledge". It rarely over-writes existing schemata, except in chronic cases of amnesia. Even there, the "confused" memory cache may be again activated. It appears the brain writes its "non-linear" paths somewhat akin to join-the-dots drawings.

53 "[...] individuals are often thought of as working in isolation, the role of other individuals is crucial throughout their development." (Gardner (1993) p 8)
Synopsis of passage setting

There is little experience in using the Internet as a teaching and learning tool. There is experience and research on computer based-learning. This has given insights into elements of screen design, the development of interaction through online and off-line working, file transfers and the evolution of the computer into an audio-visual communication device. It [was our] hope that through the examination of a [hands-on project] of the Internet and the problems of computer-based learning, when courses are made available through the Internet there will be effective teaching and learning in the material. [Forsyth (1996, p 45)] Engaging students from a variety of angles and allowing them to feel as if they are a part of the subject matter will often lead to them becoming more interested in (or at least more willing to discuss) that subject. Therefore, they invest more mental energy and thus commit the concept to memory with a better comprehensive understanding of it. Roger Schank (1995) of Northwestern University's Institute of the Learning Sciences proposes that learning be attained through the use of goal-based scenarios - the teacher, with a set of learning goals in hand, allows the students to explore the subject from their own particular point of view. Students, when encouraged and given the proper opportunity and medium, can express a wealth of opinions on nearly any subject. And by giving them the chance to articulate and share their thoughts, they can grasp the meaning of the subject and thus understand it better.54

So, within that environment, this (abbreviated) subject outline was arrived at.

INFORMATION TECHNOLOGY AS A LEARNING-TEACHING VEHICLE

GOAL

The goal of this subject was to cultivate in students an active comprehension of interactivity with the world wide web in order to design a computer-based curriculum project in joint venture with some local schools. Student teachers will have the opportunity to browse through the available regional and international web sites gathering information and data and compiling their personal directory of those sites most amenable to their particular needs. They will have the opportunity to create and write documents for publication on the world wide web and design “home” pages which will be accessible world wide to 30 million (and ever growing) internet users; particularly students with whom they will have reciprocal response through e-mail. They will be able to develop a software based curriculum project through the stages of needs assessment and evaluation. They will find out what curriculum resources are available through the internet and be able to design curriculum in key learning areas for use on the world wide web.
the internet and be able to design curriculum in key learning areas for use on the world wide web.

Objectives

Looking at WWW sites and how these might be integrated within the curricula and developing a WWW curriculum project

Functional Content

Educational design consideration; screen layout; question structuring; simulation strategies; adaptive learning strategies etc and enhancement of computing skills in a project based environment.

Considerations

If we accept that the mind is a pattern making and pattern using system, at least in the perception stage (and all the evidence suggests this), then we need to develop some deliberate habits of provocation if we are to move from established patterns to open up new ones. Our usual mode of thinking is, quite properly, based on judgement. But judgement only serves to reinforce existing patterns, not to change them. Instead of judgement we need something more provocative. Instead of judgement we need movement, and that is what lateral thinking is about. [ ] A young toddler is upsetting granny’s knitting by playing with the ball of wool. One suggestion is to put the child into a playpen. Another suggestion is to leave the child outside and put granny in the playpen. (K S Lashley, 1890-1958) The World Wide Web has all the potential for being cognitively provocative in that sense.

When “strangers” cooperate

The WIP project had several components:

Phase 1

Induction of undergraduate students as teacher learners

Coaching of undergraduate students as teacher learners

Progress through basic curriculum requirements as conventional requirements

Ongoing reviewing through collective and individual expression

Status comprehension of tactics for induction of the select group of primary scholars
Phase 2

Introduction of primary scholars and their mentor

Teachers learners break-up into groups

Induction begins

Teacher learners and primary scholars work together in groups for two hours

sessions

Primary scholars present their individual/collective "show and tell" results to parents

and friends and local print media, followed by "refreshments"

Phase 3

Undergraduate teacher learners present the outcome of the WIP project to academic

group as an introduction to the Web as learning/teaching tool.

At the first meeting, the undergraduates projected marked enthusiasm for the exploration which

was described to them in “draft” form. It was emphasised that they might have to discard a

considerable amount of pedagogical baggage and that teaching process would be coloured by a

quasi-constructivist outlook, with which they were already familiar. The ‘How do we begin?’

question raised some initial concern till they came to appreciate a hitherto unfamiliar concept of

mind mapping. This was readily grasped when explained that they could chart their individual

thought processes either by linear “listing”, “thought bubbles” or any other way which would

aid and comfort the natural planning game.

Some of the candidates were already versed to varying extents in multimedia and the Web,

others were initiates. In that situation, they were asked to mutually aid each other without being

technologically specific because the targeted children would want to get to a hands-on position

at first contact. This would be the essence of the essential synergy required of the project.

This strategy led to a situation where students unassumingly exchanged “tips” and ideas among

themselves. There was an appreciable sense of collective cooperation, rather than a spirit of

competitiveness which is often a deleterious factor in such self-governing pilot projects. This

“bonus” was to be picked up later when that same spirit was, in turn, channelled to the coaching

sessions with the targeted schoolchildren.

The discourse on evaluating the Web as a learning tool, particularly in the context of

constructivist credo, is still in flux and during the WIP project (late 1995) there were few if any

benchmark propositions in that regard. Consequently the instruction had to yield to

conventional auditing as it proceeded. Following is the course followed, which as stated before,
tended to be more malleable and subject to student/instructor brokerage as to the perceived
outcome. As the teaching/learning approach developed, the view of one of the student’s first meeting with the gifted children, is worth noting here:

‘Our visit with the children we are going to teach was a real eye opener. Hey these kids are just like all other kids, except for the fact they have a heap of ideas floating around in their little heads, a foolscap page each of ideas in fact. I was apprehensive at first about meeting the children, conjuring up images, of thirty little kids with grey moustaches and wiry hair, sitting around contemplating the validity of Einstein’s theory of the twin paradox. Instead I found a group of children who were bright and enthusiastic, who discussed issues from comparing the nuclear testing at Murora to the destruction of Hiroshima, and the cartoon show CheezeTV’.

The WIP informants’ valuation essentially had to be one of Group Work assessment and two factors had been coincidentally considered important in the evaluation approach:

1 [...] authentic assessment requires that the group aspects of the work be explored. Where the group work is simply a means, the task is to disentangle the achievement of individuals from the group process, but where collaboration in groups is an end to itself, the contribution to the group process is an aspect to be assessed.55

2 Assigning marks on the basis of observation is difficult because the observation has to be intensive if it is to be effective for the purpose. Marking by the output products of individuals has been shown to be unsatisfactory because a pupil’s report can be selective. Interviews conducted with pupils after a group task have shown the student who really understood what the group was doing did not necessarily produce the most highly rated reports, being surpassed on this by a student who also appeared confident during the work but turned out on interview to have relied on the thinking of others [...] One [means] is to mark the group as a whole and then give the members a total of marks to be divided out amongst them by negotiation. Another is to take the marks of the individual products, and then give every member the same mark - which might be the mean or the lowest set of individual marks.56

The original terms of assessment (below) had been academically conventional to a degree in nature, but as the project evolved the parameters had become more malleable, by universal consent, and had, by coincidence apparently, previewed the above 1 & 2 observations in fact.

**Assessment** Students were to be assessed on:


Reflective Journeying: Player 1

From exploring on the Internet I can see the limitations that it has as a learning tool. Some would like to think that the Internet will be the learning tool of the future. However, as a teacher, I perceive the Internet as [just] another learning tool. I would use it as a learning tool in the classroom, however I don't think that it will take the place of
other learning tools available to teachers. With the development of technology and the increase in knowledge there may even be more effective tools developed in the future [cf epigraph to this Chapter: Part 1]

At the moment searching the Internet through Netscape 1.1 is quite difficult and time consuming. After looking on the Internet for information on a particular topic, one can become quite discouraged about the quality of what is found. The quality is not always reflected in the amount of time used to find it as I guess is also the case when searching for information in the Library. The layout of the Internet, however, allows for a person to go from menu to menu without finding any significant or appropriate data. For the Internet to be a more effective learning tool it needs to be refined so that more specific information can be searched and found easily.

The information and sites on the Internet are limited to what people have made pages on. A person may not have made a page with the information that suits your needs. Also the person making the page does not need to have any expertise in the area they are writing in, nor do they have to provide details of their credentials.

Information can appear on the Internet without any checks from editors, or another neutral body to validate the information. A page produced on the Internet does not need to go through the same procedure as a book would have to. A book needs to have a lot of support financially before it can be printed. Support from others is not needed to produce a page on the Internet. Having people who do not have to be experts in a field and who have no restrictions on what they produce causes difficulties when using the Internet as a learning tool. Material that is not suitable in the education of children is produced and some children may have unlimited access to it. Unlike television parents have little control over what their children can see on the Internet. The information is available to everyone who is able to access it and no audience type is specified.

It seems impossible to explore everything on it in a life time. It is being continually updated and added to by people around the world. [...] For this reason the Internet could provide fast access to updated information for students in the classroom.

America has a larger influence than any other continent in the world. Australia has only just begun to contribute in any significant way. As a result much of the information that is on the WWW is written from an American perspective with a cultural bias. I am not comfortable with the way we have often used American textbooks and materials in our Australian classrooms. Australian classrooms need to take more time appreciating the Australian culture and learning about the uniqueness of the country.
A recent example of how the Internet was being used in global education shows how the Internet is helping students understand other cultures first hand. When studying a particular country the school sent an E-mail to a school in that country.

As a result they were able to communicate directly with students living in that culture. Such an example of a rich and meaningful learning environment is every teacher's dream.

To become a more effective tool, the Internet needs to incorporate more interactivity. This is the challenge for teachers when using the Internet for educational purposes in the classroom.

Some would say that the Internet is excellent for gifted students as they can work at their own pace. But I feel that maybe they could become bored and feel frustrated at times by the limited information it provides. However, if this does become a problem then the child could work out how to produce their own page. This task would provide them with quite a challenge. Students could produce pages as complex or as simple as they like.

With the changing nature of information it is important for teachers to show their students how to learn, not just what to learn. Statistics reveal that the rate of change is such that 90% of the jobs that students today will be employed in have not even been thought of. Education needs to equip students to be able to independently find answers quickly and effectively. The Internet is an important resource for students to be able to find information on.

The media is quick to advertise the advantages of the Internet. The potential that it has, has been talked about extensively. From my experience on the Internet, the limitations outlined will prevent it from reaching its full potential, though it will make significant contributions to education in the future. Internet provides students with access to updated information. However, as presented in this essay much of the information is often inappropriate for education. It contains a strong American bias and represents mainly the developed parts of the world. It is expensive to implement and time consuming to use effectively. Many aspects of the Internet need to be refined for it to be an effective learning tool.

I began the subject not knowing anything substantial about Internet had only heard reviews in the media about it and how it was going to become part of everyday life. I was fearful of something unfamiliar taking over from the technology that I had become familiar with. I had some experience with computers however I felt inadequate when it came to using the Internet. Once I was introduced to the Internet and how to 'Surf it', my fears began to disappear. It really wasn't as difficult as I had anticipated. As I began to search the Internet for topics that interested me, I noticed that it was hard to find specific information. I realised
its limitations. The access to information was not as unlimited as some had made me to believe. The information you found depended on the pages people had produced and whether you could find them or not. I see that this limits the potential use of the Internet in the classroom.

I discovered in my exploratory research that 'Surfing the net could be very passive and sometimes unproductive. I found that sometimes I would set out to search for a particular topic or theme and that I'd end up looking at material quite different to what I had intended. I found it annoying going from a page of links to another page of links that then took you to another page of links.

From these frustrations of mine, I began to explore ways to counteract them so that I could use it more effectively in the classroom. I decided to make my project interactive so that the students could learn more actively on the Internet. I decided to provide many opportunities for students to write, question and reflect while being creative.

I also wanted the project to have a beginning and an end. I didn't feel that it would be productive or time efficient for students to be jumping around from one page of links to another. I wanted to make it possible for students to actually go to the location that they clicked on, and know exactly where they were.

The final idea for my project began to develop as I tried out various ideas. Some worked and others didn't.

Then it was time to introduce the Internet to a group of students. They were very eager at first. However, they soon became tired of searching on the Internet. They quickly discovered that it was not profitable to 'Surf the net' aimlessly. They tried to find information about specific things and became frustrated when they couldn't find what they were looking for. Also, I find it much more beneficial to look up addresses that have been given to me rather than searching through the search engines. Better ways to search for information need to be designed in order to make the Internet a better educational tool.

The students then asked to have a look at the pages I had made on the Internet. I showed them my Resource page. They enjoyed looking at the links and writing their responses in the text boxes. Looking at information with a purpose seemed to make 'Surfing the net' more enjoyable for them.

A disappointing aspect of my Resource page was that some of the cartoons wouldn't come up. This happened because the cartoons are changed daily, and after a month they are deleted. The cartoons that I had on my page had been deleted. So I replaced them with some new ones.
Up to date information is an advantage when using the Internet as an information resource, however the constant change is also a disadvantage in that information that was there one day may not be there the next day. This could make it complicated for teachers to plan.

After exploring my Resource page, the students were very eager to start their own page. They began this task very enthusiastically. It was problematic with four eager students around one computer. They began to make a home page collectively in the short time left for the first class. They quickly learned how to use HTML and were keen to try lots of different ideas. Unfortunately I was not able to continue this project with them in the next session. Instead they made individual home pages with [another student].

I feel that from doing this subject I have become familiar with how to use the Internet as a learning tool. I am also aware of the difficulties that need to be considered when using the Internet as a learning tool. The knowledge I have gained has given me more confidence to use this type of technology in my classroom.

Player’s Summative Critique

I began the subject not knowing anything substantial about the Internet.

I was fearful of something unfamiliar taking over from the technology that I had become familiar with. I had some experience with computers however I felt inadequate when it came to using the Internet.

Introduced to the Internet and how to 'Surf it', my fears began to disappear.

I realised its limitations. 'Surfing the net' could be very passive and sometimes unproductive. [It was] '...annoying going from a page of links to another page of links that then took you to another page of links.

Also, I find it much more beneficial to look up addresses that have been given to me rather than searching through the search engines.

Looking on the Internet for information on a particular topic, one can become quite discouraged about the quality of what is found. The person making the pages does not need to have any expertise in the area they are writing in, nor do they have to provide details of their credentials. A page produced on the Internet does not need to go through the same procedure as a book would have to. Having people who do not have
to be experts in a field and who have no restrictions on what they produce causes difficulties when using the Internet as a learning tool.

[The] group of students was very eager at first. However, they soon became tired of searching on the Internet. They quickly discovered that it was not profitable to ‘Surf the net’ aimlessly, since the information is often inappropriate for education. It contains a strong American bias and represents mainly the developed parts of the world [and] the information is often inappropriate for education. It contains a strong American bias and represents mainly the developed parts of the world.

[School students] were frustrated when they couldn't find what they were looking for. From these frustrations of mine, I began to explore ways to counteract them so that I could use it more effectively in the classroom. I decided to make my project interactive so that the students could learn more actively on the Internet. I decided to provide many opportunities for students to write, question and reflect while being creative.

Information with a purpose [then] seemed to make ‘Surfing the net’ more enjoyable for them.

The school sent an E-mail to a [school in that] country. As a result they were able to communicate directly with students living in that culture. Such an example of a rich and meaningful learning environment is every teachers dream.

Australia has only just begun to contribute in any significant way. As a result much of the information that is on the WWW is written from an American perspective with a cultural bias.

Some would say that Internet is excellent for gifted students as they can work at their own pace. But I feel that maybe they could become bored and feel frustrated at times by the limited information it provides students were very eager to start their own page. [and]quickly learned how to use HTML, and were keen to try lots of different ideas.

Unlike television, parents have little control over what their children can see on the Internet.

From my experience on the Internet, the limitations outlined will prevent it from reaching its full potential, though it will make significant contributions to education in the future.
To become a more effective tool, the Internet needs to incorporate more interactivity. This is the challenge for teachers when using the Internet for educational purposes in the classroom.

It is important for teachers to show their students how to learn, not just what to learn.

Education needs to equip students to be able to independently find answers quickly and effectively. The Internet is an important resource for students to be able to find information on.

Many aspects of the Internet need to be refined for it to be an effective learning tool.

Better ways to search for information need to be designed in order to make the Internet a better educational tool.

I feel that from doing this subject I have become familiar with how to use the Internet as a learning tool. I am also aware of the difficulties that need to be considered when using the Internet as a learning tool.

The knowledge I have gained has given me more confidence to use this type of technology in my classroom.

I would use it as a learning tool in the classroom, however I don't think that it will take the place of other learning tools available to teachers. With the development of technology and the increase in knowledge there may even be more effective tools developed in the future.

This player indicates a substantial amount of scepticism and ambivalence in assessment. The "problem" appears to have stemmed principally from yet undeveloped skilled searching and filtering techniques and the technological limitations of the browser at that time. Available browsers are now capable of responding to the factors addressed by the player. However, the flagging of these 'weaknesses' underscores the essential of feedback towards improving such mechanisms. That is the essence of evolutionary exploitation of innovation. The player would probably find solace in:

**Knowledge is Doubling Every 7 Years**

 [...]Those of us involved in using or creating modern technology might take some comfort in the realisation that our perception that everything is changing at an amazing pace is because of this rapid doubling. [...]One implication of knowledge doubling is that 50% of the information learned by a freshman entering college this year will potentially be obsolete before that student graduates. One recent example of this is the slide rule. Up until the early 1970's, students in math and engineering were required to have a slide rule and be able to use it proficiently. The advent of calculators as an inexpensive and readily available new technology meant that many would never use a slide rule in their professional career.
Students who attended college just before the development and general usage of calculators spent a great deal of time learning to use a technology that was obsolete by the time they left college.\textsuperscript{57}

**Reflective Journeying: Player 2**

The internet started many years ago as a project of the American Department of Defence. The scientists wanted a way to share with colleagues at different places all around the country their information and test research about the best ways to blow people up. So they came up with ARPANET. So in the beginning, what was to become the Internet was made up of those huge room-size computers (like you see in the movies), running operating systems. Gradually computers got smaller and operating systems got better. Following this, about 30 years ago, came UNIX. (Atkins, 1995)

The protocol that allows all the computers 'on the net' to talk to each other goes by the relatively unpoetic name of TCP/IP. UNIX has TCP/IP built in and thus most of the nitty gritty work involved with the mechanics of the Internet is done by UNIX machines. (Atkins, 1995)

At the start of the session, my knowledge on the internet was very limited. I had a UNIX account, which I could use to e-mail people and use the services provided by the university (CNN etc). I had used NETSCAPE during the year, but I did not know how to do a net search. My knowledge on using the World Wide Web browser, was to type in the address which you wanted to view. This became very limiting and I soon searched through all the addresses I could find.

After the first week of session, I had learnt how to do a net search and my 'browsing' of the World Wide Web soon grew to unlimited searches. This brought me onto searching for many things I was interested in and gave me a wider scope and knowledge on the World Wide Web. This included other sources such as http, ftp and gopher. During the first week, the subject also gave me a clearer picture on bookmarks and its uses. This helped me save certain addresses which I wanted to keep and search again without going through the process of starting at an address and searching for the address which I needed. This made the whole process of using the World Wide Web more efficient and easier to use.

\textsuperscript{57} The Internet Learning Program hhw@leonardo.net (Current)
After browsing the World Wide Web, many educational tools were found, which could be used in schools to help students in gaining up to date information on a subject the class would be studying.

Using the Internet, gave me more understanding on names and conventions used in the World Wide Web / Internet. A very important aspect of this was the title 'YAHOO' after doing a net search. This listed the subject showing all the available areas on the subject searched. This provided me with a greater aspect of searching for subject through the World Wide Web/Internet.

The subject then progressed to programming in HTML. At the beginning of the course, I did not know how to program in HTML and had very little ideas on how this was done. The subject helped me understand how to view the source of a page and see what is involved in programming in HTML.

Many commands were then used to program our own little page and writing a biography of ourselves, including images of us in the final page.

Many of the commands used included:

\(<\texttt{H1}> \ldots \texttt{</H1}>\) - Heading
\(<\texttt{T1}> \ldots \texttt{</T1}>\) - Title
\(<\texttt{A}> \ldots \texttt{</A}>\) - Anchors
\(<\texttt{HR}>\) - Horizontal line \((<\texttt{HR size = 6}>\texttt{gives a horizontal line 6 pixels wide})\)
\(<\texttt{img src = 'image name.gif'}}\) place a GIF image on the screen.
\(<\texttt{A HREF = 'http://HTML'> name \texttt{</A}>\) - allows a link where name is the link you call and this colours the name word in blue, allowing the user to know that it is a link.

The subject has helped me gain interest in using the Internet / World Wide Web as a tool for teaching. This Internet/World Wide Web can be used as a resource tool for teachings, for looking up information on what the students may be studying. For teachers, the World Wide Web, can be used as a tool for development of the curriculum in key learning areas and in helping teachers find resources on the Internet.

On using the Internet in a classroom, the students may look up topics and find the relevant information which is needed without going through the process of searching through books which can give information that is out of date. The internet / World Wide Web can give the students information which is the most recent information available.

On the whole, the course has broadened my outlook on using the internet, and I do not have limited experience in using a browser to look for addresses as I did before I began the course. I have learnt using the tools of a browser (NETSCAPE) and have begun...
learning the programming language used on the World Wide Web (HTML). This has helped me understand how HTML works and how to implement it in a classroom situation.

The internet can be used as a learning tool resulting from exploratory research. The information superhighway has grown in the last few years resulting in information being widely available to anybody who has access to the internet.

By using the internet, the user can have access to a wide access of information which will be examined in this essay. The internet is not only the World Wide Web for exploratory information. Other services such as E-Mail and Bulletin Board Services are other areas of the internet where it results as a learning tool through exploratory research.

Before embarking on the topic of using the internet as a learning tool, an understanding of the information superhighway is needed. Kenway (1994) states that the information superhighway is a metaphor, and a very successful one. The information superhighway allows us to make comparisons between technologies in the terms of other 'road' metaphors. The information superhighway metaphor refers to technological inventions that make new technological and cultural practices possible. It is about the replacement of old technologies for the delivery of information, communication is their capacity to deliver much more volume, a two-way flow of communication and a wider range of means of communication together.

The information superhighway is about new sorts of delivery; about a move from narrowband to broadband and, in essence and without going into detail, the move from copper cables to fibre optics or to satellite or micro wave or these things together. It is also digital encoding. It is broadcasting into one common digital format Voice, Text, graphics and video signals. (Kenway 1994)

There are other metaphors which accompany the information superhighway. One discursive ensemble here is networking, and the discourses with it include inter-activity, interconnectedness, multi directionality, flow and fans of the internet are particularly fond of the network metaphor (the World Wide Web). Given that there are 15 million users of Internet and growing by 20 to 30% every quarter.

How is education implicated with the information superhighway? Using the internet as a learning tool can be a useful and important tool in education. Using the World Web requires little typing - it is mainly point and click. Lot's of people with data they want to make accessible have been making hypertext documents and inter linking them. The
cross-referencing makes the World Wide Web quite simply the useful and finest encyclopedia-browsing experience a learner can have. (Rutter, 1995)

An example of the Web's usefulness, a typical search is called Netsurfing. Surfing is actually a good analogy for Internet access, since the point of surfing is to enjoy the movement, not to get anywhere in particular. World Wide Web searching is very useful and helpful for the learner. There are a number of search programs - Lycos, the World Wide Web Worm etc, all of which work from a regularly updated database of many, URLs (Uniform Resource Locator - This is the core of the World Wide Web). (Rutter, 1995)

When a search is done, the typed word the user wants to search for or look up information for and the system then goes through the URL database and comes back with entries which it feels best fit the request typed into the search box. (Rutter, 1995)

Once the user searches through the entries suggested by the search program, the user is given access to a greater deal of information needed. This encourages the user on the Internet to expand the search and find other material related on the given search title.

For example (cited by Rutter, 1995) if a person is required for a science and technology project to search and find information on robots, the learner would type the word 'robots' into the search engine. The internet will reply back with the many sites it can find in the database on robots. In this case, robots, the database would show a site at a US Military establishment that purports to allow the user to examine a picture of a room via a camera and a compressed air blower. The arm's set over a gravel pit full of interesting objects, and the user can move the object for five minutes. The internet can also, therefore, give the user practical information on the a given search, to show what is involved.

In allowing the user to do searching on the internet via typing keywords on the computer in the internet search engine, this gives the user (or students) knowledge on broadening the users understanding on the topic he or she has just searched. The search engines also look into the database to see all possibilities on the keyword typed. This gives the user a more varied suggestion on the topic they are researching on. Thus, the learning the student/user will gain from the internet is very large.

Bookmarks are an essential part of the internet and using the internet as a tool for exploratory research. Bookmarks are essentially the titles of what has been searched through the internet. This can help the user while doing exploratory research as it allows the user information which has recently been looked at without having to write the whole address down.
The internet is basically like having access to a library at home. This can help the user to do research via the internet. By keying in the keyword, the search engine goes through a database looking for keywords which relate to the title keyed in the search engine. The search engine which replies is not specific in what it looks for, therefore giving the user a wide range to look for rather than just one area of the topic to be researched. This allows the user to open other doors which might not have been thought of for the specific research the user is looking for.

The internet does not just stop at the World Wide Web. There are other services which the user can use for exploratory research. Other such services include BBS (Bulletin Board Services), E-Mail (Electronic Mail) etc. The first part of the communications revolution is the E-mail. E-Mail is like writing a letter without using paper. Instead of printing the letter out, sticking it in an envelope and posting the letter away, the user can type the message in the computer, call up the e-mail server and the message is immediately sent, wherever around the world and in a matter of seconds and not days.

The second part of communications via the internet comes in conferences. On every type of E-Mail service, there are a series of conferences (called Newsgroups) on an absolutely huge range of subjects. These subjects are not only limited to computers. Most services carry conferences on everything from astronomy to zoology. If the user writes a message in one of the conferences, it is then spread to all of the other systems which participate. If the user has a query needed for research or in study (for schools in curriculum etc), a message could be placed and within a few days, people all over the word could potentially be reading the users thoughts and opinions. This can be returned by sending information to the user via the same route.

The internet does not only stop now in the E-Mail, World Wide Web and BBS. Many universities and other educational establishments are also on line, so the user can receive information for books, clip art or any number of other things. Bulletin Board Services are run by people in their spare time, although they are far from being amateur affairs. Most BBS are computers linked to a single phone line. Many BBS services mainly provide Public Domain software.

The internet can be used as a learning tool resulting from exploratory research as examined above. The information superhighway has information which is widely available to anybody who has access to the internet. The user using the internet can have access to a wide access of information. As also seen the internet is not only the World Wide Web as the source of information. Other services such as E-Mail and BBS's (Bulletin Board
Services) are areas which the internet has availability to anybody and thus the result of a learning tool through exploratory research.

After the introductory stages of the course and learning the HTML programming language for the internet, the next step was to write our own World Wide Web page. We began by having our pictures taken and these were then put into the computer using the GIF format, which was the most commonly used graphic format for the internet and HTML.

From this, we began writing a biography of ourselves, written in HTML. In this section, we looked at other sources in Web pages to see how Web pages were programmed. We then used our knowledge from viewing the sources to program our own Web pages. This included using the GIF format picture of ourselves and a short biography of ourselves. We then used links to other Web sites that were of interest to us using the command:

```html
<a href='http://sfbox.vt.edu:10021/J/jfoley/u2/u2.html'>music</a>
```

The above example, had the word 'music' underlined and written in blue for a point and click to another site, which was written in the address after href (This example: http://sfbox.vt.edu: 10021/J/jfoley/u2/u2.html).

*During this time of writing our own web pages, we were to think of writing our own world wide web pages on our own topic which we would teach to the gifted students.*

The topic which I have thought about doing was either:

1) Music - since I have an interest in music and I had found many Web sites on music (not just U2!!) or 2) Space - there are quite a few good space Web sites and usually students have an interest in looking in space web sites.

After a lot of thinking I decided to go for the space topic. At this point I had to think of what to do in a Space World Wide Web page. My initial idea is to introduce space and the planets of our solar system.

My page will include a picture of the solar system, and brief outline of what our solar system has. Following this there will be links (to other areas on my page) of planets in our solar system. Once a link has been established on a planet, the page will have detailed information (and hopefully lovely pictures) of the planet which the user has made a link to.

At home I have an astronomy program called 'Distant Suns V5' which has a lot of information on the planets in our solar system, which could also be used to help with the information on the solar system page I will be doing.
My page will have the title 'Flying to the Planets'. The introductory page will have a brief description of our solar system and links to other detailed descriptions and pictures of the planets in the solar system that the user has established a link to. The end of each linked page, there will be other links to Web sites around the world on the planet they have chosen for more information or different information. In the second stage of the internet course, we started to write our own World Wide Web pages on a topic of our choice which will be included in the education Web site of the University of Wollongong. This is also included to each the gifted and talented students a little about the World Wide Web and how to design our own pages.

REFERENCES [Player 2]


Player’s Summative Critique

At the start of the session, my knowledge on the internet was very limited. I had used NETSCAPE during the year, but I did not know how to do a net search. After the first week of session, I had learnt how to do a net search and my “browsing” of the World Wide Web soon grew to unlimited searches. This brought me onto searching for many things I was interested in and gave me a wider scope and knowledge on the World Wide Web

After browsing the World Wide Web, many educational tools were found, which could be used in schools to help students in gaining up to date information on a subject the class would be studying. before embarking on the topic of using the internet as a learning tool, an understanding of the information superhighway is needed. superhighway metaphor refers to technological inventions that make new technological and cultural practices possible. It is about the replacement of old technologies for the delivery of information, communication is their capacity to deliver much more volume, a two-way flow of communication and a wider range of means of communication together. there are other metaphors which accompany the information superhighway.

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At the end of each linked page, there will be other links to Web sites around the world on the planet they have chosen for more information or different information. In the second stage of the internet course, we started to write our own World Wide Web pages on a topic of our choice which will be included in the education Web site of the University of Wollongong. This is also included to each the gifted and talented students a little about the World Wide Web and how to design our own pages.

This student was well committed throughout the project and had done much extramural effort on it. Clearly the student had carried out research effectively to cognitive advantage and consequently produced a concise view of the task on hand. It was noted that the learner here was a “silent achiever” type who appeared to grasp the situation correctly and rapidly. Although more attentive to coaching than discursively interactive, participation took place; but more leaning to observation of group reaction to activities, where involved in these from time to time. Later observation of the learner-teacher role during the sessions with the schoolchildren indicated a characteristic “gentle persuasion” mode of coaching where knowledge gained and imparted was encouraged as a targeted mutual activity. It was an outcome that highlighted argument earlier presupposed (Duffy & Jonnasen 1992) and apparently adopted by this student instinctively:

Instruction, we believe, should not focus on transmitting plans but rather on developing skills of the learner to construct (and reconstruct) plans in response to situation demands and opportunities. Instruction should provide contexts and assistance that will aid the individual in making sense of the environment as it is encountered. A plan is one part of
that sense of making, but plans must be constructed, tested, and revised as a function of the particular encounters in the environment.58

Reflective Journeying: Player 3

For this essay I have looked at using the Internet as a learning tool at the primary school level. If one considers that the Internet is part of the 'information superhighway' one must also realise that it does have its share of twists and turns and potholes, this is particularly evident in an educational setting. As a source of information the Internet can be extremely beneficial as it is a seemingly endless resource. However, as with most good things, there is a flip side to this. Because of the way the Internet is structured, before access is given to students a number of issues have to be considered by teachers and administrators. With the large amount of users on the Internet there is a lot of diversity in what is placed on it. Once the user has found the information they are seeking, which can be a trial in itself, the user has to be able to discern which pieces of information are accurate. Also, as has been mentioned frequently in articles in publications on the Internet's use in schools, there is the issue of censorship and how schoolchildren can be prevented from accessing inappropriate material from such an unregulated resource. Another issue to be considered is the cost of establishing Internet access, as well as the availability of adequate material and human resources. All these issues and more need to be faced by schools if the Internet is going to effectively used in the learning environment as a learning tool.

When a user gains access to the Internet for the first time they are invariably astounded by the access to information and the potential of the Internet. L. McKeown (1995, p. 25) of Queensland, for instance, was keen to gain full access for herself after seeing a simple e-mail message from overseas for the first time. Within three days of a professional development course, after gaining access, she found a way to provide the students in her class access to the communication potential of the Internet by working with a class in the United States she had located through 'Kidsphere' on the Internet. According to her account her enthusiasm soon spread through her school. Similar stories have been recounted in other articles also, e.g. Weller, D. (1995, pp. 30-31).

Accessing some of the information on the Internet can be a rewarding and surprising experience. Having access to images and weather maps that are immediate and current is just one of the advantages. McKeown (1995, p. 26) relates how excited her class was when they were able to see photographs of a comet's collision with Jupiter before the same photographs reached the newspapers. With satellite photographs being updated regularly along with photographs of other scientific events, such as volcanic eruptions, the Internet provides a beneficial resource for scientific inquiry by students. More than this, the author has seen the Internet used in a school in Canberra to keep up to date on results and the medal tally of Australia in the 1994 Commonwealth Games held in Auckland, New Zealand, showing that the Internet is a practical means of keeping up to date with current affairs in the classroom. However, while there is some information on nearly all topics that can be imagined, personal experience reveals that most of the information available through the network is of a scientific or technological and entertainment nature. This should change as more people from various backgrounds gain access to the Internet the diversity of information should also increase.

The potential of the Internet goes beyond that of simply the sharing of information. The ability to communicate cheaply and immediately with all parts of the world is one of the growing educational uses of the Internet. As related previously, L. McKeown's (1995, pp. 25-26) experience on the network was more than just scanning various web sites for information. McKeown involved her class in communicating with the class in the United States through an Internet Relay Chat (IRC), which allowed the children to give and receive immediate feedback from and to their American counterparts. D. Weller (1995, p. 30) also relates how he was able to use the communication abilities of the Internet to allow his students to share with other children from around the world some of the different cultural celebrations of Christmas. Utilising the communication potential in the ways that have been outlined above shows that boundaries in education are being broken down because of this resource.

In Australia there is still differences between state education systems and therefore schools. By having the potential to communicate internationally as well as nationally means that schools can start to eliminate some of the barriers imposed by state administrators - 'it not only let our ideas out, it lets in other new and exciting ideas and friends from all over the world.' (McKeown, 1995, p. 26). This communication potential has been utilised by teachers as well as students. R. Boggs and D. Jones indicate that in the program they are involved in 'the major use of [their] system is by teachers using it to communicate with other teachers to share ideas and experiences.' (1994, p. 31).
This means, theoretically, that teachers will have access to an unlimited number of teaching ideas and resources as they share with each other.

However, for this possibility to reach its full potential some current teacher behaviours need to change. In New South Wales Schools, for instance, a lot of schools protect their teaching ideas and resources from viewing by other teachers, just one of the problems to be overcome. According to statistics published in The Australian newspaper there were approximately '66 million people on the Net.' (Hilvert, 1995), p. With the number of people having access to the Internet increasing daily, the question has to be asked, 'How can I be sure that the information I have accessed is correct?'

There doesn't appear to be a simple answer to this question at the moment. If you have some knowledge about the topic area you are searching it may be enough to help you ascertain which pieces of information are or are not accurate. However, if it is an area of field that you have little or no experience in or knowledge of, the only possible solution, at the moment, is to cross reference what you find with other sites on the web, or other reliable sources such as magazines or other texts.

Another problem that is realised by most new users of the Internet is that sometimes finding the information you require can be an ordeal in itself. With the search engines provided on the World Wide Web finding relevant sites may involve going through a large number of links before the information sought is located. Once a search is completed using InfoSeek, for example, a list of a possible one hundred sites are displayed that contain words that match the item you are searching for. The first link provided is unlikely to be the most useful as it is only the latest item placed on the World Wide Web which contains a word that matches one or more of the words entered by the user. Other search engines try to categorise information in folders under headings.

The obvious trouble with trying to do this is that there are some pages that are placed in one folder that may also have application in another folder. The only way to be sure about what you are getting is by spending time searching the Web, or getting information from other teachers who have used the Internet. Searching for things for yourself may be time consuming, but would pay dividends when it is used in an educational setting. Getting advice from other teachers limits the information you get, but may provide a good starting point for you to start your own searches from. Once you have found a good site, record its address, or make a bookmark, so you can find it easily again for future use.

Once you have decided to use the World Wide Web in the classroom it is time to consider how you are going to organise the children so they can have equal access to the Internet. Downloading information from the Web can be a slow and laborious process, as some
pages take a long time, due to the amount of disk space they require, which sometimes can result in searches being aborted. The length of downloading time can also vary depending to the number of users on the Internet. (During school hours in eastern Australia the best time to access the Internet is prior to ten o'clock in the morning - a time that most teachers like to use for routine English and Mathematics lessons.). Considering the amount of time downloading some sites may take teachers currently will have the problem of bored and agitated children.

The question that all teachers have to face is *how am I going to provide all students equal access, when downloading times vary according to the time of day, when I only have one or two computers in the classroom. This may not be a problem in the future, but without dealing with the problems of today we will not be able to face the problems of tomorrow.*

Some of the problems outlined above give rise to the issue of *who regulates and/or edits what is placed on the Internet.* Information placed on by universities and other educational institutions should have accurate information that has been checked by at least one other person. Other sites where some form of editing takes place are news sites and magazine publications that are placed on the web.

It is mainly in the case where individuals have placed information on the web that discretion on behalf of the user should be exercised.

From personal use of the web it is apparent that *for every useful and/or informative web site there are dozens that are useless in an educational setting, let alone generally, or self promoting sites placed on by people who are just wanting to showcase what they can do.*

*A possible way to overcome the problem of inaccurate, or false, information on the net is by service providers editing what users place on their web sites. However, this opens a further and much larger Pandora's box. The issue of censorship, which will be discussed later, is bound to arise if such a program was to be put in place.*

A further issue, related to the information placed on the Internet, is that of *where the information originates, in a socio-political sense.* Teachers in Australia using the Internet in the classroom at the moment have to realise that *the majority of what can be accessed on the Internet originates from the United States of America, and that there is very little information that can be found originating from Australia.* M. Williams and C. Bigum (1994, p. 14) indicate that *some are already concerned about the loss of culture and culture industries,* as the 'information superhighway' expands and that Australian culture could be jeopardised. However, this discounts the possibility that Australia's already *diverse culture could become more diversified and a lot richer* as it takes in more from around the world, and the fact that it may even be strengthened, as it now may be easily
and quickly shared with the rest of the world. Denying access to information from other cultures also gives rise to the issue of censorship.

Censorship of any information at any stage on the Internet is a problem that is at the forefront of discussion about the Internet, in the media, schools and educational publications. Censorship of what goes onto the Internet would probably be impossible, as there will always be those who are able to somehow beat the system. There is also the possibility of a new network being created to overcome the limitations put in place. Censorship of what children can access on the World Wide Web is a more attractive option open to teachers, and one that has been explored by many schools and teachers.

The problems arising from this are many and varied. Pornography on the Internet is an excellent topic to review the problems that would be faced. Teachers and parents want to know how they can protect their children from accessing obscene material. The trouble with censoring items is that each of us have different ideas about what is and what isn't obscene or inappropriate. Further, and more appropriate and, perhaps, more to the point, almost everything is objectionable to someone. This being the case, how do we establish what to censor and what not to censor? (C. D. Maddux, 1994, p.40)

While some may maintain that censorship is a viable option and that censors should and would be reasonable it should be noted that in certain areas in the United States censors have banned the books Huckleberry Finn and Robin Hood from school libraries on the grounds that the former is 'racist' and the latter 'advocates a communal or communist lifestyle and philosophy!' (Maddux, ibid). Denying access to the Internet is an option that has been adopted by some schools, but this is a case of 'throwing the baby out with the bath water.' (Maddux, ibid.). By denying total access to students teachers would be denied a huge resource and having to face the problem of the information 'haves' and the 'have nots', with the 'have nots' being greatly disadvantaged Schools who ban the Internet may also find they will fall behind society, and their own students, as many of them will eventually gain access from home computers.

This is an issue that all teachers will have to consider and they will have to remember that 'No solution to these problems is perfect.' (G. C. Futoran, J. W. Schofield & R. Eurich-Fulcer, 1995, p. 231.), but it is up to teachers to weigh up their options and decide what system is best for them and their students to work under. Doing ones own research and forming ones own theories is the surest way of achieving satisfaction with any decisions that are taken. From personal experience of working with young children on the Internet, the problem is not with pornographic and obscene material, but rather what might be
termed 'not educationally relevant'. This material may include material that everyone may agree to be harmless, but in terms of an educational setting may be an indicator of off task behaviour by children who access the material. Only on very rare occasions could The Simpsons or Ren and Stimpy, for instance, home pages be seen as educationally beneficial to students. This appears to be the major problem for teachers to overcome when using the Internet for research in the primary classroom. Children at the primary school level seem to be much more interested in finding sites relate to these and mostly disinterested in, or even unaware of, the pornographic material on the World Wide Web.

The most popular method outlined in the literature for dealing with student misuse of the Internet is to deny those responsible access to the Internet.

Again this possible solution presents yet another problem - '(Futoran, et. al 1995 p. 235.) Punishing children who misuse the Internet. Internet access is provided for curriculum purposes and is taken away for infractions. what is the educational substitute for the Internet?' by limiting their access to it may result in them falling behind in classroom activities that involve using the Internet. Again it is up to individual teachers and/or schools to consider the options open to them and decide what is most suitable for their circumstances.

It is up to schools and administrators to decide themselves whether Internet access should be given to their children. The large amount of information available on the World Wide Web is potentially beneficial to everyone. Denying access provides problems in itself, as has been identified earlier. Once the school has determined a need for the Internet in the school, the cost of hardware and access is only one thing that has to be overcome. Parents perceptions of the Internet, through limited media exposure, may prove to be an obstacle to be overcome. Parents too need to be shown the benefits of the Internet in the classroom, otherwise there are a number of undesirable scenarios that may eventuate. Firstly, as a result of parental pressure access to the Internet could be denied for the entire school. Another possibility is that individual parents may ask that their children not be allowed on the Internet. This would mean that one or more children in a class who, apart from missing out on the learning experience, would have to be found other activities to complete while any class work that is related to the Internet is underway. The best way to manage the issue of Internet access is for the whole school community to discuss the issues and formulate a policy that best suits the general consensus and live the consequences.

Paradoxically, the Internet is the source of many solutions and many problems for educators. However, when the advantages and disadvantages of providing teachers and
children access to its resources, are weighed up and considered carefully it would seem negligent not to provide students access. The amount of information, that is current, is immeasurable, as are the benefits for teachers and students who access them. More than this students are given a real and responsive audience with which they can interact. Students who are denied access are immediately disadvantaged from those who have access, polarising the current situation of the 'haves' and the 'have nots.' It is up to all schools to address each issue and provide their own solutions.

Player's summative critique

If one considers that the Internet is part of the 'information superhighway' one must also realise that it does have its share of twists and turns and potholes. This is particularly evident in an educational setting.

Before access is given to students a number of issues have to be considered by teachers and administrators.

There is the issue of censorship and how schoolchildren can be prevented from accessing inappropriate material from such an unregulated resource. Another issue to be considered is the cost of establishing Internet access, as well as the availability of adequate material and human resources.

When a user gains access to the Internet for the first time they are invariably astounded by the access to information and the potential of the Internet.

Within three days of a professional development course, after gaining access, she found a way to provide the students in her class access to the communication potential of the Internet by working with a class in the United States.

Access to images and weather maps that are immediate and current is just one of the advantages.

The Internet is a practical means of keeping up to date with current affairs in the classroom.

Most of the information available through the network is of a scientific or technological and entertainment nature.

Change as more people from various backgrounds gain access to the Internet the diversity of information should also increase.
The Internet goes beyond that of simply the sharing of information.

An Internet Relay Chat (IRC), which allowed the children to give and receive immediate feedback from and to their American counterparts.

Boundaries in education are being broken down because of this resource.

Potential to communicate internationally as well as nationally means that schools can start to eliminate some of the barriers imposed by state administrators. Teachers will have access to an unlimited number of teaching ideas and resources as they share with each other.

Current teacher behaviours need to change.

Ideas and resources from viewing by other teachers,

How can I be sure that the information I have accessed is correct?

All the information is poorly organised.

Finding the information you require can be an ordeal in itself.

First link provided is unlikely to be the most useful. Have little or no experience in or knowledge of, the only possible solution, at the moment, is to cross reference what you find with other sites on the web, or other reliable sources such as magazines or other texts. Only sure ways to be sure about what you are getting are by spending time searching the Web, or getting information from other teachers who have used the Internet. Advice from other teachers limits the information you get, but may provide a good starting point for you to start your own searches.

For every useful and/or informative web site there are dozens that are useless in an educational setting.

Download how am I going to provide all students equal access, when downloading times vary according to the time of day, when I only have one or two computers in the classroom?

Without dealing with these problems of today we will not be able to face the problems of tomorrow.

Who regulates and/or edits what is placed on the Internet?
A possible way to overcome the problem of inaccurate, or false, information on the net is by service providers editing what users place on their web sites.

The issue of censorship [...] is bound to arise if such a program was to be put in place.

The majority of what can be accessed on the Internet originates from the United States of America, where the information originates...[is]... Soc-political s some are already concerned about the loss of culture and culture industries [but] Diverse culture could become more diversified and a lot richer

Denying access to information from other cultures also gives rise to the issue of censorship.

Censorship of any information at any stage on the Internet is a problem that is at the forefront of discussion about the Internet

Censorship of what children can access on the World Wide Web is a more attractive option open to teachers

How do we establish what to censor and what not to censor?

Pornography on the Internet

[the] Trouble with censoring items is that each of us have different ideas about what is and what isn't obscene or inappropriate.

Censors have banned the books Huckleberry Finn and Robin Hood from school libraries on the grounds that the former is 'racist' and the latter 'advocates a communal or communist lifestyle and philosophy'

Denying total access to students teachers would be denied a huge resource and having to face the problem of the information 'haves' and the 'have nots'.

Schools who ban the Internet may also find they will fall behind society, and their own students, as many of them will eventually gain access from home computers.

But it is up to teachers to weigh up their options and decide what system is best for them and their students to work under. Doing one's own research and forming one's own theories is the surest way of achieving satisfaction with any decisions that are taken.
The problem is not with pornographic and obscene material, but rather what might be termed 'not educationally relevant'.

Children at the primary school level seem to be much more interested in finding sites relate to these and mostly disinterested in, or even unaware of, the pornographic material on the World Wide Web.

Material may include material that everyone may agree to be harmless, but in terms of an educational setting may be an indicator of off task behaviour.

On very rare occasions could The Simpson's or Wren and Stumpy, for instance, home pages be seen as educationally beneficial?

Most popular method outlined in the literature for dealing with student misuse of the Internet is to deny those responsible access to the Internet.

If Internet access is provided for curriculum purposes and is taken away for infractions, what is the educational substitute for the Internet?

Limiting their access to it may result in them falling behind

It is up to individual teachers and/or schools to consider the options open to them

Schools and administrators to decide themselves whether Internet access should be given to their children.

Parents too need to be shown the benefits of the Internet in the classroom.

Individual parents may ask that their children not be allowed on the Internet.

One or more children in a class who, apart from missing out on the learning experience, would have to be found other activities

The Internet is the source of many solutions and many problems for educators.

When the advantages and disadvantages of providing teachers and children access to its resources, are weighed up and considered carefully it would seem negligent not to provide students access.

Information, that is current, is immeasurable, as are the benefits for teachers and students

Students are given a real and responsive audience with which they can interact
Students who are denied access are immediately disadvantaged

This student has fine-tuned the reflective process resulting in a positive outlook for the Web's potential. Restrictive practice on accessing material(s) appears to be a major concern. The solution has been left open-ended here with the onus burdening parents and teachers. But, like the previous student's thinking, the mole appears to be bigger than the mountain and the benefits far outweigh the so-called "dangers". It is noted that the student is aware that primary school children are not particularly attracted to pornography, for instance. A good point is the note about teacher to teacher interactivity; even with the subtle note that some have an attitude of 'finders - keepers!'

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Reflective Journeying: Player 4

The Internet is a planetary party line and a medium for the free exchange of knowledge, a chaotic electronic freeway that now girdles the earth. It is a global commons on which people debate, publish, play games, do business and fall in love (Kenway, 1994, cited in Button, 1993, p.52). Currently, the Internet is being introduced to schools as a new learning and communication tool that can assist learning for both students and teachers in a wide range of areas. From one point of view, the Internet is attractive because of the wide range of resources it can provide on various subjects. In addition, it functions as a means of communication, for example, e-mail. Further, use of the Internet is said to enhance inter-personal skills. All of these are clearly valuable in the educational context.

On the other hand, many problems are involved in using the Internet as an educational learning tool such as searching difficulty, censorship, time-consuming, cost, copyright, and gender problems. An examination of the resources afforded by the Internet will confirm its value as an educational resource. However, an examination of the problems involved in using the Internet will question its value as a learning tool.

Today, 40 millions people are joining together to share information on the Internet which includes libraries, science labs, museums, newspapers, entertainment and much more. These high quality materials on the Internet are wonderful resources as 'information superhighway' for all children and all teachers in terms of learning and teaching in the classroom. The high-speed network can carry voice, data, and video services and bring a mass of information and entertainment into the classroom and children's homes, for example, library catalogues linked from around the world, information on current events news as they happen, science projects, educational games assisting students' maths, spelling skills or research projects, freeware and shareware computer software, art museums, and discussion groups for every field and interest.

In other words, the Internet as a reference and productivity tools allows the student to access and organise information in effective and efficient ways. Moreover, Siegel & Sousa (1994, p.53) said that 'an online 'intelligent tutor' as well as the real teacher would guide the student through a set of skills, strategies, and provide a range of tools to solve these problems. Information would be available to the student, ready to be accessed, understood, and learned depending on the problem at hand'. Through the searching process on the net, the student learns how to evaluate and synthesise information from diverse sources and understand the difference between facts and opinion. Undoubtedly, students of all ages learn better when they are actively engaged in a process.
Similarly, the student learns how to handle information as well as how to learn through problem solving techniques using the Internet. Also, the skills of interpersonal cooperation and communication would be enhanced through the teamwork involved in students working together to solve a series of problems and sharing their knowledge, skills and opinions with each other over the Internet. The Internet functions as a virtual textbook where pages of information are often placed on the computer screen with movable images, rich colours, and various sounds.

Naturally, the attraction of the virtual textbooks is that they may gain more attention from students who can concentrate on learning the particular subject or studying better than when using normal textbooks. To put it simply, doing research or learning from the Internet is much more fun than reading plain print textbooks.

Using the Internet as a learning tool, virtual textbook to replace the textbooks in educational areas is based on the international trend in education towards increasingly using technology which in turn is partly based on the human desire for entertainment in the learning environment. Time is another main feature of using the Internet as a learning tool as it is in principle easy to find subject matter on key word searches within a limited time. A Domer (1995, p.7) argues on the Net, 'there is no waiting time for the book to be brought to you' from anywhere within seconds. However, this is not always the case: the line may be busy; downloading an article from overseas could probably take more than an hour.

Communication is one of the main features of the Internet illustrated by the fact that each of the millions of people connected to the Internet has a unique e-mail (Electronic mail) address. Through e-mail we can communicate with the other side of world by sending messages such as texts, pictures, videos, films or sounds. In the classroom, students and teachers can 'meet' and 'talk' with students and teachers in other country about a joint project, all this within a limited time. That is, messages are sent and received almost immediately on receipt of a communicational. Here is a good example from janicke@alexia.lis.uiuc.edu: ‘Here's an idea for using the Internet in our classes this Fall. My students will put together an opening paragraph of a story and e-mail it to your class. Your students add a second paragraph and see where the story goes. What do you think?’

In this case, the benefit of an interactive network is that the information can flow both ways by e-mail on the Internet (Ingvarson, 1995, p.72). Students and teachers can learn of different cultures and different thinking styles as well as new ideas via the network. It means that using the Internet opens a world of unlimited learning opportunities and provides learning experiences to both students and teachers.
Likewise, on the Internet, there are some free discussion groups such as an electronic assistance centre for teachers called Teacher Talk (http://www.mightymedia.com/talk/working.htm) or Magnet (http://www.vicnet.net.au/vicnet/stav/mag2.htm). At those sites, teachers can share their interests, concerns, issues, and teaching problems with others and also gain sophisticated help and educational services.

It seems that the Internet is a great learning tool for teachers as well as students who can link with other teachers via the Internet in order to ask any questions about their study or share their interests and ideas while staying at home. All of this evidence proves that the Internet as a learning tool provides the students of the future with the power to become effective and creative learners. As Maddux (1994, p.37) suggests, the Internet in particular is potentially the most significant educational tool.

Although the Internet has proven to be an effective and powerful new learning tool in the hands of educators and students, there are many problems involved in the actual practice situation, for example, searching difficulties, censorship, time-consuming, cost, copyright, and gender problems.

Firstly, the Internet is in a constant state of change and there are so many options, commands, exceptions and concepts that it can all be very overwhelming. In other words, the lack of coherent structure, stability and documentation result in great difficulties for users, especially the new users.

Here is a good example to describe the feeling of the first experience of a new user: ‘a first exposure to the Internet is almost like walking into the world's largest library and finding no catalogue or other inventory, no user instructions of any kind, no titles or author names on books, and no indices or tables of contents on anything’ (Maddux, 1994, p.39).

An overwhelming sense of immense information overload can simply have as a consequence confusion and paralysis for the new users. Moreover, using the Internet requires some special skills, for example how to operate the Internet, send an e-mail, design home pages by using HTML- the Internet language. In my point of view, a basic aid such as demonstration is really necessary for all the new users before he/she really into the Internet.

Additionally, the content of the Internet is constantly changing. Sometimes the information is worthless after only days or hours. As a result, teachers have difficulties
in preparing lesson plans or even handouts beforehand. Similarly, students have difficulties in doing research or using reference information from the Internet.

Furthermore, almost everyone who has used the Internet has been frustrated by the lack of coherent documentation which means that the users often fall into a page with nothing. It is difficult to recognise which information is accurate and current and which is not because the quality of the vast majority of information on the Internet has not been evaluated. The requirements for inclusion are minimal or non-existent on the Internet resulting in everyone having the freedom to provide any kind of information. In my own experience, I do find a great difficulty to maintain the focus when I am doing the research on the Internet. Similarly, it could be difficult to keep the students on the track when they search on the Net.

This kind of situation leads to another serious issue - censorship. The range of materials provided on the Internet does not merely go from the sublime to the ludicrous, but the profane and pornographic as well (Maddux, 1994, p.40). Some of my friends have had the experience of doing research using the Internet, when, with young children. Surprisingly, some pornographic images were suddenly downloaded onto the screen. It is the main reason why many parents and educators are concerned and some of them are even completely denying the possibility of providing Internet access to classrooms. The best way we can manage this issue is by discussing this issue widely with children and their parents in order to instil a sense of responsible Internet use in children.

Secondly, the issue of time and time again being wasted is another serious problem resulting from the lack of coherent structure, stability and documentation and cost. The Internet is likely to remain a huge, unwieldy collection of resources and materials that are not completely understood by anyone. As a result, it often takes a long time to do exploratory research on the Internet within a limited time, especially without any assistance. It is necessary to provide expert help to teachers and students in learning to use the Internet at classroom level. Moreover, the school should consider whether permitting the kind of time-consuming exploration which is the only way that the Internet can be mastered on an individual basis, is a valid efficient use of time. Hence, when teachers attempt to integrate their curriculum by using the Internet, it might be necessary to seriously consider the various situations which may often occur in using the Internet as well as the use of time.

Next, the cost for access to the Internet is a huge potential problem for schools.

Now, many schools are connected to the Internet because the government pays part of the bill. If they have to pay their own way, some of them would probably decide to spend
their money elsewhere or simply just would not be able to pay for such an expensive learning tool. In this case, the Internet could actually work to increase the inequities that already exist between poor and wealthy school districts (Maddux, 1994, p.39). Likewise, there would be add-on costs for students to own this expensive learning tool at home, for instance, phone lines, modems, computer and printer or other hardware and software. This is one of the main issues which we should always consider when we attempt to introduce the Internet as a learning tool into schools.

Another issue in using the Internet in terms of learning is copyright. Technology allows ideas to travel from one source to another without passing through the mind at all. As Domer (1995, p.8) said, 'copyright is part of childhood culture and if you can lift whole sentences for homework without even the trouble of writing them out by hand, then it quickly becomes part of a learned technique of satisfying teachers'. In fact, we are not allowed to store any copyright material on our own computers. However, this is almost impossible to control. The subject of copyright provides a good opportunity for learning and teaching moral education through discussion of intellectual property.

The last concern of the Internet we will consider is the gender problem. Domer (1995, p.8) found that girls in schools tend to let the boys dominate in computer sessions, because many girls think that the computer only provides silly games for boys or even they believe that a girl should not learn keyboard skills otherwise she will be stuck in data processing all her life. In this case, the learning opportunity may turn out to be unequal between the girl and boy. I think this is a good opportunity to discuss with the students and find solutions together, for example, introduce a girl [to a] computer club or have a female computer teacher who is aware of this issue.

In conclusion, using the Internet as a learning tool does have many advantages: innumerable valuable resources, the communication function such as e-mail, the enhancement of interpersonal skills, and learning. It seems that the Internet as a new learning tool provides a great opportunity for improvement in educational areas. On the other hand, there are some problems that we do have to be concerned about before we really introduce the Internet as a learning tool into classrooms, such as the searching difficulties, censorship, time, cost, copyright and gender problems. If these problems can be successfully overcome, the Internet has the educational potential to become one of the most useful of all teaching and learning tools.

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Player's summative critique

Internet is a planetary party line and a medium for the free exchange of knowledge

An examination of the problems involved in using the Internet will [nevertheless] question its value as a learning tool.

Censorship, is time-consuming, cost, copyright, and gender problems.

Sense of immense information overload

Almost everyone who has used the Internet has been frustrated by the lack of coherent documentation

Searching difficulties, censorship, time-consuming, cost, copyright, and gender problems.
Sometimes the information is worthless after only days or hours. As a result, teachers have difficulties in preparing lesson plans or even handouts beforehand.

The lack of coherent structure, stability and documentation result in great difficulties for users.

Difficult to recognise which information is accurate and current.

The vast majority of information on the Internet has not been evaluated.

Difficulty to maintain the focus when doing the research on the Internet.

Time and time again being wasted is another serious problem.

It often takes a long time to do exploratory research on the Internet within a limited time.

[but] The Internet is attractive because of the wide range of resources it can provide on various subjects.

The Internet as a learning tool provides the students of the future with the power to become effective and creative learners.

The Internet as a reference and productivity tools allows the student to access and organise information in effective and efficient ways.

Use of the Internet is said to enhance inter-personal skills searching difficulty.

High quality materials on the Internet are wonderful resources.

High speed network can carry voice, data, and video services and bring a mass of information and entertainment into the classroom.

Synthesise information from diverse sources and understand the different between facts and opinion.

Interpersonal cooperation and communication would be enhanced through the teamwork involved in students working together.

The attraction of the virtual textbooks is that they may gain more attention from students.

The human desire for entertainment in the learning environment.
easy to find subject matter on key word searches within a limited time.

Communication is one of the main features of the Internet and through e-mail we can communicate with the other side of the world by sending messages such as texts, pictures, videos, films or sounds.

In the classroom, students and teachers can 'meet' and 'talk' with students and teachers in other countries about a joint project and different thinking styles. Students and teachers can learn of different cultures as well as new ideas.

The enhancement of interpersonal skills,

Opportunity for improvement in educational areas.

The Internet has the educational potential to become one of the most useful of all teaching and learning tools.

The benefit of an interactive network is that the information can flow both ways.

Free discussion groups such as an electronic assistance centre for teachers where teachers can share their interests, concerns, issues, and teaching problems with others.

Using the Internet requires some special skills.

Demonstration is really necessary for all the new users before he/she really delves into the Internet.

It is necessary to provide expert help to teachers and students in learning to use the Internet at classroom level.

Schools should consider whether permitting of the kind of time-consuming exploration

Cost for access to the Internet is a huge potential problem for schools.

If they have to pay their own way, some of them would probably decide to spend their money elsewhere.

In this case, the Internet could actually work to increase the inequities that already exist between poor and wealthy school districts.

This is one of the main issues which we should always consider when we attempt to introduce the Internet as a learning tool.
Issue in using the Internet in terms of learning is copyright [...] copyright provides a good opportunity for learning and teaching moral education.

The gender problem [results in] girls in schools tend[ing] to let the boys dominate in computer sessions [so that] the learning opportunity may turn out to be unequal between the girl and boy.

Using the Internet as a learning tool does [however] have many advantages [such as] the innumerable valuable resources, [and] the communication function [of] e-mail.

Player No 4 has displayed a fine sense of the Web and illustrated some of the difficulties arising at that time. Many of these problems have since been beneficially modified in later and now current browser software. The extent of information explored has been attributed a wealth of intelligence but, not necessarily of knowledge. There was much 'dross' out there. This still obtains today, although our much more sophisticated search engines have eliminated some of the drudgery of searching alluded to.

It is noted that interactivity between all users is a benchmark effort to broaden the bases of effective assimilation of knowledge through constructions based on already 'inherited' information and/or experiences, either as individual or collective. The dilemma of free access still underpins doubts insofar as unsuitable material; the question of who regulated that issue was still a grey area (filtering was not focused on as such at that time). Cultural enrichment as another bonus was well indicated. The probabilities of fiscal constraints diluting possible future benefits was a considerable hurdle to be faced. In the synopsis, the finer points alerted by the player were well founded, as was an agreeable understanding of the issues.

**Reflective Journeying: Player 5**

In trying to come to terms with this new resource, and attempting to filter through the vast amounts of information available. *It has become apparent that to use this resource with children will require 'teaching' children new strategies and organisational skills. Where children now may use one or two books to complete an assignment, when using the internet they may be presented with a hundred links to different sources of information.* J. Mckenzies in his essay, Grazing the net: Raising a Generation of Free
Range students, uses the term 'infotectives' to describe what students need to become to be able to use the internet effectively:

[An] Infotective is a student thinker capable of asking great questions about data (with analysis) in order to convert the data into information (data organised so as to reveal patterns and relationships) and eventually into insight (information which may suggest action or strategy of some kind). (J. McKenzie, 1995, p.1)

It is a teacher responsibility to create students who are able to digest and synthesise the great amounts of information they are presented with when searching the net. And to make students 'discriminative' learners who are able to quickly sort information and make decisions about what is and is not relevant to their current task.

In order to do this children, before even going anywhere near a computer, will need to create a focus question and other relevant questions which they want to answer. Also the children will need to brainstorm key words that are relevant to their topic, in order to provide themselves words to search for and words to look for in their search results.

The internet unlike other traditional learning tools such as books, is subject to ongoing costs. Where in the past books involved an initial outlay and then were stored in the library for generations to come. The internet is subject to ongoing cost such as hourly rates of use. This posses another dilemma for educators promoting this resource as it would be seen as another financial burden on the already over stretched school budgets. But the advantage far outweighs the costs, [since] a book may quickly become outdated. [F]or example a book written about parliament in 1980 is of little use when you are trying to research the parliamentarians of today.

But this information is available at the click of a mouse (well in theory) through the WWW. Also a book may only deal with the parliament in one country whereas a search on governments on the internet may produce links to governments around the world, England, The USA, Canada, New Zealand and of course Australia all have web pages by their National Governments.

When looking at the internet as a learning tool, it is important to look at it as a two way process, as both a source of information and just as importantly a place to provide information. One of the most refreshing pages I have viewed on the web is project by a school, A kids' view of Lexington, where the students provide information on their local community. These pages may not have been visually spectacular or utilised the latest 'tricks' available using HTML 3.0, but they provided meaningful insight into a local community. Information which may have been unattainable through any other medium.
The true beauty of the web lies in the fact that children can contribute and update information with relative ease.

Teachers must be careful that the only thing their class provides is not a photo with links to the children's favourite sites. After all there are plenty of sites which provide comprehensive lists of sites. Instead teachers and students must be encouraged to provide meaningful information which is useful to others, as with A kids' view of Lexington site.

Web pages are not the only way to contribute and receive information through the Internet. There are also mediums such as e-mail and interactive moo's where children can gather and have realtime interactions.

E-mail provides children with an effective and quick way for children to communicate with people across the nation and world wide. Children may have had to wait up to a fortnight for replies from pen friends overseas via snail mail but with the use of e-mail children can receive a reply the very next day from people across the world. Numerous articles cite cases of children being able to chat, swap assignments and gain great insights in other cultures through the use of e-mail.

Moos are a way for children to communicate using the internet on a more realtime basis. Having experienced Moo's for the first time recently, I have realised that that they are probably one of the most exciting aspects of the internet. According to D. Ingvarson (1995), there are numerous Moo's set up for children, (The researcher having only experienced the adults version through Lambda MOO.) he states that MOOs are an amazing place for children to interact. And that children are given an opportunity to create their own worlds which are only 'restricted by their imaginations' p.83 (or perhaps programming skills !). He also states that MOO's have a wonderful equilibrium affect where children who in the 'real world' may be inhibited by some type of physical impairment are able to interact on the same level with any other child.

One of the big debates in the educational, the internet and in the general community is the question of censorship and the WWW. Schools have been 'protected' by material deemed unsuitable for children by the community by obtaining their source material from school libraries which employed 'censor' in the form of librarians. Librarians are responsible for ensuring the educational suitability of material provided by the schools library. But with the introduction of the internet into schools, children have unlimited
access to a variety of material created by people for a variety of purposes and for a wide range of audiences.

The dilemma which faces educators is how to 'limit' children's access to material which the community deems unsuitable for them. One way of doing this is for the school to ignore it, therefore leaving themselves open to criticism and ridicule for providing this resource. The second way of doing this is to run control programs which limit children's access to this type of material. Two examples of this are Censor Man available from EdNet and Surfwatch. These programs come with a list of sites which the programmers/researchers have deemed unsuitable for children, and once installed stop children from accessing those sites. Unfortunately, when using these programs teachers are subject to the type of categorisation made by the researchers of these programs. In a recent letter to the magazine, Internet Australasia, the writer expressed his concern that Surfwatch, one of these programs, had 'in a sweeping fashion classified gay and lesbian (or 'queer' to cover all variations of sexuality) topics as sexually explicit because they talk about homosexuality, or use the words 'gay', 'lesbian' or 'bisexual' ' (L. Ngatai, 1995). Therefore it is important, that although it may be 'important for parents to prevent sexually explicit materials from entering their home, we must not let all (of the above topics) be swept up in the frenzy of censorship' (S. Brail, 1995).

The problem faced by educators, is once they have made the decision to censor children's access to certain materials by using these types of programs, what type of criteria do they use. What or whose moral/religious criteria do they use to limit children access?

What may be appropriate according to one persons criteria may be intolerable to another's. So perhaps using these types of censorship would create more dilemmas then it solves.

The third solution for educators is not to 'impose' any type of censorship on children, but rather come to agreement with children that they use the resource they have been given wisely and for purposes appropriate in the classroom. This can be done through an explicit agreement, which teachers and students sign, as some high schools do, who are currently using the internet as a resource. This agreement binds the children to use the resource appropriately and respect the privilege, with the consequences ranging from limited access to loss of access. This type of agreement makes the students responsible for their own decisions.

Player's summative critique
It has become apparent that to use this [Internet] resource with children teachers will require 'teaching' children new strategies and organisational skills. It is a teacher's responsibility to create students who are able to digest and synthesise the great amounts of information they are presented with when searching the Web, and to make students 'discriminative' learners who are able to quickly sort information. Children, before even going anywhere near a computer, will need to create a focus question and other relevant questions. They will need to brainstorm key words that are relevant to their topic. Teachers and students must be encouraged to provide meaningful information which is useful to others.

E-mail provides children with an effective and quick way for children to communicate with people across the nation and world wide.

One of the big debates in surrounding the Web in the general community is the question of censorship. With the introduction of the Web into schools, children have unlimited access to a variety of material created by people for a variety of purposes and for a wide range of audiences. Such material may be considered offensive and requiring monitoring. The dilemma for educators is how to 'limit' children's access to material which the community deems unsuitable for them. One way of doing this is for the school to ignore it, therefore leaving themselves open to criticism and ridicule for providing this resource. The second way of doing this is to run control programs which limit children's access to this type of material, two examples of this are Censor Man available from EdNet and Surfwatch. It is important, that although it may be 'important for parents to prevent sexually explicit materials from entering their home, we must not let all (of the above topics) be swept up in the frenzy of censorship' (S. Brail, 1995).

A better solution for educators is not to 'impose' any type of censorship on children, but rather come to an agreement with children that they use the resource they have been given wisely and for purposes appropriate in the classroom. This can be done through an explicit agreement, which teachers and students sign, as some high schools [already] do, who are currently using the internet as a resource. This agreement binds the children to use the resource appropriately and respect the privilege, with the consequences ranging from limited access to loss of access. This type of agreement makes the students responsible for their own decisions.

This student had a priori experience with multimedia technology and the use of browsers from Mosaic upwards. In that fashion the student had advantages over the others in the WIP project. However, this was to be of collective benefit because of a caring and sharing interaction developing throughout the workshops; a role in which this student played a high profile role (sometimes a bit boisterous and patronising but, nevertheless) revealing. The focus here was on the role(s) of instructors and the acquiring of the proper attitude in this new concept of teaching.
This student had *a priori* experience with multimedia technology and the use of browsers from Mosaic upwards. In that fashion the student had advantages over the others in the WIP project. However, this was to be of collective benefit because of a caring and sharing interaction developing throughout the workshops; a role in which this student played a high profile role (sometimes a bit boisterous and patronising but, nevertheless) revealing. The focus here was on the role(s) of instructors and the acquiring of the proper attitude in this new concept of teaching. A particular theme discussed was that of censorship. Here it appears that there was a vacillation between laissez faire and strict, if not altogether draconian, control. The teacher’s role appreciably leans towards that perceived by Ian Forsyth (1996):

> There is an expectation that a teacher working in a classroom will interpret the curriculum documents and present their version of the course with a combination of diagrams, illustrations and photographs, perhaps with supporting video. How is this transferred to the Internet? [...] The short answer is that it is possible to transfer everything to the Internet. However to do so is to fall into the worst trap of electronically delivered material, which is to create course materials that are electronic page turning with none of the features to encourage learning in a computer environment. [...] What is the internal logic of the course material that earners need to know. To answer that question you need to consider the following: How are the outcomes for the learners, the objectives, the competencies expected from the learner stated? If these are obvious, you will then need to determine how the content of the course can be given attributes; You will have to determine attributes for the information; You will have to determine the links between these elements of information.

To adopt that concept in its entirety appears to regurgitate a sovereignty where the teacher has total control over the learning process and of the learner’s singular cognitive schematics (in the sense of: “You will have to determine attributes for the information; You will have to determine the links between these elements of information”). To do so would merely be presenting an “up market” methodology and be in disharmony with constructivist thought where the individual takes up a considerably more effective participation in self-learning.

**Reflective Journey: Player 6**

> When looking at the internet as a resource teachers need to ensure that they view it as a two way process, that they not only use it as a research tool for gathering information. But actively contribute and participate in it through the creation of web pages, the use of e-mail and places like MOO’s. To achieve anything through the web teachers will need to adjust the way they view their students and the skills they ‘teach’. Whereas in the past students may have used one or two references to complete a task the internet provides children with vast amounts of information, through which students need to sort and discriminate in order to achieve their set tasks. The internet should also be seen as a collaborative tool, both within the classroom and around the world. Students shouldn’t be sat at a computer and set individual tasks to complete but rather encouraged to work in groups and to find co-learners from around the country and the world. Lastly although
there are many positive aspects of the internet there are also some negatives, two of these are the costs involved and censorship, both of which are discussed in some detail.

Teachers must be careful that the only thing their class provides is not a photo with links to the children's favourite sites. After all there are plenty of sites which provide comprehensive lists of sites. Instead, teachers and students must be encouraged to provide meaningful information which is useful to others. As mentioned above, the kids' view of Lexington, is a enlightening view into one district's demographic. Giving the people who access this information an insight into the many facets of their community. This is an extremely powerful aspect of the WWW as never before have we been able to gain up to date information on a community. As child I remember doing projects on Greece, from the Greek project sheet, which included pictures of people in togas standing outside the acropolis. Yesterday I viewed a tourist guide to Austria, which included the complete history of individual cities as well as what was happening in night clubs and local places of interest! Teachers and students must be encouraged to actively contribute information about themselves, their community/country and their current classroom projects. As what might seem everyday happenings could be fascinating to students half way across the world.

Web pages are not the only way to contribute and receive information through the Internet. There are also mediums such as e-mail and interactive moo's where children can gather and have real time interactions.

E-mail provides children with an effective and quick way to communicate with people across the nation and world wide. Children may have had to wait up to a fortnight for replies from penfriends overseas via 'snail mail' but with the use of e-mail children can receive a reply the very next day. Numerous articles cite cases of children being able to chat, swap assignments and gain great insights in other cultures through the use of e-mail.

Moo's are a way for children to communicate using the internet on a more real time basis. Having experienced Moo's for the first time recently I have realised that they are probably one of the most exciting aspects of the internet. According to D. Ingvarson (1995), there are numerous Moo's set up for children, (I myself having only experienced the adults version through Lambda MOO.) he states that MOO's are an amazing place for children to interact. And that children are given an opportunity to create their own worlds which are only restricted by their imagination's (p.83) (or perhaps programming skills !) He also states that MOO's have a wonderful equilibrium affect where children who in the 'real world' may be inhibited by some type of physical impairment are able to interact on the same level with any other child (p.83).
In trying to come to terms with this new resource, and attempting to filter through the vast amounts of information available. It has become apparent that to use this resource with children will require 'teaching' children new strategies and organisational skills. Where children now may use one or two books to complete an assignment, when using the internet they may be presented with a hundred links to different sources of information. J. McKenzies in his essay, Grazing the net: Raising a Generation of Free Range students, uses the term 'infotectives' to describe what students need to become to be able to use the internet effectively: 'Infotective is a student thinker capable of asking great questions about data (with analysis) in order to convert the data into information (data organised so as to reveal patterns and relationships) and eventually into insight (information which may suggest action or strategy of some kind). (J. McKenzie, 1995, p.1)

It is a teacher [who is] responsible to create students who are able to digest and synthesise the great amounts of information available them. Whereas in the past students may have had one or two books as a resource for research. Students now have literally hundreds of papers and source material on any one topic. As result teachers need to give students the necessary skills to become 'infotectives'. Students need to be able to effectively sort through information and make quick decision about what is and is not useful to their research. And then be able to categorise and sort this information in order to create a coherent whole out of what might be dozens of links and avenues for research.

According to J. McKenzie, the most effective way of focussing students when using the WWW is to set open ended question, which can be broken into to parts and researched by students. Questions which encourage the students to draw links between a variety of possibilities. For example rather then asking students to investigate a state, gives students the name of three cities and ask the students to investigate which city would cater best for their families needs if they had to move there. In this, students are focussed towards a definite outcome, but how they define the problem and what direction and outcome they achieve is totally their decision. (McKenzie, 1995)

The use of the internet should also be a social practice, students should not be sat in front of computers alone and set a task. Students should work groups to achieve a common goal, and should be encouraged to discuss and reflect upon their research. The WWW adds a further dimension to the collaborative learning promoted by constructivist theorist, as group members may not be confined within the classroom. Organisations such as I*EARN are committed to collaborative learning via the WWW, students and teachers from around the world collaborate on projects from art related topics to ozone depletion.
Despite the many positive aspects of the internet, it does have its negatives. *Two of the negatives are the costs of setting it up plus the current ongoing costs and the question of censorship.*

To effectively implement the internet in every school as our illustrious premier Bob Carr has promised, depends on the two important factors. Schools will need computers, modems and possible servers. At present some schools are still using Apple II's which from memory are have approximately 128k of RAM and no hard drives, not quite built for running web browsers like Netscape 1.1 which requires 3 MB of RAM to run. Perhaps Mr Carr should have fulfilled his promise of computers before jumping ahead to internet access! *Educators will also need training and support,* it's one thing to provide the resource, but it is of little consequence if no one in the school has the technical expertise to use it nor the knowledge or skills necessary to implement it into the classroom practice. All of this requires money and time which are both luxuries in the current education system.

The internet unlike other the traditional learning tools such as books, is also subject to ongoing costs. Where in the past books involved an initial outlay and then were stored in a library for use over and over again. The research material available on the WWW is ever changing and therefore needs to be accessed at the time it is needed. This is an extremely positive aspect of this resource as the information, unlike a book, does not become outdated. But on the other hand it means that this resource, if it is going to be part of classroom practice, will need to be catered for in the school's budget. Adding to already over stretched school budgets.

One of the big debates in the educational, internet and in the general community is the question of censorship and the WWW. Schools have been 'protected' by material deemed unsuitable for children by the community by obtaining their source material from school libraries which employed 'censors' in the form of librarians. Librarians are responsible for ensuring the educational suitability of material provided by the school's library. But *with the introduction of the internet into schools, children are have unlimited access to a variety of material created by people for a variety of purposes and for a wide range of audiences.*

The dilemma which faces educators is how to 'limit' children's access to material which the community deems unsuitable for them. One way of doing this is for the school to ignore it, therefore leaving themselves open to criticism and ridicule for providing this resource. The second way of doing this is to run control programs which limit children's access to this type of material, two examples of this are CensorMan available from EdNet.
and Surfwatch. These programs come with a list of sites which the programmers/researchers have deemed unsuitable for children, and once installed stop children from accessing these sites. Unfortunately, when using these programs teachers are subject to the type of categorisation made by the researchers for these programs. In a recent letter to the magazine, Internet Australasia, the writer expressed his concern that Surfwatch, one of these programs, had 'in a sweeping fashion classified gay and lesbian (or 'queer' to cover all variations of sexuality) topics as sexually explicit because they talk about homosexuality, or use the words 'gay', 'lesbian' or 'bisexual' ' (L. Ngatai, 1995). Therefore it is important, that although it may be 'important for parents to prevent sexually explicit materials from entering their home, we must not let all (of the above topics) be swept up in the frenzy of censorship' (S. Brail, 1995).

The problem faced by educators, is once they have made the decision to censor children's access to certain materials by using these types of programs, what type of criteria do they use. What or whose moral/religious criteria do they use to limit children access? What may be appropriate according to one person's criteria may be intolerable to another's. So perhaps using these types of censorship would create more dilemmas than it solves.

The third solution for educators is not to 'impose' any type of censorship on children, but rather come to agreement with children that they use the resource they have been given wisely and for purposes appropriate in the classroom. This can be done through an explicit agreement, which teachers and students sign, as some high schools do, who are currently using the internet as a resource. This agreement binds the children to use the resource appropriately and respect the privilege, with the consequences ranging from limited access to loss of access. This type of agreement makes the students responsible for their own decisions.

This essay has discussed some of the aspects of using the internet as a learning tool. It is imperative that teachers view it as a two way process, that they not only use it as a research tool for gathering information. But encourage their students to actively contribute and participate in it through the creation of web pages, the use of e-mail and places like MOO's. In order for students to achieve anything through the web teachers will need to adjust the way they view their students and the skills they 'teach'. Whereas in the past students may have used one or two references to complete a task the internet provides children with vast amounts of information, through which students need to sort and discriminate in order to achieve their set tasks. It is important that it be seen as a collaborative tool, both within the classroom and around the world. Students shouldn't be sat at a computer and set individual tasks to complete, but rather encouraged to work in groups and to find co-learners from around the country and the world. Lastly although
places like MOO's. In order for students to achieve anything through the web teachers will need to adjust the way they view their students and the skills they 'teach'. Whereas in the past students may have used one or two references to complete a task the internet provides children with vast amounts of information, through which students need to sort and discriminate in order to achieve their set tasks. It is important that it be seen as a collaborative tool, both within the classroom and around the world. Students shouldn't be sat at a computer and set individual tasks to complete, but rather encouraged to work in groups and to find co-learners from around the country and the world. Lastly although there are many positive aspects of the internet there are also some negatives, two of these are the costs involved and censorship. Both of which will need community support and time to overcome.

References: Player 6


**Player’s summative critique**

When looking at the internet as a resource teachers need to ensure that they view it as a two way process, that they not only use it as a research tool for gathering information.

Teachers will need to adjust the way they view their students and the skills they 'teach'.

The internet should also be seen as a collaborative tool, both within the classroom and around the world, encouraged to work in groups and to find co-learners from around the country and the world.

The true beauty of the web lies in the fact that children can contribute and update with relative ease information

Teachers and students must be encourage to provide meaningful information which is useful to others.

Teachers and students must be encourage to actively contribute information about themselves, their community/country and their current classroom projects.
E-mail provides children with an effective and quick way to communicate with people across the nation and worldwide. Children are given an opportunity to create their own worlds and use this resource with children.

Will require 'teaching' children new strategies and organisational skills. The teacher responsible to create students who are able to digest and synthesise the great amounts of information available to them.

Need to be able to effectively sort through information and make quick decisions about what is and is not useful to their research.

Questions which encourage the students to draw links between a variety of possibilities. The internet should also be a social practice.

Students should not be sat in front of computers alone and set a task.

Two of the negatives are the costs of setting it up plus the current ongoing costs and the question of censorship.

Educators will also need training and support with the introduction of the internet into schools.

Children are have unlimited access to a variety of material created by people for a variety of purposes and for a wide range of audiences.

The problem faced by educators, is once they have made the decision it is imperative that teachers view it as a two way process.

That they [the students] not only use it as a research tool for gathering information, but that it be seen as a collaborative tool, both within the classroom and around the world.

This player exemplifies a classroom situation where considerable thought has gone into a teacher student's view of the outcome. In this case, the informant had already acquired a sound perspective of the implications generally and from the points of view of both teacher and student user. The critique lights on the recurring themes of the other five players and similarly focuses on issues which concern the Web as a cognitive tool. There is another echo of the trepidation of the ready access possible to pornography and available extreme 'e-cultism'. But this should be weighted against a 'public opinion' which has created its own benchmark in public mores; one that could be unnecessarily restrictive.
anyway - but, paradoxically, soon become bored with its known ‘repetitiveness’ and become involved in things other than voyeurism as occupational hazard.

Summation

Emerging salient connection points

Pre-schools through to tertiary institutes in Australian education are propelling online at velocity and, nationally, the Internet aka The Web is now a portentous cognitive resource for many schools; particularly in remote areas, where it is displacing the burden of distance.

A downside to the information technology phenomenon is that much of the material flooding the Internet is moulded by a pop culture whose publication values are characteristic of contemporary media’s distorting the factual significance of the received information.

The Web has given us a wonderful technology, but on its own the Web is not enough. The challenge of quality content will never be solved by technology. [...] The challenge will only grow, until we train people to create better content, publish it more quickly and structure it in a way that enables those that need it to find it fast. Technology can support these processes, but it is quality people who will make the quality content work.59

This creative exploration, invention and testing of the Internet will require a change in education that breaks down isolation, that facilitates the work of close-knit crews and accommodates ample time for scheduled outgrowth. Such deriving programs, if well-designed, would advantage e-learning by: stressing learning as opposed to teaching; learning unconstrained by time or location; self-pacing learning which is personally tailored, unvaried and cost effective.

The pursuits of cost-effectiveness in education facilities that the new technology promises could, nevertheless, induce governments to gradually reduce overall funding. This would make it most favourable for burgeoning e-learning providers to capitalise on their wares and lobby intensively to market their products.

Coalface teachers

In 1995 coalface-teaching staff were significantly indecisive, if not adverse to new information technologies in teaching, the pace of which was astoundingly fast. For several past decades awareness had been growing that measures of inspirational reform had to be

59 Gerry McGovem (2001), Why the web was invented, Volume 6 Number 4 @ http://nua.com 29 January 2001
addressed and that rote learning had become obsolescent. Although rote learning should not be totally displaced by constructivist modelling, it had to be instilled that the students' interests are paramount. A modified style of that former institution should not be discouraged as a means of “reinforcement”.

Web designers
Web architects, cognitive tool designers and multimedia technicians need to face up to their collective ideology inconsistencies. Their motivations. There has to be greater transparency in effecting the best possible quality educational outcomes for their clients.

Need for colleagues
History suggests that many of its geniuses were “loners” in the pursuit of their researches. Often they were considered intellectual outsiders, if not quite stupidly irresponsible. But those who had attracted like minds to themselves had often become brilliant intrepreneurs and innovators in their dedicated fields. As a result much of the better quality of life for humanity had evolved. E-learning students should be encouraged to collaborate with each other in that context.

The Web and Constructivism
Creativity in ideas and interpretative narration is substantially nurtured from the Web’s infinite resources since it can provide a building-upon or rehabilitation of an individual’s prior understanding of the nature of things. Notwithstanding, the proselytising of Constructivism as the ultimate panacea for cognitive enrichment should be avoided other than that it be deemed yet another means towards the evolution of the human mind.

The players’ critiques
In this chapter, emphasis has been focused on the interpretative essays provided by the Players. The underlying theme underscores an interesting enthusiasm for the Web as cognitive tool in all of its ramifications. Given that the study was carried out in the relative infancy of Information Technology the outcome is encouraging; the moreso in their uninhibited narrative expression, individually and collectively. It is encouraging that minds can be opened up to fresh, invigorating ideas.

Though small in number, it appears that, subliminally at least, the majority of this group of players, reflects an increasing trepidation of the effects of “cultural imperialism” in the sense of Stephen Knight (1990) where he expresses that in terms of:

In this century, especially in a small state like Australia, the prime site of intellectual critical and evaluative thinking has been in the humanities departments of the universities, and in some other areas of publishing, especially the serious journals. The selling of mind occurs when people in those areas are not allowed to operate towards specific and short term ends directed by government, administrators and businessmen. [...] They have laid
well the ground for selling the Australian mind by first denigrating it, so making it easy to suggest that cerebral powers are only a set of instruments to generate desirable possessions.60

An intellectual determination in that light would be at serious odds with anything other than linear thinking along a prescriptive, predestined route which the players have already identified as potentially subversive.

Part 1 and 2 in combination have delineated the pathways of the WIP project and indicated both the positive and negative reflections of individuals as well as their teamwork role. Their respective attitudes to the project had been drawn out, principally, in their journal entries: in themselves a proven tool for assertive action in a pattern most suited to the individuals leanings. There had been various diversities in their required written works, and the outcomes had become a reflection of that “passage rite”.

Whilst a constructivist frame of mind had unobtrusively platformed the project, it appeared to be a coincidental adjunct assisting the progress of the WIP observations. The suggestion had been that the constructivist method was one which could well be tailored to the Web’s architecture in future. In tandem, those aspects of an instructive environment had already appeared to be a substantively effective tool for teaching and learning in a scenario greatly enhancing the roles of teacher and student as interactively compatible with today’s technology; a New Age attitude recognising personality as well as intellect.

In Part 1 of this chapter constructivism was discussed as a preamble to relating the workings of the Web Inquiry Project. It was also seen in the light of teaching shifts in the New Age and certain misgivings by teachers in the field, as well as academics in 1995 and in continuance.

Part 2 continues the discussion in studying the temperaments and courses adopted by the Players and the NetKids in pursuing the Web Inquiry Project. Method and procedures are touched upon, together with extracts of lesson plans, home pages and graphics. It concludes with the submissions of the Players in an abbreviated format, and suggests that the Players and the NetKids would mutually achieve gratifying results from the exercise.

It should be observed that the targeted schoolchildren comprised a group with above average intelligence reflexivity and therefore slightly biased in that notion. It does indicate that coaching teachers in the field would reassure them in their respective roles as technologically ‘liberated’ to a degree hitherto not expected; and, therefore, abates any inherent reservations about the career effects.

Those coaching processes could be achieved at low fiscal costs since they could be done in situ as a result of the explosion of computer hardware and software where the great majority of

60 Stephen Knight (1990), *The selling of the Australian mind from First Fleet to third Mercedes*, Australia: Wm Heinemann pp 175-176
schools are now equipped for the purpose. Resources did not allow for studying a similar group of (a) average conceptualisation; (b) below average capacities nor (c) intellectually/physically impaired tutees. Those are groups from which invaluable data might be extracted in other circumstances.
Constructing knowledge using the Web

If I lived twenty more years and was able to work, how I should have to modify the Origin, and how much the views on all points have to be modified! Well it is beginning, and that is something:

Charles Darwin to Joseph Hooker, 1869, quoted in Stone 1980

This chapter continues to report on the interactivity between WIP Player(s) and NetKid(s) in the exploration of evaluating the Web as a teaching/learning environment. To indicate how the pilot tuition evolved out of the Players’ and then the NetKids’ primary induction, it presents “snapshots” of various developments, together with abridged observations and commentaries raised by the participants.

Given the absence of supportive precedences published on the Web at that time, various Web-focused lesson planning was of itself elementary. Consequently, it was not essentially innovative. Extensive exploratory browsing had suggested that educators in-the-field was, at that time, simply publishing commonplace cognitive assumptions for isolated delivery in an HTML array.

Remarkably, there had been little change in the content of the Web since 1994 except for a growth of some 100 million users, some 100 million more documents. But commercial entities had increased their input by some 200% plus and exploited a burgeoning fuss of mobile applets; increased audio and visual ingenuity, and various “eye-catching” gimmickry. Generally they were associated with the “sales pitch”; nothing to enhance educational potential.

Theorists of the Web’s potential as a fruitful learning/teaching atmosphere were not then generally inspiring to the WIP project, although “antecedent” CAL and interactive multimedia developments had not been found to be wanting. Insofar as lessons on publishing on the Web, however, a growth of “how-to-do-it” material was already establishing itself. (In introductory chapters to this work the genesis of computer aided

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educational settings has been considered in relation to the evolutionary aspects of the WEB).

Nevertheless, the seminal work of Roger C Shank and Chip Cleary (1995)\(^2\) had become the exception to that generality, and their *Engines for Education* was the then leading, authoritative source for Web-dependent cognitive delivery. *Engines* permits hyperbook "readers" to immediately access not only their required topic spontaneously, but, at the same time, generate supportive links to peripheral subject matter at the disposition of the client. What the authors had done was to cluster a series of questions (in the sense of FAQs) which targeted an extensive range of topics. Upon access, the reader is then presented with an "introductory" passage to which is appended a range of those type questions, to which the reader could then respond. The Web architecture of the work continues to be an excellent sample of what was being done, and what can be done with educational, on-line literature.

During this project, the researcher had progressively perceived a tenable relationship with, inter alia, L S Vygotsky (1978)\(^3\); Jean Piaget (1952)\(^4\); Dee Brock (1990)\(^5\) Peter Cookson (1989)\(^6\) H G Wells (1938)\(^7\); Parker Rossman (1982)\(^8\); S Papert (1988)\(^9\) and Enrico Hsu (1995):

**Enrico Hsu observes**\(^10\)

The group dynamics made the class an extremely cohesive learning group. Through constant guidance in an informal manner, I was able to get psychologically close to the students. In contrast to the other section [... that I taught [...] “virtual lab” has enabled the students to communicate much more freely and with “rich” content. [260-261]

Hsu’s theory is essentially a teacher stance where tentative issues are presented to students and their reflexes observed. Students respond according to what they interpret


\(^5\) Dee Brock (1990) “Using technology to deliver education”, *Bulletin of American Society for Information Science, August-September*

\(^6\) Peter Cookson (1989), Research on learners”, *American Journal of Distance Education* 3 (2) 22-34

\(^7\) H G Wells, (1938) *World Brain*, Garden City NJ: Doubleday Doran


the position to be, rather than teachers superimposing their reading of things. Thus, what became the yardstick of the WIP project was that: ‘by recognising that, for students, schooling must be a time of curiosity, exploration, and inquiry, and memorising information must be subordinated to learning how to find information to solve real problems,’ (Jacqueline G Brooks and Martin J Brooks (1993))

Ironically, the mentoring mode adopted by the instructor in the WIP was to be imbued with a behaviourist stimulus. This was essentially a by-product of a justifiable sense of the WIP as pilot project. Another perspective of the task in hand was reflected in Zane L Berge’s (1995) understanding that:

Distance educators are beginning to focus on a related set of notions: (a) that there are different learning styles, (b) that students create their own meaning when learning new things, and (c) that what makes a difference in content retention and transfers is not so much what is done by teachers but what students as learners can be encouraged to do.

Although there had been an absence of formal lectures, as such, and the progressive tutorials had become more or less extroverted, teaching tactics had been agreed by consensus. One of the outcomes was the following digest of topical discourse. Such interactive dialogue simulated findings of Jane M Healy (1990) which simultaneously revealed that all of the Players had had near-similar misgiving:

Many educators have trouble with the idea of upsetting traditional ways of teaching and encouraging mental autonomy in their students. Yet true critical thinking cannot simply be added to the curriculum like driving a train [or that] By engaging students only in a quest for the correct answer rather than the interesting question, we condemn them to live inside other men’s discoveries. (Priscilla Vail) (pp 315 and 309 respectively).

There is a mitigation, however, in the above generality. Most often, not all educators have a problem with innovation and its growing technology. (Zane Berge, 1998)

Teachers are changing their teaching styles to be more responsive to the characteristics of on-line environment and to focus on students’ self-directed learning. These teaching methods are labour intensive for staff and demanding for the students. As one on-line teacher stated: ‘[...]It keeps me thinking and digging constantly as we (the students and myself) interact together ... I know that the students are learning based on what I hear and see when they leave this class’.

[...] The shifting roles that are prevalent in on-line classrooms pose many challenges to students and teachers. Instructors must often coordinate groups of students, intervene at

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12 Zane L Berge (1995) *Computer-Mediated Communication and the On-line Classroom in distance education: from marks in the sand to computer conferencing*, ex Horizon Home Page (owner-horizon@listserv.oi.t.unc.edu)

13 Jane M Healy PhD (1990), *Endangered minds: why children don’t think and what can be done about it*, New York: Simon and Schuster
critical points in new and different ways than in the past, diagnose individual learning problems, and provide a right balance of feedback and ambiguity for students. At the same time, students must take responsibility for their learning, in many cases learn collaborative skills in addition to the individual learning strategies they are most accustomed to [...]. What really counts is that knowledge is not linear, nor is the process of learning. Learning is a journey, not a destination. Each point of view is a temporary intellectual stop along the path of ever-increasing knowledge.

The WIP Project - Prologue

As an undergraduate elective subject the proposed study curriculum had had to be couched in conventional instructive terms and, for the greater part, that engagement had been adhered to. But, as the delivery had relaxed in the spirit of discovery, the methodology had become increasingly fluid, in that its participants had become incrementally aware of the self-evident meaning of interaction and collaborative improvisation. The learners were instinctively to become a team rather than a group. This reflects Gardner’s (1993) recognition that:

Such a selection allows me to comment not only on the particular achievements of a group of talented persons but also on the ties that formed them, and that they in turn helped define. (p 7)

As outcome, this cohesiveness had not at any stage appeared to impair the individual creative bent for the players; although new ways of thinking things out had unconsciously been acquired in the learning process.

Although it had not been brief-specific, the case study, as it progressed, had suggested that Howard Gardner (1993) was also on track in filtering out the various (7+) intelligences (characteristics) of learners.


15 ‘The key to the Web’s success lies in its ability to present information in a non-linear format. Though a user may begin with a given starting point (often known as a home page), where to go from there depends is up to the whim of that user. Order becomes irrelevant, at least in the traditional sense of reading a book from one end to another. Because the Web allows you to click your new subject, you can skip over entire sections of information while nesting through others in great depth. This ability to “surf the ‘Net”, exploring the Internet with no defined end point or order, is known as hypenavigation and the form in which it appears on the Web is commonly referred to as hypertext.’ [Andy Carvin’s Home Page @ http://edweb.gsn.org/web.hypertext.html (2 July 1998)]

16 ‘[...] individuals are often thought of as working in isolation, the role of other individuals is crucial throughout their development.’ (Gardner (1993) p 8)
Table 6.1 Gardner’s Type

<table>
<thead>
<tr>
<th>Gardner’s Type</th>
<th>Example</th>
<th>Profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinesthetic</td>
<td>Freud</td>
<td>Psychiatrist</td>
</tr>
<tr>
<td>Visual-Spatial</td>
<td>Picasso</td>
<td>Painter</td>
</tr>
<tr>
<td>Mathematical-Logical</td>
<td>Einstein</td>
<td>Scientist</td>
</tr>
<tr>
<td>Musical</td>
<td>Stravinsky</td>
<td>Musician</td>
</tr>
<tr>
<td>Linguistic</td>
<td>Eliot</td>
<td>Poet</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>Martha Graham</td>
<td>Dancer</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>Ghandi</td>
<td>Politico-Spiritual</td>
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</tbody>
</table>

In the light of anecdotal, biographical commentary, there was an identifiable and interesting catalyst in the characteristics of each of Gardner’s examples where the early youth of these people had been somewhat unfocussed. In each case, the subjects evidently had given no premature indication of future “genius”. This pattern was to develop gradually out of an individual, inherent instinct for creativity, lateral thinking and an attitude of doing things their way.

At the first meeting, the undergraduates had projected marked enthusiasm for the WIP exploration which had been described to them in “draft” form. It had been emphasised that they might have to discard a considerable amount of pedagogical baggage and that teaching process would be coloured by a quasi-constructivist outlook, with which theories they were already familiar. The ‘How do we begin?’ question had raised some initial concern till they came to appreciate a hitherto unfamiliar concept of mind mapping. This had been readily grasped when explained that they could chart their individual thought processes either by linear “listing”, “thought bubbles” or any other way (whiteboard brainstorming) which would aid and comfort the natural planning game.

Some of the candidates had already been versed to varying extents in multimedia and the Web, others had been initiates. In that situation, they had been asked to mutually aid each other without being technologically specific because the targeted children would want to get to a hands-on position at first contact. This was to be the essence of the essential synergy required of the project.
This strategy had led to a situation where students had unassumingly exchanged "tips" and ideas among themselves. There had been an appreciable sense of collective cooperation, rather than a spirit of competitiveness; which is often a deleterious factor in such self-governing pilot projects. This "bonus" had been picked up later when that same spirit was, in turn, channelled to the coaching sessions with the targeted schoolchildren.

The discourse on evaluating the Web as learning tool, particularly in a context of constructivist credo, still remains in flux, and during the WIP project (late 1995) there were few if any benchmark propositions in that regard. Consequently the instruction had to yield to somewhat conventional auditing as it proceeded.

The hands-on process

Following is the direction that had been followed which, as stated before, tended to be more malleable and subject to student instructor brokerage as to the perceived outcome. As the teaching/learning approach had developed, the view of one of the student’s first meeting with the gifted children, is worth noting here:

"Our visit with the children we are going to teach was a real eye opener. Hey these kids are just like all other kids, except for the fact they have a heap of ideas floating around in their little heads, a foolscap page each of ideas in fact. I was apprehensive at first about meeting the children, conjuring up images, of thirty little kids with grey moustaches and wiry hair, sitting around contemplating the validity of Einstein’s theory of the twin paradox. Instead I found a group of children who were bright and enthusiastic, who discussed issues from comparing the nuclear testing at Murora to the destruction of Hiroshima, and the cartoon show CheezeTV".

Out of that type of interactive dialogue between the participants, numerous points had been raised during briefing sessions held before hands-on activity and wash-up debriefings prior to each subsequent session.

The WIP Project: Getting Started

A developing trend within the Players’ team had been an increasingly vibrant “debate”, based on both generic question and response consensus that came to mind in discussion. Relevant notations made at that time and when such (de)briefing sessions took place follow. The Players’ collectively accepted premise then adopted (1995) was essentially built on one to be described three years later, by (again) Berge (1998)17:

The range of Student teacher interactions was very broad including teachers who stated students should discover new knowledge without explicit instruction from the teacher, to others who engaged in very direct instruction. The most common teaching styles used by the on-line teachers responding to assessment.

By collaboration the researcher means: the joint intellectual effort by students in peer groups, or students and teachers together, with the emphasis on the students’ exploration of the course goals rather than the teacher’s presentation or delivery of course material and content. By authentic learning activities I mean teachers who promote inquiry learning, problem solving using real world problems, practice, or project-centred activities, or case studies.

During the flow of the WIP project, that feedback from the Players on procedural points had been prompted every so often by the instructor, and the more significant comments noted, as represented below. The gist of those WIP Players’ inferences appears to have been considerably voiced earlier in de Bono (1970)¹⁸ where he illustrates that:

The purpose of thinking is to collect information and to make the best possible use of it. Because of the way the mind works to create fixed concept patterns we cannot make the best use of the new information unless we have some means of restructuring the old patterns and bringing them up to date. Our traditional methods of thinking teach us how to refine such patterns and establish their validity. But we shall always make less than the best use of available information unless we know how to create new patterns and escape from the dominance of old ones. [...] Lateral and vertical thinking are complimentary. Skill in both is necessary. p 13)

Inferences of the Players’ Awareness

The 25 points referred to below (Table 1.1) were not the result of a specific questionnaire of itself but had emerged orally out of a continuous routine established at the first workshop where then, and at each session thereafter, Players and instructor would review the then current conception and progressively build upon their ongoing hands-on experiences for the term of the project.

These “warm-ups” had always been based on candour by all participants. It had been intriguing to note how individuals had manifested their singularities of reasoning but, side by side, had responded favourably to the interactive nature of sharing and absorbing the many perspectives suggested by other frames of mind.

Table 6.2 Hunters and Gatherers: previewing some underpinning mentoring ingredients

Samples of approach issues raised in formulating an evaluation criteria which was to be progressively assumed by the Players

Agreed: Positives

The analysis of data is only a facility for the checking out of hypothesis.

It is an impediment to introduce only information that we perceive is needed for problem solving in the classroom.

What you do not know that you do not know: is that important.

What you know you do not know: is that important.

Thinking itself not a substitute for information.

It is true that teaching how to think and not what to think is best practice.

We should teach how to think as individuals?.

We cannot teach creativity, but should endeavour to foster it.

We should be targeting aptitudes to best cognitive advantage.

It is true that the Web promotes “New Age” criteria.

A school’s in situ resources for the NetKids’ haves and haves-not is to be a prior, major consideration in facilitating WIP monitoring at university level.

It is consider that there is still much to do by way of utilising the Web to best advantage.

We should be reviewing the effect of the Web on mentors concurrently.

Academics should be first to adapt to this new information technology.

Agreed that, in problems set at school, ‘[W]e are so used to being given only information that we need for the problem that we actually leave school believing what we “learn”

We think that search engines could be continuously improved possibly by introducing quest-obedient butler.

It follows (metaphorically) a Darwinian premise that adapting to changing environment assures survival of the fittest.(Edward de Bono)

Agreed: Beneficial

Q. How is Information Technology shaping up to be in terms of education?

Search engines and cataloguing should be continuously improved and topic indices might reduce needs for “butlers".
Many have observed that the effect of students using computer aided learning is that they retain greater proportions twelve months later than those learning by cramming and that the Web similarly boosts retention.

Agreed: Likely to be beneficial

Q. Does the WIP study’s title still hold good for estimating learning utility?

The Web achieved our sought for cognitive support possibilities.

Agreed: Prior knowledge

What you know is not the most important factor in teaching.

Agreed: Undecided about benefits

Q. Can we utilise existing teaching forces to adapt quickly and excise technophobia?

Players’ perceived “terms of reference”: Preliminary reservations

The Players appeared to have expressed preliminary reservations about the quality and/or value of their experienced areas of tertiary study. They appeared to have a common doubt about the real benefits of what can, perhaps, best be described as “blanket” downwards information dissemination and lack of opportunity to interact by contribution towards achieving common goals of knowledge and its development. In other words the an informed flow should be:

Educator(s) > Students(s) rather than a preferred Educator(s) <-- Students(s)

Interpretation of finding

Although the analysis of data and subsequent interpretation of findings could be seen to be a finite step in understanding the transition from hypothesis to proof or disproof in research, it is the experience of the “journey” of discovery that is itself the most beneficial reward. The exploration generally opened up further (even if controversial) debate, and often attracted farther reaching and continuous research into the topic and its consequences.

Beneficial results for education

The response there suggested that Information Technology, by way of the Web, would probably produce many beneficial results for education because the prospective data to be analysed would be more expansive and more up-to-the-minute and, therefore, likely to be more reliable.

Adapting to changing environments-

The perception here is that teachers should not presume to have all-seeing knowledge, and that there is always room for adapting to changing environments; that teachers can learn from their students because, in general instances, upcoming undergraduates, especially, had had a more flexible understanding of computer aided education features.
In 1995, whilst the USA was leading the global field in Information Technology, Australia's primary and secondary schools generally had incorporated intranet CAL systems with appreciable success. They were also gradually establishing limited Internet access. In contrast, tertiary institutes were only then, and merely in a handful of cases, introducing on-line (distance learning) courses.

The Internet as teaching environment was only in its relative infancy, and, in those institutes, few academics were practised conversants with the Internet and archival retrieval implications through its browser(s); mainly Netscape 1.0. Consequently, the majority of instructors were at disadvantage to their undergraduate/graduate intakes.

Although there has been an intense focus on computer aided environments, even in 1999, the success of dedicated classrooms is still very much dependent upon teaching and learning tactics inside them. There is ongoing debate about the correct approach to take in installing machines: should they be centralised in a laboratory or fully intra-networked throughout the building etc. Central to this is always the question, present and future costs, and future updating of equipment. Numbers of educators and scholars still find themselves uneasy about subscribing to a regime where students themselves are obliged to participate energetically. Few teachers still have little or no expertise in that area of educational technology; suggesting a more considered focus on how to infuse teachers in optimising technology's potential.

Excess baggage

The Players apparently recognised that 'What you know...' is not in fact the most important factor because the “what you know” often implies an excess baggage of past teaching methods and experiences where the innovative is readily rejected in favour of the more “comfortable” than the conservative canon.

Innovative perspectives

The corollary to the above, suggested here, is that accepting that what ‘you know you do not know’ is the most important factor and that this attitude to teaching indicates a open-mindedness that is alert to innovative perspectives in teaching and in learning in any given arena of the profession. Especially in that seemingly infinite wide-band inventory of constantly updated information which the Web is able to deliver instantly at will.

Problem solving from different angles

This observation reinforces the idea that teachers should be able to recognise that they may not, after all, have all the answers, that looking at problem solving from different angles often results in a more accurate interpretation of the problem’s resolution

More flexible lateral thinking

Thinking, of itself, may only backtrack on “hard-wired” information which may not be credibly relevant to the current problem, because familiar thinking generally follows a linear, information tracking “seek and find” command; or the quickest (habitual) route to possible “inbuilt answers”. By acclimatising, or conditioning, the thought process to a more flexible lateral thinking mode, the retrieval will benefit by having initiated new perspectives, probably more beneficial to the customary “thinking” on hand. That activity will simultaneously add to the mind’s intellectual “resources” for future referrals on the subject matter.

“New Age” thinking

Teaching ‘how to think’ as best method for disseminating information-retrieved knowledge essentially requires that the teachers themselves know how to think. In recent

19 'The single most important element in learning is failure, and since creativity is an outgrowth of learning, failure is also important for creativity.' (Roger Schank)

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years, specialists in that field, like Edward de Bono, Robert Shanks and growing numbers of like experts have done substantial research and, subsequently, effectively advanced writing on the creative and evaluative thinking processes. Consequently, an increasing number of educators have been taught “new age” thinking. That, in turn, has beneficially rewarded their students.

Thinking as individuals

Thinking as individuals requires an evaluation of “hard wired” intellectual resources. Creative and lateral thinking tends to question a priori “knowledge” gained from whatever other sources of learning. The result of creative or lateral thought creates an exclusive personalization of reconsidered materials. But that of itself does not necessarily harvest the correct answer. However, it does extend the interpretation perspective, thereby boosting the odds of achieving the preferable, universally acceptable answer.

Intelligence harvesting

We may not be able to teach creativity, but we can instruct how it can be nurtured by various techniques suggested by contemporary specialists in the field - like Gardner and de Bono - who have produced generally acclaimed results globally. It is worth observing here that the terms “lateral” and “creative” generally applied to thinking are gradually being replaced by “wide band” thinking. This appears to have derived as a metaphor for the Internet’s electronic, information transmission dimensions in intelligence harvesting.

Cornerstone principles

It is widely accepted that Jean Piaget (1952) and Howard Gardner (1993) laid the cornerstone principles of multiple intelligences inherent as the norm in every person. This has led to developing changes in attitude to teaching methods where aptitude is becoming the major relevance in the learning process. The theory and practice of Constructivism in teaching and learning environments has subsequently become the focus of much ongoing research.

Understanding of the role

This point focused on the formative cognitive process and leaned towards an understanding of the role of the metacognitive influence in formulating personal “insights”. It also underscored the Players’ fundamental recognition of the increasing part played by constructivist techniques in educational self-realisation and, perhaps, a promising acknowledgment of their own future role(s) in their capacities as educators. Whilst inconclusive at that stage, the Players did respect the possible advantageous effects of the Web in that environment.

Using the Web collaboratively

There had been agreement here that there would be positive benefits in using the Web collaboratively in the classroom and, moreso, in globalising interactive exchanges of meaningful information at intercultural stages.

Adequate coaching for the Web

In similar projects, where adequate coaching for the Web and its facilities, and assessment of outcome, is undertaken at university level, it is essential that the in situ evaluation of technological resources (state-of-the-art) of the “home” primary or higher school students is undertaken before commencing the project. Not all schools and their students have the same level of resources and/or computer literacy; nor their school(s) offered sufficient

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20 "The single most important element in learning is failure, and since creativity is an outgrowth of learning, failure is also important for creativity." (Roger Schank)


hands-on experience in many cases. Where “gifted” children are being observed, the end evaluation can only relate to them in such prevalence of their individual expertise. It does not accurately measure the capacities or potential of the norm, which, at base, includes average to below average computer literates as a majority.

**Future teaching method and intelligence assimilation**

There is a likelihood, according to the Players, that the Web will play an exceptional role in future teaching method and intelligence assimilation for its users. However, governments - as final arbiters for fiscal assistance - would be obliged to ensuring supply of necessary logistics and its maintenance, as well as appropriate numbers of educators. Reviewing and updating of teaching method and its utilities would have to be under regular appraisal in order to maximise benefits to all concerned. These reactions suggested a positive outlook towards shaping increasingly “healthy” vista of the quality of life aiming at universal benefit.

**Providing adequate Internet access**

Given the current state of the nation (Australia, 1995), there was much more to be done in providing adequate Internet access in all the domains of education, the public sectors and private users. That, despite a prevalent inflated sense of achievement in that direction; generally the result of media “force selling” and a good measure of national chauvinism in the face of overseas “competition”. Related to CAL, as such, the Players had concluded that it was likely that those technological resources, together with the Web as instructive vehicle, would have a sound effect on the production of knowledge in the future. There had been an understanding indicating that provision of all required resources should be a planetary priority, and that its provision should never be sequestered in any socio-political or socio-economic sense.

**Mentors in action**

Observing mentors in action concurrently with the targeted students would provide valuable insights into the better ways of equipping future mentors and students to provide maximum mutual benefits. The researcher would note the student teachers’ reactions in applying what they themselves had learned to consequently investing the schoolchildren with that teaching resource.

**As more teachers are “liberated” from technophobia**

Demonstrating to probable users of the Web that, indeed, it was not as complicated to use as was feared by many (the ready rationale of the technophobe) was the best way of resolving the apathy that was present in the field. As more teachers are “liberated” from technophobia they in turn pass on their skills to their colleagues and peer, so setting up a “chain reaction” of skilling management. Nevertheless, the Players had concluded that they had little capacity to dilute an existing technophobia in the field, and that their only likely future influence would be to adopt an “evangelisation” stratagem.

**Management and archival factors**

There had been significant concern about the current (1995) provision of search engines and how to use them for best purposes. At that time, the search engines had limited functional “expertise”, but how to use them to gain best results was the obstacle. There is a way to “talk” to the searcher in much the same way as was required in librarianship technique. But, even at that time, there were growing numbers of search engines and with them far more “skilled” retrieval qualities. The evolution of so-called “intelligent butlers” indicated the search and retrieval was an ongoing factor in Web page management and archival factors.

**Possibilities as an effective medium**

Whilst agreement had been reached that the Web would beneficially affect future educational method, there had been an acknowledgment with this response that much had yet to be fulfilled in that process. But the WIP project had notably highlighted its possibilities as an effective medium in current and future education areas. This return, in
fact, had reflected a consideration that the (WIP) Players should interchange their findings for mutual inspiration and benefit. Notably, this had been, for the greater part, most usefully effected gratuitously throughout the project. The project’s title had followed the Darwinian premise, metaphorically, and satisfactorily.

**Stumbling blocks encountered**

This had been a response to stumbling blocks encountered in the various search procedures, where the Players had often come to dead-ends in their researches. It had been a “teething” trouble gradually ameliorated by the Players’ individual ploys to “outwit” the performance mechanism at a time (1995) when search engines were still “quite naive” in function; as well as were the searchers’ introductory techniques.

**Educators should seek better understanding**

There had been common assent that the title of the research project had encompassed the exploratory situation effectively, and that the Darwinian allusion had been in keeping with the unfolding WIP study. And subsequently: that educators should seek better understanding of the possibilities and implications of the Web and be among the first to adapt to that innovative method of teaching and information delivery in that light.

**Retaining personal prerogatives of expression**

There was a general feeling that primary and high schools, as passageway to tertiary education, would do well to note that: ‘[W]e are so used to being given only information that we need for the problem that we actually leave school believing that life will carefully lay out the information that we need in every situation.’

(Edward de Bono)

The de Bono approach had not totally flavoured the outcome, but the participants had apparently mellowed out their various mind-sets whilst retaining personal prerogatives of expression in their ongoing WIP productivity. Briefing sessions had evolved from the traditional concept of tutorials in which a student (or more) presents a “work” which the others then seek to appraise; preferably in an objective mood. Nonetheless, it had realised the primarily intended role of _pilot_ in the exercise. In this case, the project was to become a formative teaching/learning procedure.

The WIP variation became one where ideas themselves were first interactively verbalised and subsequently reshaped into prospective working tactics for the group as well as the individual. It suggested that, for such an undertaking, as the WIP, it is considerably advantageous to confine such inquiry projects to small induction clusters, even though statistical variables might inject certain exactness limitations.

**The targeted schoolchildren**

The primary schoolchildren undertaking the WIP inquiry comprised students who had been participants of a parent-teacher sponsored DSE (NSW) pilot undertaking for evaluating methods in teaching so-called “gifted” children. These pupils had been “co-opted” from a number of schools in the area and had been meeting weekly at a central school under the supervision of a specialist teacher.
Although scholastically “gifted”, the children had been derived from a wide spectrum of socio-economic family backgrounds. They had also been computer literate to above average standards, although their school equipment had been very basic (1995). Some of them, however, had been fortunate to have had personal computers and peripherals at home; some with modem access already. But at that time, and for the greater part, they had had to make do with classroom provided resources, which were generally makeshift.

Whilst that nucleus had fitted into the WIP concept comfortably it could not have given a clear-cut, dependable reading of the desired outcome. The required variables for that purpose would have been better served where resources might also have provided observation of comparative numbers of academically average and below average tutees with similarly basic or extensive CAL wherewithal. Kurt Rowley\textsuperscript{23} and Edward de Bono\textsuperscript{24} reflects on this context in other synergetic words:

\textbf{Rowley}

[...]the acquired learning strategies lead to connections made in the brain that are unique to each individual, based on experiences, genetic traits, and decisions made by the learner, and those connections are heavily influenced by the learning environment.[...]One of the more interesting aspects of modern systems theories (see James Leick’s book ‘Chaos, making a new science) is the notion than in a complex system such as a human learning environment, the effects of all elements of the system on each other are recursive. In other words, the changes to the learning environment (including instructional strategies and cultural variation) are to effect changes in the learning mechanisms (including brain structure and individual preferences), which in turn exert a change back in the learning environment (teachers and researchers responding to feedback from the students), and so on.

And

\textbf{de Bono}

What is needed is not more technology design but more ‘value concept’ design. Technology can deliver almost any value we design - but we are lagging far behind in the design of value.

\textsuperscript{23} Kurt Rowley, PhD (1999), IFETS Discussion Group (20 February, 1999) <Kurtrowley@aol.com>

\textsuperscript{24} Edward de Bono (1998), \textit{Simplicity} Middlesex England: Penguin Books (Viking)
Known WIP instructional strategies

In the disposition of what has just been conveyed, Gagné, (1995)\textsuperscript{25} proposes that: ‘There are known instructional strategies. The acquisition of different types of knowledge and skill require different conditions for learning.’ Merrill et al (1996)\textsuperscript{26} have counterpointed that perception in their approach on that outlook:

> If an instructional experience or environment does not include the instructional strategies required for the acquisition of the desired knowledge or skill, then effective, efficient, and appealing learning of the desired outcome will not occur.

So, in substance, appreciably:

> Each of the different types of intelligence may still require the learner to acquire a concept, learn the parts of an entity, learn a procedure, or understand a process. It is these fundamental types of outcome that determines different instructional strategies in a content-by-strategy interaction. [...] Each of these architectures may be set in individual or collaborative environments. [but] ...a given instructional goal still requires all of the strategy components that are consistent with this goal for the learning to be effective.\textsuperscript{27}

Arriving at a mission “statement”

The reflections on sampling lesson plans described in Chapter Five had been influenced in some measure by the process here successively associated. In those plans, the Players had clearly displayed their personal characteristics whilst simultaneously employing an acceptable, if not conventional, method of imparting their acquired proficiency.

At that stage the researcher had already been formulating my own comprehension of the process in which the Web was likely to have a decidedly, perhaps irreversible, influence on teaching and learning.

From an instructor’s view the researcher had, at that time, been attracted through serendipity to a philosophy later to be aired on-line (7 October 1997) in Engines for Education\textsuperscript{28} and, in his own terms, had proposed it for adoption by the Players within their own perception of teaching the NetKids and scholars in general. I had felt that there was a legitimate underpinning proposition in Shank and Cleary’s (1995) seminal study.


\textsuperscript{26} David M Merrill, Drake, Leston, Lacy, J Mark, Pratt, A Jean & ID2 Research Group (1996), *Reclaiming Instruction Design*, Educational Technology, 36(5), 5-7

\textsuperscript{27} M David Merrill (1999) “Learning strategies then and now”, IFTES-DISCUSS Digest - 3/4 February 1999

\textsuperscript{28} Top ten Mistakes in Education, Engines for Education @ http://www.ils.nwu.edu/~e_for_e/nodes/NODE-283-pg.html (7 October 1997)
Schools act as if learning can be dissociated from doing

There really is no learning without doing. There is the appearance of learning without doing when we ask children to memorise stuff. But adults know that they learn best from the job, from experience, trying things out. Children learn best that way too. If there is nothing to actually do in a subject area we want to teach children it may be the case that there really isn’t anything that children ought to learn in that area.

Schools believe they have an obligation to create standard curricula

Why should everyone know the same stuff? What a dull world it would be if everyone knew only the same material. Let children choose where they want to go, and with proper guidance they will choose well and create an alive and diverse society.

Teachers believe they ought to tell students what they think is important to know

There isn’t all that much that it is important to know. There is a lot that is important to know how to do, however. Teachers should help students figure out how to do stuff the students actually want to do.

Schools believe students have a basic interest in learning whatever it is schools decide to teach to them.

What kid would choose learning mathematics over learning about animals, trucks, sports, or whatever? Is there one? Good. Then teach him/her mathematics. Leave the other children alone.

Nevertheless, there is considerable peril in allowing total free fall, or aimless free ranging, in students searching the Web as consequence to their initial coaching session(s).

Eileen H Kramer on-line (6 October 1997) sums this problem up quite neatly when she says:

I have heard that the Web is addictive but I have never seen it capture a teacher and his [her] students so easily. Has anybody out there had this happen to them? I know this goes into the most embarrassing file. I also felt that the way a teacher let his [her] students go hog wild would give the Web a bad name in academic circles. I think it is more a case of students bringing basic knowledge and academic interests to the Web rather than the Web being good or bad.

The problem of “too much” versus “too little” information access had already been flagged by Guba & Lincoln(1989) and now becomes another ingredient in the recipe for cognitive enlightenment in coming years:

If information is power, then information withheld is power reduced. If clients have the final word on what information will be released, to whom, when and by what means, the process is clearly tilted toward the maintenance and even enhancement of power for those who already possess it, while depriving the relatively powerless of even that little that have.

(pp 9-10).

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29 Eileen H Kramer, The one that got away. Interpersonal Computing and Technology (ehkuhall117@delphi.com) from LISTSERVER.GEORGETOWN.EDU (6 October 1997)
In that frame of mind, and following upon their common introductory visit with the targeted (NetKids) schoolchildren, the Players, had been encouraged, in due course, to develop a generic home page illustrating *their* rudimentary concepts of implementing the Web as a teaching tool.

What follows are extracts from the Players’ and the NetKids home pages.

**Player One**

**RATIONALE**

This site is intended for use by children to learn more about the issues surrounding nuclear testing through using the WWW as a research tool. The site is not only a collection of links on the topic but also a place for people to contribute their feelings, insights and knowledge on this topic for display to the whole WWW community.
The idea for this site arose after speaking to a group of children and asking what they would like to contribute to the WWW. I was presented with pages of topics from the children, but one topic was consistent among all, that was sending e-mail to President Jacques Chirac in protest of nuclear testing in the Pacific. Rather then sending e-mail directly to the French President I thought it was more appropriate for the children to express their feelings through poetry, letters and drawings through their personal home pages.

Hence this site was created in order for the children to further their research into nuclear testing and provide them and others (like yourself) a place to exhibit their views on this topic.

How To Use This Site With Children in the Classroom

The function of this site is obvious: it serves to provide children with links to the topic of Nuclear Testing. Through doing this it is hoped that the children will gain an insight into the issues surrounding this topic using the WWW as their main source of information.

The main aim of this site is for children to express their knowledge and attitudes about this issue through poetry, stories, letters and even art works. Which will then be displayed for the wider WWW community.

Through the design of this site I have tried to make it a self contained research tool. The site explains it's purpose to the children, and attempts to gain some insight into their existing knowledge of the topic through the pre-contribution page. The site is designed purposely in a linear manner in order to lead the children through the site in a logical progression, i.e. from pre-assessment to their expression and demonstration of learning, through the contribution they submit.

Since the site is self-contained it is hoped that it could serve as the focus as a unit of work in either English or Social Studies, as the themes and activities involved relate closely to these to subject areas

Specific Teaching Strategies:

You may wish to show the students how to navigate the site as a whole class, before they begin using the site. In order to minimise confusion when they are moving around the various links Children should work in at least groups of two, with one child responsible for navigation and the other responsible for note taking.

Children should be encouraged to contribute to the site, as this is the ultimate aim of the activity. Children may need to complete their research and organise their thoughts before contributing, so they may wish to research one day, contribute the next.

The children should be encouraged to progress through the site in a linear progression as this will ensure they gain the maximum out of using this resource.

The children should be encouraged to take notes when visiting sites as well as printing pages of particular interest.

This site is not an exhaustive selection of nuclear testing material on the WWW, it is only a selection. The children may wish to expand on their research by doing their own searches on the topic.

Contributions are not limited to the examples given, they are only limited by the imagination, and of course the technology available. So children may wish to contribute sounds or movies, if they are able to.
The site tries to act as a crude assessment device by both conducting pre-assessment of prior knowledge and values and attitudes, and overall assessment by publication of a piece of work.

How to use this site:

This site is intended as a home base for your research, it saves you the time of collecting links together and sorting them under topic headings, as it is already done for you.

The links take you to a number of sites on the WWW at any time you can return to this site by either using the Back button or going to the GO menu and selecting 'Nuclear Tests Resource Page'.

Before going onto the resource page take the time to fill in the pre-site survey which gives me some insight in to your knowledge of this topic before you use the links provided. And before leaving the site take some time to make a contribution to the site which will be added along with the others, for the everyone to view.

Researcher's critique

The Player, in this case, has gone to significant effort to include various interactive propositions. Using scroll-forms within home pages, he made full use of what was then innovative teaching practice; which contributed essential feedback for the author and the users alike. Samples of these are given here in an abridged format. Additionally, the searching “blueprint” of the NetKids has revealed a worthwhile contribution to research data for the WIP study.

(Note: Original text fields have been omitted here in this instance)

Pre-contribution:

Before you begin using this site take some time to fill out the following:

Your name:

Your e-mail address:

Five things you currently know about Nuclear testing:

Five things you would like to know:
Click which face best describes your feelings towards nuclear testing:

: ( happy ...... :( sad ...... :o shocked ...... :| indifferent ...... :8 angry ...... :

An interesting feature here is the introduction of the "fun factor" using *smilies* where the user is required to indicate happiness through sadness at the closure of the form.

The next form, once more introduces an ideal data provider for the WIP study Player:

*(Note: Original text fields have been omitted here in this instance)*

Contribution:

Your name:

Your e-mail address:

Five things you learnt About nuclear testing through using this site:

Your contribution:

You may either write something in the box below that describes your feeling towards nuclear testing, for example a poem, letter of protest or story.

OR

You may enclose a picture/graphic through e-mail by pressing Attach in the Netscape mail options.

All contributions will be considered for display in this site.

Click here to see the examples of the contributions already submitted.
This is a further page indicating the importance of disclaimers when making home pages through an ISP publisher.

The site:

This site consists of five main pages, pre-contribution and post-contribution, teachers notes, how to use this site, and the site itself.

The following key will be used throughout:

Disclaimer:

The views expressed by those who contribute to this site remain their property and are not necessarily the views of the site designer (that's me : ) ) nor those of the University of Wollongong.

Secondly, there may appear to be some bias in the links provided and information presented in this site, but you are free to interpret the information as you please and take any stance on the issue you see fit. Personally I can see no justification for nuclear testing as both an individual citizen nor as a professional educator.

The player, there, approached the WIP requirements as a formative process which embedded both instructive and assessable results. Recognising that the Web induces thought provoking reflexes that could be used for resolution of complex problem solving - through its embedded multimedia resources of infinite variety - the core of the homes pages focused on that task efficiently and effectively. Thus, the NetKids were encouraged to become distinct thinkers. At the same time, developed skills permitted them to manipulate and reconstruct their acquired knowledge uniquely and, through those experiences, encounter knowledge in the making. The prospective result being a
synthesis of the targeted resources with the innovative technology of the Web’s capabilities.\textsuperscript{31}

All educators and, particularly, all leadership have an implicit accountability in ensuring that they are capable of distinguishing the nuances bridging \textit{direction} and \textit{manipulation}. Their personal interpretations as mentors, have, and will continue to have, a profoundly lasting effect on the state of society and the amelioration or erosion of instinctive, individual characteristics; which is the genesis of homo sapiens thinking creativity. A problem in teaching is that what is sometimes thought to be \textit{instinctive transference of knowledge} may well be a subtle transmission of personal predilections based on how that knowledge was acquired, and from whence.

In that Player’s comprehensive product, it can be seen that, reflexively, a constructivist underpinning has been established

**Player Two**

![Image of Player Two coaching her NetKids team](image)

Player two, above, coaches her NetKids team prior to its hunting and gathering data.

**EXPLORING THE WORLD WIDE WEB**

Exploring the WWW...

During the four hours we have been working the together, the students have had the opportunity to explore sites of interest on the World Wide Web. They have accessed sites of interest as well as informational sites related to their classroom study (e.g. communicating through my e-mail account! This was a positive outcome of a seemingly pointless venture.

Developing the Profiles...

In the first week, the students were introduced to HyperText Markup Language (HTML), the language used to make information readable by the WWW browser. Some students took home a quick reference guide and began constructing their own autobiographical pages. Others started from scratch in the second session, using another student's profile (already published in HTML) as an example. The students worked co-operatively together as they explored the capabilities and limitations of the language (e.g. background colours, image inclusion).

Publishing the Profiles...

A few students had the time to actually publish their own pages and I have published the others since last week...so, sorry guys if your pages don't quite look like what you originally envisaged! You can make any changes later if time allows. Once you're completely satisfied, they'll be put onto the World Wide Web for everyone to see!

| Suzanne | Joshua | Laura | Owen | Alicia | Ben | Chloe | Project |

I would be interested to know your views concerning the Internet, including your perceptions about the sessions that have taken place. Just click below and type..........................

MELANIE

With “Exploring the Internet”, the Player has neatly packaged her mentoring plan as a home page. The NetKids were not able to e-mail messages globally because an intranet system as resource allowed only internal (not off campus) access; notably because of the number of Internet traffic problems and ISP down-times prevailing at the time. However, the children did not “miss out” on the hands-on e-mail experience.

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Once you’re completely satisfied, they’ll be put onto the World Wide Web for everyone to see!

| Suzanne | Joshua | Laura | Owen | Alicia | Ben | Chloe | Project |

Once again, a WIP Player has displayed acquired, knowledgeable appreciation of those special mentoring qualities required in using the new technology of the Web as an effective education environment.

Another mentoring ploy was to focus interest is the “personalization” of an exercise as exemplified in this profile.

NAME: Brendan

AGE: 10 years

SCHOOL: Public School, Sydney

FAVOURITE SUBJECTS: English and Maths

INTERESTS: Playing soccer and watching the rugby

AMBITION: To become a sports journalist

FAVOURITE SAYING: “Tomorrow’s another day!” FAVOURITE LINK: My favourite link is KidPub because it’s full of interesting stories and poems to read.

Check it out for yourself!

CORRESPONDENCE: If you want to contact me, you can do it through my sister because I don’t have an e-mail account. send any e-mail to: ****@uow.edu.au
Lesson Plan for the World Wide Web Incorporating Montgomery and WWII Web Page

Initial Rationale

The Internet provides students and teachers with a seemingly endless teaching and learning resource. Because of the complex nature of the World Wide Web presently, part of the problem it presents is maintaining focus. The purpose of using the Montgomery and WWII page I have designed and these learning activities are to allow children within a classroom to experience using the Web, not only generally, but for a specific purpose.

Organisation of Learning Activities

The learning activities outlined here are based on the assumption that the children within the class have had previous experience in using the Internet. However, if the children have not had Internet experience, the first, introductory, stages should be preceded by some instruction in the use of search engines and what links are and what they do. Of course the structure of these learning activities should not be seen as the ideal model for every classroom environment, so it is expected that some teachers will modify the activities to suit their own individual classroom needs.

As this series of lessons assumes that the children have no experience in using the Internet they are logically structured to provide the children with the experience and basic knowledge they will require to complete the task set out in the resource page Montgomery & WWII.

Learning Activities
1. Introductory lesson

Have children view a wide as possible variety of images from World War Two (not too graphic of course). Make sure that the children have sufficient time to take in as much information as possible from the pictures. As the children are viewing the pictures you may want to provide a brief history of the war, such as when it started and which countries were the main players.

Sit the children in a circle on the floor and have them close their eyes and be totally silent. Once they are silent tell them to think about the images that they have seen. After an appropriate pause (30 - 60 seconds, depending on how settled the children are) ask each child, going around the circle, to give one word that describes how they think it must of felt for the people in the pictures. Make sure that the students remember the word that they used. After each child has given one word, send them back to their desks and have them write down the word they used at the top of a blank page.

Allow the children time to look at the pictures again and have them write a few sentences based on the picture of their choice, under the word they have written on the blank page. In their writing the children should include the word at the top of their page. Have volunteers read what they have written to the rest of the class.

2. Body

Either on the blackboard, or a large sheet of cardboard, have a list of international leaders names from WWII that the children may know (eg. Winston Churchill, Franklin D. Roosevelt, Joseph Stalin, Adolf Hitler, Benito Mussolini), along with some of the famous WWII leaders from your own country (eg. Australia: Bob Menzies, John Curtin, Ben Chifley, General Blamey, etc.; USA: Generals, MacArthur, Eisenhower and Patton, Freddie Truman, etc.) and ask the children for their own suggestions as to why leaders might have been necessary during the war.

Relate the need for leaders to the writing task that the children completed in the introductory activity - without leaders in war there would be no organisation, and life for soldiers would have been a lot tougher, even in non-battle situations.

Introduce children to the Web site Montgomery & WWII allowing them time to read through it at their own pace. How you go about this will depend on how many computers you have in your classroom. The site Montgomery & WWII is ideally designed for use with no more than three children at one computer - I do not see one child per computer as being ideal in this situation as this limits the children's interactions.

Allow the children to work through the page at their own pace. The fact that the page encourages them to visit other Web sites for research purposes means that the children are going to need time to explore to find the information they may need in producing a final document.

The time allowed for children to complete the task set out on the page Montgomery & WWII will depend on a few variables: your own judgement of your students capabilities; limits on computer access; the speed in which pages are downloaded, which will vary depending on the time of day children will have access.

3. Conclusion

Children should present their written drafts - hopefully word processed - for discussion with the class teacher, who will check the text for grammatical, structural, etc. correctness before the children present what they have found and
completed to the rest of the class, and before being sent on its way through the Montgomery and WWII site.

This Player has produced a comprehensive lesson plan Home page focusing resources that the Web had made available to the NetKids and an easy-to-understand schema of how to best achieve tutoring sessions.

If the intention there had been to portray warfare in a sanitised characterisation, the end result might have had the opposite intent of decrying it, that is: the tendency, of young people especially, to be conditioned by their national leaders to glorify and mythologise it as such.

The act of filtering or quarantining graphic realism is generally suspect. Warfare is unconscionably brutal in its effect and should be understood to be so. There are no longer any fairy tale jousting knights defending their country’s “honour”. Such dilemmas are, unfortunately, continue to be forced upon us unwillingly as part of society.

Nonetheless, the Player, here, had written into the lesson plan a subject of his personal predilection. In this instance it had not been an adverse proposition since the limited time afforded the NetKid sessions obviously had had to include such a form of “direction” targeting which would let them access pictorial and other multimedia material of wide band range. It suggests the dilemma confronting educators confronting social standards; often forced into play by the more vocal, “hard-wired”, conservatives.

The NetKids’ home page, produced below, indicated that they had, after all, been able to project their own ideas, and that they had not mimicked the Player’s version, accepting that it had merely been instructive, not a direction to be followed. It also illustrated that the concept of collaboration(with opposite genders, in this case) had been a comfortable and fruitful example of a growing understanding between tutor and tutee.
Hi my name is Luke. My favourite cartoon is REN & STIMPY. I am 124 years old. NOT! I live in Kiama on the Australian south coast. Yes it is excellent living near the famous blow hole. Last time I watched GARFIELD I almost peed my pants. I enjoy fishing, riding my mongoose B.M.X bike and playing my bass guitar. My message to shauques shirac is not suitable for younger viewers. When I get to university I will study ancient history. I was born on Jupiter and the jet lag is still hammering down on me. This is only my second attempt on the internet. I think that's enough about myself so here's Khoa. P.s my real name is Obeloincden Fungentula. My Names Khoa Nguyen

My favourite cartoons are REN AND STIMPY, X MEn and THE SIMPSONS. I am 11 years old. I like playing soccer, basketball and cricket. I enjoy fishing and riding my bike. When I'm in high school, we're moving to Sydney. I was born on Venus. My family was the last of the race. They all died because of radiation poisoning.

An important observation from the measure of that home page as valuable educational avenue is that the authors had not chosen to cut-and-paste from the Web; often a problem in mentoring. Instead, they had used a creative approach as budding "writers". It is a facet of Web page authoring where a constructivist approach can be encouraged to blossom freely.

In lesson planning, there had appeared to be a remarkable semblance to Jane M Healy (1990) where she addresses "Metacognition: the art of knowing your own mind"32: 'Potentially great minds are also encouraged to "mess around" with real-life challenges - and with great ideas. Neither have neat, tidy edges'. (p 313)

But there is also a cautionary rider to that sentiment, which charges the teacher/coach to consider that:

In that absence of this sort of experience which he terms "mediated learning", Feuerstein believes children do not develop adequate thinking skills. As an example of non mediated learning, he describes parent putting toys around a room

32 Jane M Healy PhD (1990), Endangered minds: why children don’t think and what can be done about it. New York: Simon and Schuster
expecting a child to play. In mediated learning, the parent would place a building
toy in front of a child and then sit down and demonstrate several ways to use it,
talking about each alternative and allowing the child to experiment while still feeling
the support of the adult. (p 315)

Player Four

Player Four (above) had displayed significant skills in creating home pages that were to
have encouraged strong interactively between mentor and tutees. Good use had been
made of the “forms” facility at a time (1995) when this had not yet been in wide use in
the educational home page building sphere.

[Note that the field area(s) anchors can be manipulated, as edited here within the original construct.]

This a truncated version of a preview of a home page designed by Player Four.
To choose this page you must have some interest in our environment.

Look at the various sites below and write your response to the questions in the box. Only what is seen in the box will be printed, so when you near the end of the line press return.

Take a look at today's Weather.

What sort of activities would be suitable today? Where would you like to be?
Environmental Issues

What issue are you most concerned about?

Environmental Resources

How many resources does this page describe that we have?

[Note: other pages continue that construction]

Continuing the encouragement of interactive collaboration within the WIP mentoring of the NetKids another exemplary home page designed by Player Four is provided below. This theme is continued in the Cartoon Home Page below; which accentuates the “fun-to-be-learning” concept of tutoring on the Web. The page includes clear-cut hints for the user to best apply the resources available.
Base camp

This is named Base Camp because of the fond memories I have of camps. From a base camp we were able to go and explore many different places. Also from here you can go and explore in many different areas on the Internet.

Before you go and explore, read the question and come back to answer the question in the space provided.

Go to Naturally Natural - for the environmental enthusiasts.

Go to Cartoon Corner - for those who love cartoons.

Go to topic 3 - under construction

Go to topic 4 - under construction

Have fun writing your own caption!!!

First write your name in the box provided.

Choose one of the following and make up a different caption for it.

Save the image on the disk and then open Clarisworks - Drawing.

Open the image from the disk.

Delete the text by putting a box around it and then put a new text box in.

Write your caption and then print it.

Laser Research
Choose your own adventure story

Humptylocks is a Choose your own adventure story. Make your decisions wisely and then write back here what the ultimate consequence was.

What decisions do you think you could have made differently to have another outcome?

Now you can PRINT this page by going to the icon at the top of the screen.
Each of the WIP Players had had their personal characteristics subsumed in their works, which indicates that they had designed those versions singularly but from collective experiences of the prior workshop situations. Player Five had adopted a different style from the other Players’ Lesson Plan

LESSON PLAN

AIMS

To introduce students to the Internet.

To use Search Engines in a Web Browser.

To introduce students to HTML language.

To construct a World Wide Web Page using HTML.

CONTENT

1 Introduce students to the Internet

- What is the Internet?

- World Wide Web

- E-mail

- IRC (talking to other people on the Internet)
2. Use search engines in the Internet
   Do a search using the NETSEARCH (Infoseek) on Netscape.
   - Examine other search engines.
   Using bookmarks to keep favourite links.

3. Introduce students to the HTML language
   View sources on pages found on the World Wide Web.
   Look at the basic and common commands used in HTML.

4. Write a simple World Wide Web page using commands studied
   - Use images as well.

LESSON OUTLINE
1. Introduce students to the Internet.
   Ask questions such as what is the Internet?
   What is the purpose of the Internet?
   How can the Internet help the students?

2. Introduce students to search engines
   What is a search engine?
   What is the purpose of a search engine?

Students do a search on a favourite topic, using the NETSEARCH on Netscape.
   Discuss if there are other search engines available.
   What is the difference between the different search engines?

3. Introduce the HTML language to the students.
   View sources on the students favourite pages.
Find the common commands found in all Web Pages veiled.

Explain

\[
\begin{align*}
&\text{<HTML> ... </HTML>} \\
&\text{<TITLE> ... </TITLE>} \\
&\text{<HR>} \\
&\text{<A> ... </A>} \\
&\text{<CENTRE> ... </CENTRE>} \\
&\text{<P> ... </P>} \\
&\text{<H1> ... </H1> (UP TO H7)} \\
&\text{<IMG SRC ="XXXXX.GIF"}> \\
&\text{<A HREF=""> ... </A>}
\end{align*}
\]

4. Students write a page using the commands they have learnt.

**BRENDON'S PAGE**

My name is Brendon and I enjoy red cordial, blue lollies and Sega.

I was born at Wollongong Hospital 12 years ago.

My favourite link is:

Sonic the Hedgehog

Player Five appears to have had "his" NetKids author smaller home pages so that each of them individually would have had a hands-on experience. Two more samples follow. Background colours in each case were solid vibrants.
Hi! My name is Michelle and I am 11 years old. I enjoy reading, writing and I am a Big Disney Fan! I have 1 brother who is 7 years older than me and he is always bashing me up. I was born in Nowra on the 17th of the December 1984.

My Favourite Links are:

Lyrics for Colours of the Wind and The Lion King

Hi! My name’s Owen(as if you didn't know already). I'm 11 years old and I enjoy "surfing the net" and playing softball and baseball.

I was born in Wollongong Hospital on the 15/6/84.I live in Albion Park Rail.

My favourite things on the internet are:

sonic the hedgehog and gameboy cheats
This Player had voiced concern over publishing the photographs of any NetKids, hence the use of the “missing picture” GIF. Balanced with the brevity of the sample home pages, however, he authored a very substantial resource avenue for his team which had collectively favoured astronomy as their choice of topic.

Navigating Through The Solar System

Have you ever wondered what it would be like to get in a spaceship and travel through our solar system?

This page will allow you to travel through our solar system and land your spaceship on each planet. What type of ship you are in? The ship is a VIPER SS 2000. It is the latest model in the space market and can travel through our solar system from mercury to Pluto in a number of seconds. It is a nuclear free power driven ship and proton rocks (don’t explain) give the VIPER its power.

Let’s begin our journey...

Earth

The earth is a huge ball covered with water, rock and soil and is surrounded by air. The earth is another planet in our solar system that travels around the sun. The earth is very special, because it is home to people and many other livings things. It is just the right distance from the sun, so it isn’t too hot or too cold. Most living things need water and oxygen. The earth has plenty of this! The earth is roughly 70% water. Almost all of it is the ocean. Land is only 30%. The earth has only one moon. People have landed on the moon in 1969.

Click here for some pictures on the moon.

The earth is always moving. It spins and travels around the sun at the same time. We use this to measure the length of days and years. One day is the time it takes the earth to spin around once. One year is the time it takes the earth to travel once
around the sun. The earth ranks fifth in size among the planets in our solar system. It is about 150 million kilometres away from the sun.

The earth has air which surrounds the planet and extends as far as 1600 kilometres above the surface of earth. This air is called the atmosphere. The clouds float in the lowest part of the atmosphere. Wind, storms and other features of the earth's weather all take place here. As you travel further away from the earth, the air gets thinner and at the end the atmosphere gradually fades into space.

It is time to fly off earth and travel to the next planet closest to the sun...

Venus

Venus is known as the earth's "twin" because the two planets are so similar in size. The diameter of Venus is about 12,180 km, which is about 580 km smaller than that of the earth. As seen from the earth, Venus is brighter than any other planet or even any star! At certain times of the year, Venus is the first planet or star that can be seen in the western sky in the evening. At other times it is the last planet or star that can be seen in eastern the sky in the morning.

The distance from the sun is about 108,230,000 km. Venus nearly travels in a circular orbit around the sun. Venus takes about 225 earth days or about 7 and a half months to go around the sun once, compared to 365 days for the earth.

Although Venus is called the earth's "twin", the surface of the planet appear to be entirely different from those of the earth. The planet is covered by thick dark clouds. The surface is probably very hot, dry and dusty. Dust and sand blown by strong winds are believed to have worn away much of the surface, making it rather smooth and flat. There is no water on Venus' surface, because the high surface temperature would make it boil away.

Many astronomers think Venus' atmosphere contains large amounts of water vapour, and that some of the clouds around the planet consist of water vapour. But only small amounts of water vapour have been discovered. The average temperature of Venus is about 430°C.

It is very hot now, lets go to a hotter place...

Mercury

Mercury is the smallest planet and it is the planet closest to the sun, so therefore it is the hottest planet in our solar system.

It is about 46 million kilometres from the sun. It moves around the sun faster than any other planet because it is the closest planet to the sun. Mercury takes 88 days to complete one year. The surface of Mercury appears to be much like the moon. It reflects about 6% of the sunlight it receives, about the Same e as the moon's surface reflects. Many astronomers believe than Mercury is covered by craters, like those found on the moon. The planet is dry, extremely hot and almost airless. The sun's rays are about seven times as strong on Mercury as they are on earth. The sun also appears to be two and a half times as large in Mercury's sky as in the earth's. The temperature on the planet Mercury is about 629°C during the day and lower than 27°C at night.
It is very hot now, let's view the sun from mercury...

The Sun

The sun is a large glowing ball of gases at the centre of the solar system. The earth and the other eight planets travel around it. The sun is only one of billions of stars in the universe. The diameter of the sun is about 1,392,000 km (about 109 times the diameter of the earth).

From the earth, the sun looks like a circle. Astronomers often use the term disk for the part of the sun that can be seen from the earth. Some astronomers have measured the disk and found that it is slightly flattened in some places. But other astronomers are not certain how correct these measurements are.

Like the earth, the sun spins like a top. Just as the earth revolves around the sun, the sun revolves around the centre of the Milky Way Galaxy. The earth takes a day to rotate once on its axis, an imaginary line through the North and South poles. But the sun takes about a month to spin around once on the axis through its poles. The earth takes a year to revolve around the sun, but the sun takes about 200 million years to make one revolution around the centre of the Milky Way. During this period, the sun travels about 10 billion times as far as the distance between it and the earth.

Ok, fasten your seat belts, we are going to travel away from the sun, to a cooler place next to the earth...

Mars

Mars is the only planet whose surface can be seen in detail from the earth. It appears red from the earth, and was named Mars after the bloody red god war of the ancient Romans. Mars is the fourth closest planet to the sun, and the next planet beyond earth. The distance of Mars from the sun is 227,700,000 km. Mars takes about 687 earth days to go around the sun, compared to 365 days for earth. Mars rotates once every 24 hours and 37 minutes, while earth rotates once every 23 hours and 56 minutes. The surface of Mars is more like earth's than those from any other planet.

The temperature on Mars averages about -62°C. There is not enough water on the planet to fill even a small lake on the earth. The atmosphere surrounding Mars contains almost no oxygen. In spite of these conditions, some astronomers believe that some form of plant life exists on Mars. If Mars is viewed through telescopes some form of plant life exists on Mars. If Mars is viewed through a telescope, the surface has three outstanding features bright areas, dark areas and polar caps. At least part of the planet's surface is covered by craters, caused by meteors crashing into it.

Click here to view some images of Mars.

Jupiter

Jupiter is the largest planet in the solar system. Jupiter is ranked as the fifth planet from the sun, with a distance of about 778 million kilometres. For Jupiter's orbit to complete one year, it would take about 4333 earth days, or almost twelve earth
years. Jupiter spins faster than any other planet. It rotates in 9 hours and 55 minutes.

Because Jupiter is farther from the sun than the earth is, the temperatures are generally lower. The temperature at the top of Jupiter's clouds averages about -145°C. The temperatures in the atmosphere beneath the clouds appear to be higher than those at the top. Astronomers estimate the temperature under the clouds to be between -18°C to 38°C.

A large, oval mark called the Great Red Spot can also be seen on Jupiter's clouds. The spot is about 40 000 kilometres long (more than three times the diameter of the earth), and about 8000 km wide. The spot slowly changes its position from year to year. Most astronomers believe the spot is caused by some type of disturbance in Jupiter's atmosphere.

The atmosphere of Jupiter appears to consist of about 60% hydrogen and about 36% helium, with small amounts of methane and ammonia. The clouds around Jupiter that are visible from the earth seem to be frozen ammonia crystals.

Click here to view some images of Jupiter.

Saturn

Saturn is the second largest planet in our Solar System. The planet which is the largest is Jupiter. Saturn is the sixth closest planet from the sun. The distance is about 1 428 300 000 km from the sun. Saturn rotates faster than any other planet except Jupiter. Saturn spins around once in only 10 hours, and 14 minutes, compared to 24 hours for earth. Saturn takes about 10 759 earth days, or about 29 and a half earth years to go around the sun, compared to 365 days for the earth.

Astronomers do not know exactly where Saturn's atmosphere ends and where its surface begins. Only the top of a layer of clouds is visible from the earth. The tilt of Saturn's axis causes the sun to heat the planet's northern and southern halves unequally. Astronomers believe the temperatures below Saturn's clouds may be somewhat higher than those at the top of the clouds.

Click here to view some images of Saturn.

Uranus

Uranus is the seventh planet from the sun in our Solar System. The size of Uranus is almost four times that of earth. It takes about 84 earth years to go around the sun. One day on Uranus takes 10 hours and 49 minutes Uranus appears to be surrounded by clouds. It has five moons (satellites) which move around the planet.

Click here to view some images of Uranus.

Neptune

Neptune is much larger than the earth, but astronomers know little about it. Neptune is about 30 times as far from the sun as is the earth. Neptune's diameter is about 44 400 km or about three and a half times the earth's diameter. The
distance from the sun is about 4,498,100,00 km and it goes around the sun once about every 165 earth years.

The atmosphere surrounding Neptune consists of hydrogen and methane gas, with some helium and ammonia. Astronomers believe this atmosphere is about 3200 km thick. The tilt of Neptune’s axis causes the sun to heat the planet’s northern and southern halves unequally, resulting in seasonal temperature changes. The plant and animal life of the earth could not live on Neptune because of the lack of oxygen and the low temperature.

Click here to view some images of Neptune.

Pluto

Pluto is the most distant planet in our Solar System. It is roughly 5,914,300,000 km away from the sun. Pluto travels around the sun once about every 248 years, compares to one a year for earth. The planet spins around once in about six earth-days, compared to one day for earth.

Little is known about the surface of Pluto. It is about half the size of earth and the temperatures may be as little as 218°C.

Click here to view a rendered image of Pluto.

Conclusion

Various sources have been used for this project in terms of collecting information, such as distances and temperatures of each planet. These can be seen through many addresses found on the internet. Below are a few addresses which contains a lot of cool information about space and our solar system.

The images found in this web page were from NASA home page found at.

http://www.jpl.nasa.gov

The best way to find the NASA home page is simply to type in NASA in your search engine and...

Player Five had authored a really instructive home page for Astronomy beginners. The topic had been agreed collectively by his NetKids, who became engrossed with the way the route through the planets had guided those novices in a “let’s walk through this project together” frame of mind. I had had the opportunity to “eavesdrop” on the children’s’ comments in this case and noted their individual faces light up, wide-eyed at what had been revealed to them via the Web. The graphics embedded had been the most “revealing” in the exercise and fully underscored the text, written in simple, non technical, language for the tutees.
THAT IS ME!

[MY photo was shot by one of her NetKids, hence the red-eye effect!]

My name is ******Lin (most people only call me - Lin).

I come from Taiwan (Taipei city). Now I am doing early childhood education in Wollongong University and I am going to continue my master study from beginning of next year. I really love and interest about young children, so I hope I can gain some jobs in the early childhood education area, when I completed my study.

If you have any comments or suggestions about my page, please send e-mail to ******@uow.edu.au.

Player Six had experimented with innovative GIFS. In this edited home page the "That is Me" header was animated to flash on and off.

LIN'S FOOD WORLD
Welcome to the "World Wide Web" and my own Personal Home Pages.

Hello! Welcome to Lin's Food World. My name is Lin and I like eating very much so that I would like to introduce many kinds of food from different countries to you. Push the following buttons and enjoy your meal.

JAPANESE FOOD

Japanese Food include main dishes and sweets with drinks!

Player Six devised a creatively clever gourmet's home page for her team. Included in it were dozens of dishes and their respective menus from various countries. Each of the illustrations on the dish(es) and their recipe(s) were completely clickable; a good demonstrable source of cultural exchange and interactivity for the Player and her tutees alike. On her Thai Home Page, the recipes and graphics were listed and accessible, and, on individual pages, other country's favourite dietary delights had been embedded in the architecture.

THAI FOOD - MIXED SEAFOOD SOUP
In singular measure, the outcome of the WIP study was achieved by the ever-patient, good humoured contribution of its technical support. Children work best when a smile can be raised at the expense of the teacher, because it helps to create a bridge of intellectual contact between adult and child. The sample graphics here are representative of a collective “relaxed” mentoring code sustained throughout the WIP environments. The text(s) and graphics have been modified here.
Collaborative tutor and technology partner

Virtual WIP NetKids

WIP MENU

(The Starting Point)

A small group of undergraduate students in Education at the University of Wollongong gathered in the spring of 1995 to investigate the World Wide Web and its use to them as future primary school teachers. In the attached pages, structured by some of the tasks they were set, you will find some of the materials they produced... along with some of the thoughts they had as they worked.

1. Student HomePages
2. Internet Essays
3. Lesson Plans
4. Resource Pages
5. Kids' HomePages
6. Evaluations

[More information on these groups of material and their function in the context is provided on each of the linked pages containing them. You may also like to look at the subject outline provided to students at the outset... so long as you realise that original intentions and actual events diverged somewhat!]

Sponsored by John Hedberg, supervised by Michael Arrighi and given practical guidance by Jim Meek, the group of six students produced a range of products. These were focused by their involvement with a year 5/6 'gifted and talented' group from Kanahooka Primary School in south-western Wollongong.

If you have any observations you would like to make, most participants would welcome your e-mail, which can be sent via respective home pages. Alternatively, you might like to forward commentary or questions to Michael via the attached form.

The foregoing, and the following excerpts, are only a portion of the text and graphics that were produced during the workshop session with the NetKids, but they are representative of a solid, mutual engagement in the Web Inquiry Project.

At this point, focus is made on the various authorships of some of the 23 KetKids targeted for this study; again, limited by textual constraint here.

NetKid One

Rainforest Animals!

My name is Christina. I am going to tell you about some different rainforest animals.

A four acre patch of rainforest can have as many as 150 different species of colorful butterflies!

There are many species of butterflies in the world. Most of them live in rainforest areas.
The Toucan is another animal which mainly lives in the rainforest. This bird has a bright orange beak. The feathers are black and white.

go to Clementina's picture

At the second coaching session a simple, yet slightly more sophisticated home page had developed. [Image distorted, names substituted]

CHRISTINA

Would you like to have look Christina's home page? Yes! Please click Clementina's Home Page. 😊
Ironically, here, the lesson plan initiative itself had underscored that "simple is good". It admirably served the purpose of *coaching* the children rather than *teaching* them. It also leaned towards stimulus creativity which, at the same time, offered no serious constraints to self-learning and the creation of a "personal" knowledge cache. It was a good example of introducing a culturally informative instruction. The element of "reward for effort" expressed in, 'Then, we will have a party and say good-bye!!!' added an agreeable touch to the closure of the session.

Continuing the review of the Players' lesson plans and NetKids' input, it is evident that each individual had had a personal style, an interpretation of how best to tackle the problem of coaching the NetKids given the introductory experience which resulted in considerable creativity.

The quoted illustrations indicated another level of practical teaching directly through interactive home pages designed to evaluate searching aptitudes as well as creative thinking on the part of the NetKids targeted.

They were good exemplars for what the Web could provide insofar as "information to build upon". Productively, though, these had not encouraged all students to *seek and find that with which you better relate in constructing your idea of reality*. Instruction may have been better served in applying the context of Healy (1990), who touches on this factor in teaching.

**Children without their own visions**

> *If we encourage our teachers to be thoughtful, well-informed, and curious themselves, we may more likely expect them to infuse the entire curriculum with creative as well as critical thinking. Otherwise we abandon our children - who now, more than ever before - need good models of imaginative intellectual engagement - to machine or "teacher-proof" kits and workbooks. Why spend time on activities such as "write an essay from the point of*

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view of an eraser" while leaving untouched the significant mental challenge of a child's world? This is about as silly as teaching children to "think" by dropping "factlets" into an intellectual abyss in the name of something called "cultural literacy". [...] At this point computers can perform many functions of the brain's storehouse. Nonetheless, they [the children] still have to depend on the executive and general reasoning abilities of the brain. I venture to say it will be a long time, if ever, before prefrontal, emotional and motivational centres can be attached to a hard disk. Thus it may be especially important to make sure our children retain these capabilities themselves. (pp 318-325)

In the most cases, considerable acquired skill had been displayed, with a similar emphasis on colour effect. The prospect of interactivity had been closely demonstrated where the NetKids had become more "professional". A noticeable phenomenon is that most female participants tended to use more vibrant colours than their counterparts. A promising area of research psychology, perhaps.

Some more samples of NetKids' efforts after one session of tuition

Owen's Home Page

NAME: Owen
AGE: 11, 12 on November 30th, 1995
SCHOOL: I'm in Year 6 at ..........Public School
FAVOURITE SUBJECTS: Maths and Science
HOBBIES: Cricket, Soccer and occasionally, Playing my Macintosh computer
FAVOURITE FOODS: Chocolate and Mangoes
I LIVE AT: ..........a small town about 50 km south of Wollongong, N.S.W. Australia
FAVOURITE T.V SHOW: The Simpsons

Suzanne | Joshua | Laura | Owen | Alicia | Ben | Chloe | Project |
That NetKid "publisher" had used deep purple for background, black for text and blue for links.

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**MICHELLE'S PAGE**

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Hi! My name is Michelle and I am 11 years old. I enjoy reading, writing and I am a Big Disney Fan! I have 1 brother who is 7 years older than me and he is always bashing me up. I was born on 17th of the December 1984.

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My Favourite Links are:

*Lyrics for Colours of the Wind* and *The Lion King*

The colourings used in this sample here were: red for background, white for text and blue for links, and the page used minimal graphic effects.

Whilst the page(s) had been of simplistic construct, in themselves, it had been a tactic encouraged in the sense that beginners - such as the NetKids targeted for the WIP - were constrained in their exercises for various factors such as time available; which had to be distributed as evenly as possible. The creatively developmental factor in an educational environment had not been adversely diminishes to a substantial degree because of those restrictive elements, apparently.

Whilst the Players had tutored the NetKids in the e-mail procedures, chat groups, newsgroups and the various aspects of information interactivity, few of the children had used these tools, (primarily because of down-time failures) preferring to dwell on the Web as intelligence gathering source and, more specifically, constructing their own brands of home pages out of whatever they had accessed.
Here below, however, is one more interesting interactive communication via Netscape Mail. The child, in this case, was apparently enraptured at having contacted the correspondent accomplished through the Australian Defence Forces Academy, whilst others in the group had had more “mundane” responses.

From: Hamish ======
Date: Mon, 23 Oct 1995 16:59:27 -1400
To: kmd77@uow.edu.au
Subject: Re: Joshua [name substituted here]

At 04:18 PM 23/10/95, you wrote:

>To Hamish,

>Gerringong is a small town 5 km South of Kiama which is 50 km South of Wollongong, which is about 100 km South of Sydney (See a good map). I don't have access to the Internet, but am doing an activity at Wollongong Uni, which explains the student teacher who is 20 years old. If you want to write back just send any mail to my teacher and she'll forward it to me.

To Joshua,

Thank you for the letter with the information about your student teacher and Gerringong. What do you think of the Internet and what you have seen?

Have you had access to things such as Netscape yet or is it just newsgroups?

Anyway I have to go to do my homework. Have fun and good luck with your school and I hope you see more of the Internet.

Hamish

Hamish ======

OCDT

10 Division Australian Defence Force Academy

Campbell ACT

AUSTRALIA 2601

Northcott Drive

e-mail: =====@csadfa.oz.au

HTTP: http://r-203.blk65.adfa.oz.au
Reviewing the project and outcomes

As a novice instructor in the WIP project the researcher had drawn upon constructivist propositions as a “rule of thumb” in this innovative approach to using the Web as teaching-learning manoeuvre. Much of what he perceived to be most relevant to the outcome had been identified by Jacqueline G Brooks and Martin G Brooks (1993)34

The principle, then, was to free-up Player-student independence, so that resourcefulness became allowable and fostered, and hopefully, in turn, trickle through to the NetKids. This code of conduct had been aimed at assisting learners to achieve their personal intelligence complexion. In the process of becoming issue resolvers by positing incertitudes and situations, and then analysing and responding to them, they should have become responsible for their own scholastic and social lifestyle enrichment.

Reflective thinking had also been nurtured so that students were “teased” by suggestion rather than mechanisation. Learners had been encouraged to correlate and shape impressions by probing, forecasting, offsetting and sustaining their understanding. The Web had had the capacity to rapidly retrieve substantial numbers of pro and con arguments in an infinity of archival resources for such intellectual practises. In other words:

'...learning is a constructive process in which the learner is building an internal representation of knowledge, a personal interpretation of experience. This representation is constantly open to change, its structure and linkages forming the foundation to which other knowledge structures are appended. Learning is an active process in which meaning is developed on the basis of experience'35 [and that] 'The constructivist view emphasises that students should learn to construct multiple perspectives on an issue. They must attempt to see an issue from different vantage points. It is essential that students make the best case possible from each perspective; that is, that they truly understand the alternative views.' 36

In that situation, interactive dialogue had helped shape concepts where their own thoughts and those of their peers had been freely ventilated. This encouraged them to build upon their own perceptions from “supportive” intelligence aired around them. In

35 Anne K Bednar, Donald Cunningham, Thomas M Duffy & J David Perry, "Theory into practice: how do we link?" in Constructivism and the technology of instruction: a conversation, Thomas M Duffy & David H Jonassen (Eds), Hillsdale NJ: Lawrence Erlbaum Associates, p21
36 Anne K Bednar, Donald Cunningham, Thomas M Duffy & J David Perry, "Theory into practice: how do we link?" in Constructivism and the technology of instruction: a conversation, Thomas M Duffy & David H Jonassen (Eds), Hillsdale NJ: Lawrence Erlbaum Associates, p27
this arena of free transport of ideas, prior constraints were to dissolve in the comfort of knowing that they were “not alone” in the quest of knowledge and experience. Experiences that were to challenge numerous assumptions in the course of discussion and practise.

The resources of the Web, as unfashioned (often interactive) disclosure, had initiated real life perspectives, refreshing re-evaluations and strengthened cognisance. Or, at least, had created an approach to a hitherto unexplored avenue for intellectual outstretch.

As touched upon in the previous chapter and this one, the Players had seemingly reappraised their own “teaching” values insofar as a liberal-thinking pupil management. Ironically though, in the pursuit of their own learning from the Web and although free-fall thinking routes (non-linear) appeared to have superseded prior mind sets, the links accessed had actually followed a linear type pattern.

Where the browsing “history” window is opened after an engagement session, a virtual blueprint of the user’s “thought stream” is created by the machine. This suggests that in accessing the Web, the brain itself engages in circuit tracing in the process of channelling hitherto unexplored information so that the existing cache of a priori knowledge, supplemented in that way, is expanded exponentially.

In interactive bonding with the machine, the Web, mimics the human cognitive approach but, of itself, does not “shape” it, and in that fashion it becomes a coach rather than a teacher. Thus ‘A cognitive technology is provided [by the Web] that helps transcend the limitations of the mind, such as memory, in activities of thinking, learning and problem solving.’ 37 This ‘Structural knowledge represents the acquisition of diverse but interrelated networks of propositions or concepts,’ 38 that the Web favours in seemingly boundless measure. Using the Web’s resource base as a teaching tool, differentiates between merely schooling for competence betterment and assisting the learner in structuring comprehension. (Von Glasserfeld [1989]) 39

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39 E Von Glasserfeld (1989) “Cognition, construction of knowledge, and teaching” in Synthese 80, 121-140
We do well, however, to embody Pea's (1985) observation here that:

Regardless of our media, our aim should no longer be the hopeless task of pouring an ocean of facts through a straw [the Web] into the child's memory in hopes of a well-bucket coming up full when it is needed. Instead, we can work to help children learn for themselves how [to use search engines] to seek out, organise, and use information for different purposes. From this orientation, education is envisaged as a process of enabling independent, critical, and unique thinkers to take initiatives individually and collaboratively to pose and solve problems, and to apply and develop their learning and thinking skills while accomplishing these tasks.

In the area of self-expression triggered by the Web as education environment, an interesting example is provided in the context of the nature of atomic warfare. In this instance, the "study" undertaken by these NetKids had measured the influence of Web accessible information supplemented by that of the global media at that time (and the Player-coach, probably). The reactions reflected the political impasse between Australia and France at that time. It is an example itself of the increasingly widening reach of the Web in such matter:

Despite protests from all parts of the world, France resumed underground nuclear testing on September 5, 1995 for the ostensible reason of calibrating equipment to facilitate computer simulations designed to check the reliability of French nuclear warheads. France detonated a small nuclear device equivalent to about 8000 tons of TNT at its Mururoa test-site in the South Pacific [...] France carried out a second nuclear test, in the current series at Fangataufa on October 1 [...] The resumption of French Nuclear testing had evoked strong criticism [...] France being perceived as somewhat of a political pariah, particularly by nations in the South Pacific. Australia and Chile recalled their envoys from Paris, while New Zealand, Japan and South Pacific Forum nations issued condemnations...23

Below we have a graphic sample and textual selection of extracts from the evaluations submitted by the NetKids at the end of their input into WIP project. The NetKids had been asked to present their thoughts in writing at the conclusion of their Web exploration and use. A summary of their thoughts on aspects of the WIP exercise have been extracted word-for-word as follows:

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Post-Workshops Critiques by the NetKids

When the AG Class accessed the Internet I had as lot of fun. It was great to make a home page and to know that I was showing a piece of my work all around the world. The downside was that around 10.00 am the system slowed down a lot and it took a long time to download images and text... (Aged 11)

Before I tried out the Internet I knew nothing about it. I had heard of it and suspected it was just a massive collection of meaningless junk. Only when I went to try looking for something I wanted to see then the real extent of this immense system came to me... (Aged 11)

Personally I enjoyed being able to retrieve information on a wide variety of topics that interested me... (Aged 12)

I was amazed at how easy it was to access the wide range of information on the Internet. It was very exciting and educational... (Aged 10)
It was good, clean fun! We were able to surf the net and make a home page which we enjoyed doing... (Aged 11)

It was exciting using the Internet. We got to look at a lot of things like Star Trek, The Simpsons and Ren and Stimpy... (Aged 11)

I found the net searching easy but making a home page was hard. I would like more opportunities to use the computers and more time... (Aged 11)

The teachers made just about everything easy! I particularly liked the way they were so patient with us. There's so much information on the net... (Aged 12)

I enjoyed using the internet a lot. I was immensely impressed with the depth and scope of it all, all that data at my fingertips... (Aged 11)

I enjoyed using the Internet, as it was an enormous source of info for research. However, there is a lot of junk on the Internet that should be erased... (Aged 12)

The presentation of my home page was slightly different from what I imagined it would be... (Aged 11)

The vast amount of information greatly outweighed any negative aspects of the net, and I was quite contented to wander around... (Aged 12)

The Internet is really interesting. I enjoyed it because of the latest technology. The home pages were fun but the codes confused me... (Aged 11)

I was in a group of 3 and it worked well with each of us getting a good turn on the Internet. A group of 3 let us learn from each other... (Aged 11)

Everyone picked up the codes for our pages very quickly which made it easier for the students... (Aged 11)

It certainly made things easier [browsing] with the help of the teachers. Nothing was difficult to do, but I'm sure it would have been if we had just been thrown at computers and told 'This is the Internet!'... (Aged 11)

On the Internet I would like to be able to access worthwhile things without the hassle of searching through all the links just to find a piece of good reading material. To improve the services of the Internet I believe grouping programs in categories would be effective as well as a list of good programs for different age groups and abilities... (Aged 11)

Good things: The internet gave me a lot of information. Bad things: Sometimes the internet slowed down and wouldn't let us into some areas. Things I found easy: It was easy to get into basic areas. Things I found hard: It was hard to find certain things. You had to know what you were looking for... (Aged 11)

The “evaluations” that the NetKids have contributed will be further examined in Chapter Seven, where we will recapitulate and review the Web Enquiry Project as a perspective of its utility as cognitive tool in teaching and learning using the Web as productive technological resource. We will also consider some developments that have evolved which might considerably affect those considerations. The various references used during the WIP have been attached as appendices in that section of this study.
At this point an overview of the most striking elements of discovery are here outlined as possible further clarification of the overall effect of the WIP in this phase of its overall research activities.

The process of observing both Players and NetKids during their mutual exploration session of the WEB illustrated the advantages of cognitive interactivity with "teamwork" singularly and collectively. The rapport between learners and student teachers had created enthusiasm for discovery coupled with the excitement of creating new perspectives on freshly acquired information.

The NetKids readily adapted to a cognitive mode where their personal style of thinking had not been unduly 'massaged' by their mentors' perceptions of the various, ongoing, learning aspects of the project. In return, the Players, themselves, had begun to re-negotiate their views of the NetKids' inherent learning/understanding capacities.

An informal teaching style enabled all participants to create an atmosphere where each contributed a piece of the understanding of the whole adventure and a discovery of building new knowledge from novel information resources. Innovation in idea formulation had been effortlessly adopted.

New ways of thought processing - acquired unconsciously - apparently did not adversely affect the participants of the WIP. ‘[…] Individuals are often thought of as working in isolation, the role of other individuals is crucial throughout their development.’ (Gardner (1993) p 8)

The various intelligence types cited by Gardner (1993) had been validated in their various forms among the participants. Some consider Gardner's type listing falls short of subsuming various other inherent aptitudes, for instance, the sense of smell as it might affect 'understanding'. However, such inclusions of probable signification in knowledge building might raise countless other possibilities. Those of Gardner are therefore generally perceived to be more than adequate in this context.

During the practices of the WIP, the researcher had noted 'an increasingly vibrant "debate", based on both generic question and response consensus that came to mind in discussion'. Such mental stimulation was not usually recognised as the norm in the smoke stack school environment where all "learning" flowed downward without occasion for querying by the learners.

At pages 182-187 a wider explanatory interpretation of the philosophical ambience of the WIP in action is measured against various creditable benchmarks. These have been
presented as a perspective to be considered by educators exploring the same cognitive tools domain.

Each of the participating Players had been encouraged to set forth personal understanding of perceived best ways of implementing the WEB as learning tool, outlining rationales and proposed teaching strategies, and to include this in publishing an inward looking home page for e-learning purposes. This proved to be a valuable research asset shedding much light on the effectiveness of the study and consideration of future methodologies in that light.

As product, the NetKids had also been encouraged to publish their version of home pages. This device proved to be a further gauge of how their comprehension of the WIP had equipped them with a much more attractive sense of scholarship. Their student teacher mentors unanimously confirmed a certain rapture in what they had achieved for their students and for themselves. Evidently, co-operation and dialogue had a considerable bearing on the final outcome.
As the births of living creatures at first are ill-shapen, so are all innovation, which are the births of time.¹

The act of imagination is the opening of the system so that it shows new connections.²

As the World Wide Web continues to become more ubiquitous in Australia, we can reflect on its spectacular growth since the WIP was implemented in 1995 and its future potentials:

**Figure 7.1 Australians online September 2000 ³**

An estimated 6.4 million adults (46 per cent of Australia's adult population) accessed the Internet in the 12 months to May 2000 compared with 5.5 million adults (40 per cent) in the 12 months to May 1999.

Over half of all Australian households (54 per cent or 3.8 million households) had a home computer and one-third (2.3 million households) had home Internet access by May 2000.

This compares to May 1999 data where 47 per cent of Australian households (3.2 million) had access to a home computer while 22 per cent (1.5 million) had home Internet access.

The increase in the number of households with home Internet access (800,000 households) was much higher than the increase in the number of households with home computers (579,000) over the 12 months to May 2000.

Households with children under 18 years were nearly twice as likely to have either computer or Internet access at home, compared to households without children under 18 years at home.

As a disciple of innovation and an observer of imagination at work and play, the researcher was readily attracted to the idea that computers as learning tools were in a prime position to contribute to the growing academic debate on the advantages or disadvantages of using such technologically devised tools to enrich teaching practice.


³ Australian Bureau of Statistics (ABS) estimates (online 24 September 2000)
But the Web providers then had yet to master more than the mere electronic distribution of educational material in the fashion, which many educators had been practising at that time (1995). The Web had been shaping itself into becoming a Babelfest for conservatism where innovation and imagination in teaching procedures were still at a premium, despite digital classroom enrichments even then available.

It had appeared that the potential for satisfying the mutual needs of pupils and teachers in a more “enlightened atmosphere” was not being better exploited. The task, consequently, had been to examine atmospheres where a group of undergraduates and schoolchildren could be observed during a process of conditioning themselves to innovativeness and creativity within a collaborative scenario using the Web’s architecture of that time.

**Analysing the outcomes of the WIP: Methodology**

The cohorts involved in this study had been perceived to be too small to support a viable quantitative methodology, and the nature of its pioneering elements had foreshadowed a qualitative approach in the fashion of narrative analysis. The subsequent data essentially comprised a story about the various participants’ experiences throughout the study. This mirrored the essence of collective interactivity in that situation, so fortifying the meaning of *teamwork towards approaching mutual cognitive enrichment*. As Resiman (1993) had claimed: “Narrative analysis takes as its object of investigation the story itself.”

The notion has since been strengthened by Parranee Liamputtong Rice (1999) voicing that:

> While logico-scientific rationality may be useful for understanding chemistry and biology, its usefulness is very limited in studies of meaning and human action. The consequence of this is perhaps more graphically illustrated in the development of psychological theory. In its quest to be scientific, psychology has almost completely forgotten to study people.

Adding further to that idea, D. Poklinghorne (1998) suggests that:

> Nearly all published psychological studies up to 1978 do not attempt to study a whole individual person, and those that do, the whole person is not the point of research, so much as an illustration of a point.

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4 C Reismann (1939) *Narrative analysis*, Newbury Park: Sage p 1
Within that background, many pertinent issues and determinations had been collectively raised targeting preliminary questions and ongoing ones stemming from the project.

**Anecdotal feedback: colloquials**

One of the instruments of ongoing assessments practised in the foregoing context was the informal feedback gained from continuous discussion with the various participants, particularly with the schoolchildren subjects. For instance:

**Figure 7.2 Dialogue instructor and pupil**

<table>
<thead>
<tr>
<th>Instructor</th>
<th>What do you think about the Web now that you’ve had a hands-on go at it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupil</td>
<td>Well sir, there is an awful lot of stuff out there and it’s not easy to find?</td>
</tr>
<tr>
<td>Instructor</td>
<td>Do you think maybe that you’re asking the search engines too hazy a question?</td>
</tr>
<tr>
<td>Pupil</td>
<td>Well, every time I do a search I get hundreds of answers. It takes too long to get where you want to get the right answers.</td>
</tr>
<tr>
<td>Instructor</td>
<td>OK! Let me see if we can work that out for you? What was it you were interested in?</td>
</tr>
<tr>
<td>Pupil</td>
<td>Well sir, I wanted to find out about flying saucers landing in Australia and typed-in “UFOs”.</td>
</tr>
<tr>
<td>Instructor</td>
<td>OK! - Let’s try this......</td>
</tr>
</tbody>
</table>

At which point the instructor and the novice collaboratively in solving the problem to mutual benefit in keeping with “A basic question that drives the interpretative project in the humanity disciplines: how do men and women live and give meaning to their lives and capture the meaning in written, narrative and oral forms?” N Denizen

Before formulating the nature of the objectives - the principal questions and answers sought - the researcher has to include a basic platform, based on input had from the student teachers’ prior experiences and strategies for achieving their respective and collective goals had been a primary agent for data collection outcome. That framework was further supplemented by the researcher’s prior perceptions. This is further discerned by Greg Gay.

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7 Such a tactic referred to by Parranee Liamputtong Rice, Douglas Ezzy (1999), *Qualitative research methods: a health focus*, South Melbourne (Victoria Au): Oxford University Press p 120.


9 Greg Gay (online April 200) *Lesson design- constructing knowledge and scaffolding instruction*. Ontario Institute for Studies in Education/ University of Toronto [ggay@utoronto.ca]
When learning is intentional, or requires effort, scaffolding supplies a frame from which a child can learn. Modelling social interaction and cognitive behaviour allows a child to develop skills that would not be learned by chance. Likewise, in the early stages when incidental learning of language is a pragmatic function of a need to communicate, modelling competent use of language within a [...] Scaffolding is appropriate when ever there is a discrepancy between what a child knows or is capable of, and the developmental step up to a more expert like level of knowledge. This method is appropriate well into adulthood, as new skills are learned which are more efficiently obtained through the modelling of others rather than trial and error, or self-guided learning.

It implies that students should be coached and assisted in their various practises; that when and where needed, explanatory, interactive dialogue should be used; that from that mode of tutoring, the instructor can profit and gain insights hitherto unexplored; that instructors have to retain an air of forbearance in the process; that the mentor has to display a high degree of subjective backing and encouragement and react to learners’ blunders with resilience; and that the instructor practise a fading of intensity in support in order to hone the learner’s eventual self-efficiency.

The Research Questions

Principal Question:

How will taking advantage of the architecture and resources of the Web be of benefit to teacher undergraduates and primary school children as a formative schooling medium in innovative production of knowledge into the next millennium?

As stated in Chapter 4 ‘We should consider that the lack of relevant literature at the time this study began in 1995 and that: “Since the Levy (1998) case study of the University of Arizona, there has been little literature relating to the pace of acquisition of information technology at institutions of higher education”. Levy (1998) was to become a front-runner in pointing to the lack of studies in Information Technology but that was three years after the Web Inquiry Project (WIP) was undertaking. The same lack of substantial debate in that context could be said of Computer Aided Learning procedures at the time

The global debate on that particular question suggests that more definitive literature is still budding. Nevertheless, research into the possibilities of the Web as a significant cognitive tool is ongoing and user access suggests that there are impressive benefits to be harvested where the growth in usage has proliferated since 1995 when the WIP study

10 Winston Tellis, (1997) Application of a case study methodology, Vol 3 No 3, September (online @ http://www.nova.edu/ssss/QR/QR3/tellis2.html) (Online 4 September 2000)

11 Winston Tellis 1997, Application of a case study methodology, Vol 3 No 3, September (online @ http://www.nova.edu/ssss/QR/QR3/tellis2.html)
was undertaken. The Figures 7.1 and 7.3 are indicative of growth of Internet access in Australian households up to 2000 for instance.

Whilst the architecture of the Web continues to become more and more sophisticated and its use in educational facilities more prevalent there is a distinctive caution to be taken:

We truly must think about what we see and hear. We must evaluate and select. We must choose our guides. What better lesson than this to teach our young children to prepare themselves for a new century of social, economic and technological change.\footnote{V G Cerf (1996) On the internet, April 2(2) p 37 (David M Grossman “The evolution of the World Wide Web as an emerging instructional technology tool” in Badrul H Khan(1997)Web-based instruction, Englewood Cliffs New Jersey: Educational technology Publications} Cerf (1996) has echoed the researcher’s own perceptions about the need for fine-tuning and continuous scrutinies became more and more apparent during the course of the WIP study and thereafter. Whilst we might readily be seduced into the Web’s possibilities as an aid to learning, we must be aware of its addictive “bells and whistles” engrossment, which in the end, could dilute the intrinsic quality and effectiveness of its values as IT learning instrument.
The researcher’s experience in this particular study was that a qualitative approach would be the effective one to apply. Thomas and Patricia Reeves (1997)\textsuperscript{13} have posited a mode of interpreting outcomes that had, in fact, been variously interspersed in the Web Inquiry Project. The factors embraced were: pedagogical philosophy, learning theory, goal orientation, task orientation, source of motivation, teacher role, metacognitive support, collaborative learning, cultural sensitivity and structural flexibility, which were then \textit{synthesised} by the researcher out of the extant literature as catalyst.
Guiding questions reiterated:

How do we set about the WIP introductory learning structure’s in the context of previously acquired experiences in IT?

Close interactive dialogue has to be established between an instructor and the student teachers in the first instance. This would be done at round-table briefing and debriefing sessions as described and graphically displayed in Chapter 4, Figure 1. The student teachers would then apply that principle to their various NetKids (in a modified way, due to logistical constraints) before any hands-on practice. Their extra mural group’s classroom mentor has to brief the instructor prior to a similar WIP project.

What elements are considered to be essential to informants in experiencing the innovativeness of the Web as learning/teaching strategy?

At the first level, informants need to have demonstration of the potentials of the Web and its hunting and gathering of resources potentials. The WIP achieved that goal in supporting the proposition that: “If you want people to understand better than they otherwise might, provide them information in the form in which they usually experience it” (Lincoln and Guba (1985)).14 (Cf). But this was an adjunct to and not specific to the (qualitative) approach adopted.

The next and most important stage is hands-on activity singly then in collaboration, all of which should be followed up with brisk roundtable dialogue feedback. In that way the players and informants demonstrate their respective, primary, understandings of the various elements of instruction and its requirements (as manifested in Chapters 5 and 6 where the researcher has recorded those experiences from the informants’ varied perspectives.

What will be the informants anticipated gain from the experience(s) collectively and individually gained from introduction to the Web’s resources?

It had been anticipated that the various activities of the informants would generate fresher approaches to self-understanding through self-learning and that the gained new insights into their own construction of knowledge would enhance the learning process to a greater degree than past practices. Concept mapping as a starting point had been an essential ingredient towards that end and the end results resulted in their intellectual enrichments and self-confidence. (cf Chapters 5 through 6)


Post-Workshop Critiques by the NetKids are an enlightening source for endorsing the wide-ranging outcomes of the WIP (as in Chapter 6 p 234). A sample of this line of “testing” would be indicative of its potential value. Their comments enthusiastically and reflectively endorse its utility:

When the AG Class accessed the Internet I had a lot of fun. It was great to make a home page and to know that I was showing a piece of my work all around the world. The downside was that around 10.00 am the system slowed down a lot and it took a long time to download images and text... (Aged 11)

Before I tried out the Internet I knew nothing about it. I had heard of it and suspected it was just a massive collection of meaningless junk. Only when I went to try looking for something I wanted to see then the real extent of this immense system came to me... (Aged 11)

Personally I enjoyed being able to retrieve information on a wide variety of topics that interested me... (Aged 12)

I was amazed at how easy it was to access the wide range of information on the Internet. It was very exciting and educational... (Aged 10)

It was good, clean fun! We were able to surf the net and make a home page which we enjoyed doing... (Aged 11)

It was exciting using the Internet. We got to look at a lot of things like Star Trek, The Simpsons and Ren and Stimpy... (Aged 11)


Does the Web promote more accessible learning in a particular way?

The intricacies of Web-resources’ management often appear to be daunting to the learner, however harvesting the wanted resources is readily achieved through its search engines. Nevertheless, there has to be an intelligent approach to the effort in order to infoglut otherwise. The process of harvesting is certainly likely to be faster than conventional library searches creating reliable conduits to learning resources. There is always the promise of future artificial intelligence being built into search engines and computers generally. But its implementation might well be another case of caveat emptor: “Proponents of artificial intelligence tend to have a fundamental flaw at the centre of their thinking. It is that humans are logical and that life and nature follows logical patterns that can be predicted.”


Does the Web promote improvement in the learning process?

It had not been feasible to have pre/post testing regimes applied in this instance and to provide reliable benchmarking variables for performances would otherwise have been insufficiently applicable. For instance: it would have required a cohort to be assigned a particular project, say, using conventional library stock versus another using the Web to

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15 NUA http://www.nua.ie/newthinking/archives/newthinking367/index.html “ARTIFICIAL COMMON SENSE” Gerry McGovern gerry@nua.ie (online 2 April 2000) -
construct the knowledge required of that project. Additionally the researcher would have had to consider variables within those informants relating to the individuals’ overall, cognitive, comprehension capabilities and so forth. Nevertheless, the WIP study suggests that using the Web is generally inclined to promote lateral thinking and creativity within the study group, a consideration that could be reasonably expected to be developed and replicated in the wider areas of computer assisted learning within the majority of disciplines. As a measure of adequacy, it should be noted that, subsequent to this study and in this campus, Information Technology has become central to education; particularly in training undergraduate teachers.

There is a developing infinity of research possibilities using the Web as resources provider. Using its graphics and charts, for instance, give a certain professionalism to any writing projects; apart from informative publishing on the Web. In fact, sources exist that can create graphs and tables from online data sets. Publishing is becoming more prolific because of the growing issue of HTML editors that relieve a certain tedium for others than the aficionados of manual entry Hypertext as it exists today.

The basic elements of Web publishing have become very ‘professional’ in recent times. Schools, worldwide, are adding such pages by the hour and the evolution from first-step raw efforts (cave drawings) to almost Spielberg-type educational ‘story lines’.

What is the significance of this study in the arena of information technology?

Whilst the study itself was a fulfilling journey for the researcher personally, it was simultaneously stimulating for all its participants; particularly when they became skilled enough to present their “findings” to a sizeable group of interested academics within their faculty. The catalyst for this was the researcher’s appreciation that pupils should be listened to rather be spoken at. It is a situation where the researcher-tutor can gain best knowledge of the tutees’ understanding of given disclosures. As a result of this rapprochement, relationships in creating knowledge between mentor and pupil can be (and in this instance were) mutually enriched.

In Chapters 5 and 6, the collective journeying of all participants discussed there indicates that there was substantial motivation for researchers to adopt the constructivist slant in applying a foundation understanding of the Web’s architectural potential and its application for creatively enriching assimilation of information in constructing new knowledge.

In that light, the Players’ and NetKids’ concluding presentation(s) were to be applauded by their respective mentor-co-explorers, their parents, academic staff and the local print
media which was to feature the event. This commendation had fortified the underpinning philosophy of the Web Inquiry Project and, insofar as education academics of the faculty, the study was significant in that it apparently aroused a substantial, ongoing move towards adopting the Web as a state-of-the-art producer and repository of knowledge and subsequently a vital segment of undergraduate courses.

In the years following, the advantages of piloting such studies became very much apparent as courses and workshops proliferated from K-12 through tertiary educational curriculums, as courses were put online. This is by no means to say that the WIP study had, of itself, been the only catalyst!

What might be the possible recommendations stemming from the conclusions drawn from the study?

Since the original study had taken place in 1995 the use of the Web has taken quantum leaps ahead and recommendations in this instance would be superfluous if not, perhaps, flippant in the context of this reflection. The researcher would propose, though, that future teacher practicums focus strenuously on collaborative in situ teaching segments in similar circumstance as to the role(s) played by the Player(s) in the Web inquiry Project. Faculties should be required to employ autonomous Webmaster/developers in areas specific to their disciplines. Continuous liaison between local schools should be an imperative to ensure that best practice becomes a means to that end. Archiving of state-of-the-art electronic literature applicable to those disciplines is essential to keep pace with New Age thinking.

Teachers in this Digital Age cannot be feint hearted, considering what appears to be on the drawing board for the near future:

The year 2000 will turn out to have been a pivotal moment in the emergence of the Internet, a Darwinian shake-out in which the fittest inhabitants of cyberspace survived and thrived [...] Moore’s Law famously holds that every 18 months the power of the microchip doubles. (...) our human ability to harness technology in creative ways is something that increases just as rapidly.16

We should prepare ourselves for the precocious syndrome which is entrenching itself digitally at school, at play, and in the home. Numerous educators can no longer expect to be more World Wide Web knowledgeable than their charges - indeed they may have much to learn from them in that regard.

16 Adam Cohen ‘The Internet: who’s cool in a hot medium’ in Time, September 18 2000, p 55
Perceived contributions

1. The researcher had made a serious insight into the use of the Web as cognitive tool at a time (1995) when its platform had just recently been generally introduced into Australian schools as government and academic policy.

2. Tertiary sectors were still vacillating about the merits of online courses and research archives. The attempt here was to evaluate within the scope of resources then available - a mode of electronic tuition using undergraduate teachers and K-12 students. It is believed that, as a result, the faculty would have been inspired to capitalise on the end product, which was elemental to the researcher’s thinking.

3. The WIP project enriched the reflections of its subject cohorts. They were to implement what they had gained from the project in substantive ways. Two became effective Webmasters upon completion of the degree requirements and the other four have since put into practice the skills gained at first encounter and since polished through daily contact with their respective charges.

4. Various schools reacted favourably seeking more such workshops for their students in situ. That was not possible, but, in any case, has since been ameliorated by the education students of this university who have entered the scene at the coalface of teaching.

5. There had been considerable public attraction to the role of the Web in schools, especially by parents, as a result of word-of-mouth lauding from those parents who had “witnessed” their children at work, as it were. In great part the print media gave more than favourable exposure to the event; a valuable public relations concept.

Understanding how knowledge is created, used, shared and advanced in organisations is the thrust of the Knowledge Ecologies theme. Increasingly, economic growth is fuelled more by ideas and knowledge and less by traditional resources. As a result, successful companies are becoming knowledge-based ecologies – continuous learning environments in which innovation thrives.

The conclusions of the most advanced pilot experiments stress that technology prompts a rethink of the structure and contents of education and training programs, making it essential to launch experimentation in order to derive pointers on what school,
university and training tomorrow [sic] should be associating closely teachers, trainers, learners, parents and their representative organisations, industry and social partners"

Increasing interest in distance learning

Largely because of the increasing competition for students as well as the increasing popularity of the Internet, higher education institutions are increasingly investing in the development and delivery of distance learning courses and programs. The Gartner Group predicts that by 2002 more than 80% of traditional U.S colleges and universities will use distance learning technologies and techniques in one or more “traditional” academic programs. This trend can also be seen in other countries including Great Britain and Australia.

In the October 1997 report on Distance Education in Higher education Institutions published by the U.S National Centre for Education, higher education institutions were reported as having the following goals for development of distance learning programs: reducing per-student costs; making educational opportunities more affordable for students; increasing institution enrolments; increasing student access by making courses available at convenient locations; increasing institutional access to new audiences; improving the quality of course offerings and meeting the needs of local employers.

Emerging trends

The trend in the market would show that the on-line education is fast catching up. As per a report by UNESCO, there are approximately 80 million students enrolled in higher education programs worldwide in 1999, of which 6,150,000 are on-line. Australia alone enrolled 690,000 student in higher education courses. In the US, which is coming up as a big base for online education, 710,000 student were enrolled distance learning last year. By 2002 this number is estimated to touch 2.2 Million. According to IDC, a whopping 90% of the online market is still untapped. The University of Southern Queensland in Australia claims that 75 percent of its 20,000 students are studying through distance education that involves some form of electronic delivery. Further, according to the Campus Computing Project 30 percent of US colleges and universities plan to incorporate the Internet into their distance learning activities.

Computer-facilitated Learning and Support Materials in Australian Universities

Universities in Australia are currently in an environment of intense change. They are being required to educate more students, from an increasing variety of backgrounds,
with decreasing government funding. Universities are required to compete vigorously for student enrolments and external sources for funding. In this environment, universities have to reassess their fundamental business and the way they go about it. Information technology (IT) is viewed as an important factor in streamlining their operations.

There has been a great deal of development of electronic educational resources in the last few years. This has occurred with substantial development of IT systems and infrastructure in all Australian universities. However, there is little evidence of dissemination of these resources and practises. Greater collaboration and sharing of resources is becoming an increasingly urgent issue. There are several existing databases of CFL materials, but these databases do not appear to have significantly increased the take-up of CFL materials and strategies. In order to make the most of the valuable resources that exist, a range of educational, technological and management factors needs to be addressed.

**Future research areas**

Since 1995, there has been an explosion of interest and of publication on the Web in Australia as well as globally. Whilst there is always ongoing debate upon the cause and effect of electronic cognitive tools, research will be more directed to be further focused in demographic measurement of those effects and how it is likely to further shape Australia’s standing in academia. Wide ranging initiatives will be encouraged and implemented in what is going to be a dramatic race to capture the minds of mankind in this Third Millennium. Within the education arena this continuing research is an imperative if we are to keep up that pace that is aggressively dominating the Web.

At the same time project managers and developers focused on the Web have to reconsider much of its content as educationally appetising and nourishing instead of its developing into “edutainment” as still the norm. Each faculty might include dedicated “cyber-vigilantes” within their development schemes so that continuous analysis of best practice Web sites becomes routine. Some of the best examples of such sites can be found in the architecture of digital libraries. Librarianship’s expertise is, apparently and unfortunately, overlooked in that context. Design models and resources should be developed to assist this process.

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17 David Stern (Ed) (1999), *Digital libraries, philosophies, technical design considerations and example scenarios*, Binghampton, NY: The Haworth Press Inc
Computer skills within K-12 schools in Australia, whilst becoming more and more refined, still do not yet have the most desirable resources backing due to fiscal constraints. Consequently the in situ digital skilling of teachers themselves is deprived. Growing numbers of students have now acquired personal computers and domestic Internet access providers, giving them an advantage over the limited channels otherwise available to them in schools. In tertiary establishments - which have conventionally equipped future professionals in various disciplines - there are still pockets of reluctant learners despite increasing pressures towards honing their expertise. It is not a condition likely to thrive, however. But it is one that can be remedied more speedily through obligatory staff development policies. Nevertheless, we have to ascertain the best possible means of bringing this about.

**Research interests need to target the development and improvement of Key Features needed in an National Inventory of CFL Resources to ensure that these:**

- Have a distributed nature;
- Be maintained in an ongoing sense;
- Be owned by academics and professional staff;
- Contain contextual information about the resource, including a full description of the product; the rationale behind its development; its unique characteristics; the pedagogical approach used; intellectual property details, and how it might be obtained; and evaluation data;
- Contain a range of experiential information on how the resource was used in a real-life teaching context, both by the developer and others; and
- Return the appropriate level of information to the queries submitted by users.
- Their data submission and retrieval process should be straightforward.
- Resources should be submitted by people with expertise in CFL and knowledge of the discipline, following a scholarly review process.
- Resource submission should not be by the developer of the resource.
- Resources successfully submitted to the database should attract scholarly recognition.
There is much promise in the use of IT and, particularly, the Web’s becoming more widely available to all at any time and in any place. It should not be neglected, however, that *individuality in learning styles is a paramount consideration*. This should attract cognitive psychologists in the field so that ongoing research addresses the velocity at which technology is changing the (re)construction of knowledge. The *emotional aspects of learning* methods have become an area for essential fine-tuning in research.

Today’s technology evolution further requires that training of educators themselves have to be ongoing so that best teaching practices be effected through focused research into the achievement of this aim.

The extending use of technology now requires that education centres get to know what elements of IT are best suited to their individual resources requirements. Teachers and mentors have to know “what they are talking about” in teaching situations. Here, again, it should be recognised that not everyone can become adept. A certain amount of educators do have an inherent forte for IT – others have their own special niche in education.

Educators are now empowered with the most innovative means of delivering knowledge confronting this millennium. Innovation is the child of research as much as invention is the mother of necessity. Continuing research into the Web as learning tool should result in prolific innovation and a wonderful experience for educators and their students.

Additionally, it has to be recognised that ageing is no longer a limiter of intellectual expertise and skills. More people are living longer. People are concurrently not so secure in their professions or job tenures. Years in the respective workforces have embedded skills and expertise that should not be terminal upon leaving the workforce for, very often, so-called “human resources downsizing” and/or “profit motivated reconstruction”. My experience has been that it is often the case that children interact cognitively with such elder citizens on a better standing than with their so-called “grownups”. This is an important area for researchers in that field.

We, as humanity, have come a long way from the flintstone’s first path to enlightenment and subsequently to the World Wide Web, as we know it. In this New Age our learning capacity has become a most desirable lifelong task which can improve the quality of life for so many. The production of knowledge is not an inviolable asset of the few. It has to be shared globally. It should not be insular in practice. Educators have serious responsibilities in ensuring that information is not a means to *discovery* of
itself it is the interpretative skills of that knowledge that must be honed religiously. The World Wide Web is such an instrument.

It would be premature to posit a definitive evaluation of the Web as learning tool - it may well take another decade to arrive at unambiguous theories in this context. Its potential for improving the quality of life for the masses is clear, but there is little doubt that corporate sector and socio-political engineers have a vested interest in its mechanics. It behoves educators universally to be vigilant, so ensuring that this vehicle is not to be driven by such entities. Failing this, we can anticipate an isolated tier of humanity perpetually imprisoned in that category for which Nicholas Negroponte has coined the label: *The Digitally Homeless.*

*Supplementary Footnotes: The state-of-the art: Australia and Globally*


5. E-EDUCATION: The RevolutionNext CIOL online @ [http://www.voicendata.com/content/VnDspecial/100010106.asp](http://www.voicendata.com/content/VnDspecial/100010106.asp)

Appendix A

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A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

ADN (Advanced Digital Network) -- Usually refers to a 56Kbps leased-line.

ADSL

See: DSL

Anonymous FTP

See: FTP

Applet A small Java program that can be embedded in an HTML page. Applets differ from full-fledged Java applications in that they are not allowed to access certain resources on the local computer, such as files and serial devices (modems, printers, etc.), and are prohibited from communicating with most other computers across a network. The current rule is that an applet can only make an Internet connection to the computer from which the applet was sent. See Also: HTML, Java
**Archie** A tool (software) for finding files stored on anonymous FTP sites. You need to know the exact file name or a substring of it.

**ARPANet** (Advanced Research Projects Agency Network) -- The precursor to the Internet. Developed in the late 60's and early 70's by the US Department of Defense as an experiment in wide-area-networking that would survive a nuclear war.

See Also: Internet

**ASCII** (American Standard Code for Information Interchange) -- This is the de facto world-wide standard for the code numbers used by computers to represent all the upper and lower-case Latin letters, numbers, punctuation, etc. There are 128 standard ASCII codes each of which can be represented by a 7 digit binary number: 0000000 through 1111111.

**Backbone** A high-speed line or series of connections that forms a major pathway within a network. The term is relative as a backbone in a small network will likely be much smaller than many non-backbone lines in a large network.

See Also: Network

**Bandwidth** How much stuff you can send through a connection. Usually measured in bits-per-second. A full page of English text is about 16,000 bits. A fast modem can move about 15,000 bits in one second. Full-motion full-screen video would require roughly 10,000,000 bits-per-second, depending on compression.

See Also: Bps, Bit, T-1

**Baud** In common usage the baud rate of a modem is how many bits it can send or receive per second. Technically, baud is the number of times per second that the carrier signal shifts value - for example a 1200 bit-per-second modem actually runs at 300 baud, but it moves 4 bits per baud (4 x 300 = 1200 bits per second).

See Also: Bit, Modem

**BBS** (Bulletin Board System) -- A computerized meeting and announcement system that allows people to carry on discussions, upload and download files, and make announcements without the people being connected to the computer at the same time.
There are many thousands (millions?) of BBS’s around the world, most are very small, running on a single IBM clone PC with 1 or 2 phone lines. Some are very large and the line between a BBS and a system like CompuServe gets crossed at some point, but it is not clearly drawn.

Binhex (BINary HEXadecimal) -- A method for converting non-text files (non-ASCII) into ASCII. This is needed because Internet e-mail can only handle ASCII.

See Also: ASCII, MIME, UUENCODE

Bit (Binary Digit) -- A single digit number in base-2, in other words, either a 1 or a zero. The smallest unit of computerized data. Bandwidth is usually measured in bits-per-second.

See Also: Bandwidth, Bps, Byte, Kilobyte, Megabyte

BITNET (Because It’s Time NETwork (or Because It’s There NETwork)) -- A network of educational sites separate from the Internet, but e-mail is freely exchanged between

BITNET and the Internet. Listservs®, the most popular form of e-mail discussion groups, originated on BITNET. BITNET machines are usually mainframes running the VMS operating system, and the network is probably the only international network that is shrinking.

Bps (Bits-Per-Second) -- A measurement of how fast data is moved from one place to another. A 28.8 modem can move 28,800 bits per second.

See Also: Bandwidth, Bit

Browser A Client program (software) that is used to look at various kinds of Internet resources.

See Also: Client, URL, WWW, Netscape, Mosaic, Home Page (or Homepage)

BTW (By The Way) -- A shorthand appended to a comment written in an online forum.

See Also: IMHO
Byte A set of Bits that represent a single character. Usually there are 8 Bits in a Byte, sometimes more, depending on how the measurement is being made.

See Also: Bit

Certificate Authority An issuer of Security Certificates used in SSL connections.

See Also: Security Certificate, SSL

CGI (Common Gateway Interface) -- A set of rules that describe how a Web Server communicates with another piece of software on the same machine, and how the other piece of software (the “CGI program”) talks to the web server. Any piece of software can be a CGI program if it handles input and output according to the CGI standard. Usually a CGI program is a small program that takes data from a web server and does something with it, like putting the content of a form into an e-mail message, or turning the data into a database query. You can often see that a CGI program is being used by seeing “cgi-bin” in a URL, but not always.

See Also: cgi-bin, Web

cgi-bin The most common name of a directory on a web server in which CGI programs are stored. The “bin” part of “cgi-bin” is a shorthand version of “binary”, because once upon a time, most programs were refered to as “binaries”. In real life, most programs found in cgi-bin directories are text files -- scripts that are executed by binaries located elsewhere on the same machine.

See Also: CGI

Client A software program that is used to contact and obtain data from a Server software program on another computer, often across a great distance. Each Client program is designed to work with one or more specific kinds of Server programs, and each Server requires a specific kind of Client. A Web Browser is a specific kind of Client.

See Also: Browser, Server

colocation Most often used to refer to having a server that belongs to one person or
group physically located on an Internet-connected network that belongs to another person or group. Usually this is done because the server owner wants their machine to be on a high-speed Internet connection and/or they do not want the security risks of having the server on their own network.

See Also: Internet, Server, Network

Cookie The most common meaning of "Cookie" on the Internet refers to a piece of information sent by a Web Server to a Web Browser that the Browser software is expected to save and to send back to the Server whenever the browser makes additional requests from the Server. Depending on the type of Cookie used, and the Browser's settings, the Browser may accept or not accept the Cookie, and may save the Cookie for either a short time or a long time. Cookies might contain information such as login or registration information, online "shopping cart" information, user preferences, etc. When a Server receives a request from a Browser that includes a Cookie, the Server is able to use the information stored in the Cookie. For example, the Server might customize what is sent back to the user, or keep a log of particular user's requests. Cookies are usually set to expire after a predetermined amount of time and are usually saved in memory until the Browser software is closed down, at which time they may be saved to disk if their "expire time" has not been reached. Cookies do not read your hard drive and send your life story to the CIA, but they can be used to gather more information about a user than would be possible without them.

See Also: Browser, Server

Cyberpunk was originally a cultural sub-genre of science fiction taking place in a not-so-distant, dystopian, over-industrialized society. The term grew out of the work of William Gibson and Bruce Sterling and has evolved into a cultural label encompassing many different kinds of human, machine, and punk attitudes. It includes clothing and lifestyle choices as well.

See Also: Cyberspace

Cyberspace Term originated by author William Gibson in his novel Neuromancer the word Cyberspace is currently used to describe the whole range of information resources available through computer networks.

Digerati The digital version of literati, it is a reference to a vague cloud of people seen
to be knowledgeable, hip, or otherwise in-the-know in regards to the digital revolution.

**DSL** (Digital Subscriber Line) -- A method for moving data over regular phone lines. A DSL circuit is much faster than a regular phone connection, and the wires coming into the subscriber's premises are the same (copper) wires used for regular phone service. A DSL circuit must be configured to connect two specific locations, similar to a leased line. A commonly discussed configuration of DSL allows downloads at speeds of up to 1.544 megabits (not megabytes) per second, and uploads at speeds of 128 kilobits per second. This arrangement is called ADSL: "Asymmetric" Digital Subscriber Line. Another common configuration is symmetrical: 384 Kilobits per second in both directions. In theory ADSL allows download speeds of up to 9 megabits per second and upload speeds of up to 640 kilobits per second. DSL is now a popular alternative to Leased Lines and ISDN, being faster than ISDN and less costly than traditional Leased Lines.

See Also: bit, bps, ISDN, Leased Line

**Domain Name** The unique name that identifies an Internet site. Domain Names always have 2 or more parts, separated by dots. The part on the left is the most specific, and the part on the right is the most general. A given machine may have more than one Domain Name but a given Domain Name points to only one machine. For example, the domain names: matisse.net mail.matisse.net workshop.matisse.net can all refer to the same machine, but each domain name can refer to no more than one machine. Usually, all of the machines on a given Network will have the same thing as the right-hand portion of their Domain Names (matisse.net in the examples above). It is also possible for a Domain Name to exist but not be connected to an actual machine. This is often done so that a group or business can have an Internet e-mail address without having to establish a real Internet site. In these cases, some real Internet machine must handle the mail on behalf of the listed Domain Name.

See Also: IP Number

**E-mail** (Electronic Mail) -- Messages, usually text, sent from one person to another via computer. E-mail can also be sent automatically to a large number of addresses (Mailing List).

See Also: Listserv®, Maillist

**Ethernet** A very common method of networking computers in a LAN. Ethernet will
handle about 10,000,000 bits-per-second and can be used with almost any kind of computer.

See Also: Bandwidth , LAN

**FAQ** (Frequently Asked Questions) -- FAQs are documents that list and answer the most common questions on a particular subject. There are hundreds of FAQs on subjects as diverse as Pet Grooming and Cryptography. FAQs are usually written by people who have tired of answering the same question over and over.

**FDDI** (Fiber Distributed Data Interface) -- A standard for transmitting data on optical fiber cables at a rate of around 100,000,000 bits-per-second (10 times as fast as Ethernet, about twice as fast as T-3).

See Also: Bandwidth , Ethernet, T-1 , T-3

**Finger** An Internet software tool for locating people on other Internet sites. Finger is also sometimes used to give access to non-personal information, but the most common use is to see if a person has an account at a particular Internet site. Many sites do not allow incoming Finger requests, but many do.

**Fire Wall** A combination of hardware and software that separates a LAN into two or more parts for security purposes.

See Also: Network , LAN

**Flame** Originally, flame meant to carry forth in a passionate manner in the spirit of honorable debate. Flames most often involved the use of flowery language and flaming well was an art form. More recently flame has come to refer to any kind of derogatory comment no matter how witless or crude.

See Also: Flame War

**Flame War** When an online discussion degenerates into a series of personal attacks against the debators, rather than discussion of their positions. A heated exchange.

See Also: Flame

**FTP** (File Transfer Protocol) -- A very common method of moving files between two
Internet sites. FTP is a special way to login to another Internet site for the purposes of retrieving and/or sending files. There are many Internet sites that have established publicly accessible repositories of material that can be obtained using FTP, by logging in using the account name anonymous, thus these sites are called anonymous ftp servers.

**Gateway** The technical meaning is a hardware or software set-up that translates between two dissimilar protocols, for example Prodigy has a gateway that translates between its internal, proprietary e-mail format and Internet e-mail format. Another, sloppier meaning of gateway is to describe any mechanism for providing access to another system, e.g. AOL might be called a gateway to the Internet.

**GIF** (Graphic Interchange Format) -- A common format for image files, especially suitable for images containing large areas of the same color. GIF format files of simple images are often smaller than the same file would be if stored in JPEG format, but GIF format does not store photographic images as well as JPEG.

*See Also:* JPEG

**Gigabyte** 1000 or 1024 Megabytes, depending on who is measuring.

*See Also:* Byte, Megabyte

**Gopher** A widely successful method of making menus of material available over the Internet. Gopher is a Client and Server style program, which requires that the user have a Gopher Client program. Although Gopher spread rapidly across the globe in only a couple of years, it has been largely supplanted by Hypertext, also known as WWW (World Wide Web). There are still thousands of Gopher Servers on the Internet and we can expect they will remain for a while.

*See Also:* Client, Server, WWW, Hypertext

*hit* As used in reference to the World Wide Web, “hit” means a single request from a web browser for a single item from a web server; thus in order for a web browser to display a page that contains 3 graphics, 4 “hits” would occur at the server: 1 for the HTML page, and one for each of the 3 graphics.

“hits” are often used as a very rough measure of load on a server, e.g. “Our server has been getting 300,000 hits per month.” Because each “hit” can represent anything from a request for a tiny document (or even a request for a missing document) all the way to a
request that requires some significant extra processing (such as a complex search request), the actual load on a machine from 1 hit is almost impossible to define.

**Home Page** (or Homepage) Several meanings. Originally, the web page that your browser is set to use when it starts up. The more common meaning refers to the main web page for a business, organization, person or simply the main page out of a collection of web pages, e.g. “Check out so-and-so’s new Home Page.” Another sloppier use of the term refers to practically any web page as a “homepage,” e.g. “That web site has 65 homepages and none of them are interesting.”

See Also: Browser, Web

**Host** Any computer on a network that is a repository for services available to other computers on the network. It is quite common to have one host machine provide several services, such as WWW and USENET.

See Also: Node, Network

**HTML** (HyperText Markup Language) -- The coding language used to create Hypertext documents for use on the World Wide Web. HTML looks a lot like old-fashioned typesetting code, where you surround a block of text with codes that indicate how it should appear, additionally, in HTML you can specify that a block of text, or a word, is linked to another file on the Internet. HTML files are meant to be viewed using a World Wide Web Client Program, such as Netscape or Mosaic.

See Also: Client, Server, WWW

**HTTP** (HyperText Transfer Protocol) -- The protocol for moving hypertext files across the Internet. Requires a HTTP client program on one end, and an HTTP server program on the other end. HTTP is the most important protocol used in the World Wide Web (WWW).

See Also: Client, Server, WWW

**Hypertext** Generally, any text that contains links to other documents - words or phrases in the document that can be chosen by a reader and which cause another document to be retrieved and displayed.
IMHO (In My Humble Opinion) -- A shorthand appended to a comment written in an online forum, IMHO indicates that the writer is aware that they are expressing a debatable view, probably on a subject already under discussion. One of may such shorthands in common use online, especially in discussion forums.

See Also: BTW

Internet (Upper case I) The vast collection of inter-connected networks that all use the TCP/IP protocols and that evolved from the ARPANET of the late 60’s and early 70’s. The Internet now (July 1995) connects roughly 60,000 independent networks into a vast global internet.

See Also: internet Internet (Lower case i) Any time you connect 2 or more networks together, you have an internet - as in inter-national or inter-state.

See Also: Internet, Network

Intranet A private network inside a company or organization that uses the same kinds of software that you would find on the public Internet, but that is only for internal use. As the Internet has become more popular many of the tools used on the Internet are being used in private networks, for example, many companies have web servers that are available only to employees. Note that an Intranet may not actually be an internet -- it may simply be a network.

See Also: internet, Internet, Network

IP Number (Internet Protocol Number) -- Sometimes called a dotted quad. A unique number consisting of 4 parts separated by dots, e.g.165.113.245.2 Every machine that is on the Internet has a unique IP number - if a machine does not have an IP number, it is not really on the Internet. Most machines also have one or more Domain Names that are easier for people to remember.

See Also: Domain Name, Internet, TCP/IP

IRC (Internet Relay Chat) -- Basically a huge multi-user live chat facility. There are a number of major IRC servers around the world which are linked to each other. Anyone can create a channel and anything that anyone types in a given channel is seen by all others in the channel. Private channels can (and are) created for multi-person
conference calls.

**ISDN** (Integrated Services Digital Network) -- Basically a way to move more data over existing regular phone lines. ISDN is rapidly becoming available to much of the USA and in most markets it is priced very comparably to standard analog phone circuits. It can provide speeds of roughly 128,000 bits-per-second over regular phone lines. In practice, most people will be limited to 56,000 or 64,000 bits-per-second.

**ISP** (Internet Service Provider) -- An institution that provides access to the Internet in some form, usually for money.

See Also: Internet

**Java** Java is a network-oriented programming language invented by Sun Microsystems that is specifically designed for writing programs that can be safely downloaded to your computer through the Internet and immediately run without fear of viruses or other harm to your computer or files. Using small Java programs (called "Applets"), Web pages can include functions such as animations, calculators, and other fancy tricks. We can expect to see a huge variety of features added to the Web using Java, since you can write a Java program to do almost anything a regular computer program can do, and then include that Java program in a Web page.

See Also: Applet

**JavaScript** JavaScript is a programming language that is mostly used in web pages, usually to add features that make the web page more interactive. When JavaScript is included in an HTML file it relies upon the browser to interpret the JavaScript. When JavaScript is combined with Cascading Style Sheets (CSS), and later versions of HTML (4.0 and later) the result is often called DHTML. JavaScript was invented by Netscape and was going to be called "LiveScript", but the name was changed to JavaScript to cash in on the popularity of Java. JavaScript and Java are two different programming languages.

See Also: HTML, Java

**JDK** (Java Development Kit) -- A software development package from Sun Microsystems that implements the basic set of tools needed to write, test and debug Java applications and applets
See Also: Applet, Java

**JPEG** (Joint Photographic Experts Group) -- JPEG is most commonly mentioned as a format for image files. JPEG format is preferred to the GIF format for photographic images as opposed to line art or simple logo art.

See Also: GIF

**Kilobyte** A thousand bytes. Actually, usually $1024 (2^{10})$ bytes.

See Also: Byte, Bit

**LAN** (Local Area Network) -- A computer network limited to the immediate area, usually the same building or floor of a building.

See Also: Ethernet

**Leased Line** Refers to a phone line that is rented for exclusive 24-hour, 7-days-a-week use from your location to another location. The highest speed data connections require a leased line.

See Also: T-1, T-3, DSL

**Listserv®** The most common kind of maillist, "Listserv" is a registered trademark of L-Soft international, Inc. Listservs originated on BITNET but they are now common on the Internet.

See Also: BITNET, E-mail, Maillist

**Login** Noun or a verb. Noun: The account name used to gain access to a computer system. Not a secret (contrast with Password). Verb: The act of entering into a computer system, e.g. Login to the WELL and then go to the GBN conference.

See Also: Password

**Maillist** (or Mailing List) A (usually automated) system that allows people to send e-mail to one address, whereupon their message is copied and sent to all of the other
subscribers to the maillist. In this way, people who have many different kinds of e-mail access can participate in discussions together.

**Megabyte** A million bytes. Actually, technically, 1024 kilobytes.

See Also: Byte, Bit, Kilobyte

**MIME (Multipurpose Internet Mail Extensions)** -- The standard for attaching non-text files to standard Internet mail messages. Non-text files include graphics, spreadsheets, formatted word-processor documents, sound files, etc. An email program is said to be MIME Compliant if it can both send and receive files using the MIME standard. When non-text files are sent using the MIME standard they are converted (encoded) into text - although the resulting text is not really readable. Generally speaking the MIME standard is a way of specifying both the type of file being sent (e.g. a Quicktime™ video file), and the method that should be used to turn it back into its original form. Besides email software, the MIME standard is also universally used by Web Servers to identify the files they are sending to Web Clients, in this way new file formats can be accommodated simply by updating the Browsers’ list of pairs of MIME-Types and appropriate software for handling each type.

See Also: Browser, Client, Server, Binhex, UUENCODE

**Mirror** Generally speaking, “to mirror” is to maintain an exact copy of something. Probably the most common use of the term on the Internet refers to “mirror sites” which are web sites, or FTP sites that maintain exact copies of material originated at another location, usually in order to provide more widespread access to the resource. Another common use of the term “mirror” refers to an arrangement where information is written to more than one hard disk simultaneously, so that if one disk fails, the computer keeps on working without losing anything.

See Also: FTP, Web

**Modem** (MOdulator, DEModulator) -- A device that you connect to your computer and to a phone line, that allows the computer to talk to other computers through the phone system. Basically, modems do for computers what a telephone does for humans.

**MOO** (Mud, Object Oriented) -- One of several kinds of multi-user role-playing environments, so far only text-based.
Mosaic The first WWW browser that was available for the Macintosh, Windows, and UNIX all with the same interface. Mosaic really started the popularity of the Web. The source-code to Mosaic has been licensed by several companies and there are several other pieces of software as good or better than Mosaic, most notably, Netscape.

See Also: Browser, Client, WWW

MUD (Multi-User Dungeon or Dimension) -- A (usually text-based) multi-user simulation environment. Some are purely for fun and flirting, others are used for serious software development, or education purposes and all that lies in between. A significant feature of most MUDs is that users can create things that stay after they leave and which other users can interact with in their absence, thus allowing a world to be built gradually and collectively.

See Also: MOO, MUSE

MUSE (Multi-User Simulated Environment) -- One kind of MUD - usually with little or no violence.

See Also: MOO, MUD

Netiquette The etiquette on the Internet.

See Also: Internet

Netizen Derived from the term citizen, referring to a citizen of the Internet, or someone who uses networked resources. The term connotes civic responsibility and participation.

See Also: Internet

Netscape A WWW Browser and the name of a company. The Netscape (tm) browser was originally based on the Mosaic program developed at the National Center for Supercomputing Applications (NCSA). Netscape has grown in features rapidly and is widely recognized as the best and most popular web browser. Netscape corporation also produces web server software. Netscape provided major improvements in speed and interface over other browsers, and has also engendered debate by creating new elements
for the HTML language used by Web pages -- but the Netscape extensions to HTML are not universally supported. The main author of Netscape, Mark Andreessen, was hired away from the NCSA by Jim Clark, and they founded a company called Mosaic Communications and soon changed the name to Netscape Communications Corporation.

See Also: Browser, Mosaic, Server, WWW

**Network** Any time you connect 2 or more computers together so that they can share resources, you have a computer network. Connect 2 or more networks together and you have an internet.

See Also: internet, Internet, Intranet

**Newsgroup** The name for discussion groups on USENET.

See Also: USENET

**NIC (Networked Information Center)** -- Generally, any office that handles information for a network. The most famous of these on the Internet is the InterNIC, which is where new domain names are registered. Another definition: NIC also refers to Network Interface Card which plugs into a computer and adapts the network interface to the appropriate standard. ISA, PCI, and PCMCIA cards are all examples of NICs.

**NNTP (Network News Transport Protocol)** -- The protocol used by client and server software to carry USENET postings back and forth over a TCP/IP network. If you are using any of the more common software such as Netscape, Nuntius, Internet Explorer, etc. to participate in newsgroups then you are benefiting from an NNTP connection.

See Also: Newsgroup, TCP/IP, USENET

**Node** Any single computer connected to a network.

See Also: Network, Internet, internet

**Packet Switching** The method used to move data around on the Internet. In packet switching, all the data coming out of a machine is broken up into chunks, each chunk has the address of where it came from and where it is going. This enables chunks of
data from many different sources to co-mingle on the same lines, and be sorted and
directed to different routes by special machines along the way. This way many people
can use the same lines at the same time.

**Password** A code used to gain access to a locked system. Good passwords contain
letters and non-letters and are not simple combinations such as virtue7. A good
password might be: Hot$1-6

See Also: Login

**Plug-in** A (usually small) piece of software that adds features to a larger piece of
software. Common examples
are plug-ins for the Netscape® browser and web server. Adobe Photoshop® also uses
plug-ins. The idea behind plug-in's is that a small piece of software is loaded into
memory by the larger program, adding a new feature, and that users need only install
the few plug-ins that they need, out of a much larger pool of possibilities. Plug-ins are
usually created by people other than the publishers of the software the plug-in works
with.

**POP** (Point of Presence, also Post Office Protocol) -- Two commonly used meanings:
Point of Presence and Post Office Protocol. A Point of Presence usually means a city or
location where a network can be connected to, often with dial up phone lines. So if an
Internet company says they will soon have a POP in Belgrade, it means that they will
soon have a local phone number in Belgrade and/or a place where leased lines can
connect to their network. A second meaning, Post Office Protocol refers to the way e-
mail software such as Eudora gets mail from a mail server. When you obtain a SLIP,
PPP, or shell account you almost always get a POP account with it, and it is this POP
account that you tell your e-mail software to use to get your mail.

See Also: SLIP, PPP

**Port** 3 meanings. First and most generally, a place where information goes into or out
of a computer, or both. E.g. the serial port on a personal computer is where a modem
would be connected. On the Internet port often refers to a number that is part of a URL,
appearing after a colon (:) right after the domain name. Every service on an Internet
server listens on a particular port number on that server. Most services have standard
port numbers, e.g. Web servers normally listen on port 80. Services can also listen on
non-standard ports, in which case the port number must be specified in a URL when
accessing the server, so you might see a URL of the form: gopher://peg.cwis.uci.edu:7000/ shows a gopher server running on a non-standard port (the standard gopher port is 70). Finally, port also refers to translating a piece of software to bring it from one type of computer system to another, e.g. to translate a Windows program so that is will run on a Macintosh.

See Also: Domain Name, Server, URL

**Portal** Usually used as a marketing term to described a Web site that is or is intended to be the first place people see when using the Web. Typically a "Portal site" has a catalog of web sites, a search engine, or both. A Portal site may also offer email and other service to entice people to use that site as their main "point of entry" (hence "portal") to the Web.

**Posting** A single message entered into a network communications system. E.g. A single message posted to a newsgroup or message board.

See Also: Newsgroup

**PPP** (Point to Point Protocol) -- Most well known as a protocol that allows a computer to use a regular telephone line and a modem to make TCP/IP connections and thus be really and truly on the Internet.

See Also: IP Number, Internet, SLIP, TCP/IP

**PSTN** (Public Switched Telephone Network) -- The regular old-fashioned telephone system.

**RFC** (Request For Comments) -- The name of the result and the process for creating a standard on the Internet. New standards are proposed and published on line, as a Request For Comments. The Internet Engineering Task Force is a consensus-building body that facilitates discussion, and eventually a new standard is established, but the reference number/name for the standard retains the acronym RFC, e.g. the official standard for e-mail is RFC 822.

**Router** A special-purpose computer (or software package) that handles the connection between 2 or more networks. Routers spend all their time looking at the destination addresses of the packets passing through them and deciding which route to send them on. See Also: Network, Packet
Switching Security Certificate A chunk of information (often stored as a text file) that is used by the SSL protocol to establish a secure connection.

**Security Certificates** contain information about who it belongs to, who it was issued by, a unique serial number or other unique identification, valid dates, and an encrypted “fingerprint” that can be used to verify the contents of the certificate. In order for an SSL connection to be created both sides must have a valid Security Certificate.

See Also: Certificate Authority, SSL

**Server** A computer, or a software package, that provides a specific kind of service to client software running on other computers. The term can refer to a particular piece of software, such as a WWW server, or to the machine on which the software is running. e.g. Our mail server is down today, that’s why e-mail isn’t getting out. A single server machine could have several different server software packages running on it, thus providing many different servers to clients on the network.

See Also: Client, Network

**SLIP** (Serial Line Internet Protocol) -- A standard for using a regular telephone line (a serial line) and a modem to connect a computer as a real Internet site. SLIP is gradually being replaced by PPP.

See Also: Internet, PPP

**SMDS** (Switched Multimegabit Data Service) -- A new standard for very high-speed data transfer.

**SMTP** (Simple Mail Transfer Protocol) -- The main protocol used to send electronic mail on the Internet.

SMTP consists of a set of rules for how a program sending mail and a program receiving mail should interact. Almost all Internet email is sent and received by clients and servers using SMTP, thus if one wanted to set up an email server on the Internet one would look for email server software that supports SMTP.

See Also: Client, Server
**SNMP** (Simple Network Management Protocol) -- A set of standards for communication with devices connected to a TCP/IP network. Examples of these devices include routers, hubs, and switches. A device is said to be "SNMP compatible" if it can be monitored and/or controlled using SNMP messages. SNMP messages are known as "PDU’s" - Protocol Data Units. Devices that are SNMP compatible contain SNMP "agent" software to receive, send, and act upon SNMP messages. Software for managing devices via SNMP are available for every kind of commonly used computer and are often bundled along with the device they are designed to manage. Some SNMP software is designed to handle a wide variety of devices.

See Also: Network, Router

**Spam** (or Spamming) An inappropriate attempt to use a mailing list, or USENET or other networked communications facility as if it was a broadcast medium (which it is not) by sending the same message to a large number of people who didn’t ask for it. The term probably comes from a famous Monty Python skit which featured the word spam repeated over and over. The term may also have come from someone’s low opinion of the food product with the same name, which is generally perceived as a generic content-free waste of resources. (Spam is a registered trademark of Hormel Corporation, for its processed meat product.) E.g. Mary spammed 50 USENET groups by posting the same message to each.

See Also: Maillist, USENET

**SQL** (Structured Query Language) -- A specialized programming language for sending queries to databases. Most industrial-strength and many smaller database applications can be addressed using SQL. Each specific application will have its own version of SQL implementing features unique to that application, but all SQL-capable databases support a common subset of SQL.

**SSL** (Secure Sockets Layer) -- A protocol designed by Netscape Communications to enable encrypted, authenticated communications across the Internet. SSL used mostly (but not exclusively) in communications between web browsers and web servers. URL’s that begin with “https” indicate that an SSL connection will be used. SSL provides 3 important things: Privacy, Authentication, and Message Integrity. In an SSL connection each side of the connection must have a Security Certificate, which each side’s software sends to the other. Each side then encrypts what it sends using
information from both its own and the other side's Certificate, ensuring that only the intended recipient can de-crypt it, and that the other side can be sure the data came from the place it claims to have come from, and that the message has not been tampered with.

See Also: Browser, Server, Security Certificate, URL

**Sysop** (System Operator) -- Anyone responsible for the physical operations of a computer system or network resource. A System Administrator decides how often backups and maintenance should be performed and the System Operator performs those tasks.

**T-1** A leased-line connection capable of carrying data at 1,544,000 bits-per-second. At maximum theoretical capacity, a T-1 line could move a megabyte in less than 10 seconds. That is still not fast enough for full-screen, full-motion video, for which you need at least 10,000,000 bits-per-second. T-1 is the fastest speed commonly used to connect networks to the Internet. See Also: Bandwidth, Bit, Byte, Ethernet, T-3

**T-3** A leased-line connection capable of carrying data at 44,736,000 bits-per-second. This is more than enough to do full-screen, full-motion video.

See Also: Bandwidth, Bit, Byte, Ethernet, T-1

**TCP/IP** (Transmission Control Protocol/Internet Protocol) -- This is the suite of protocols that defines the Internet. Originally designed for the UNIX operating system, TCP/IP software is now available for every major kind of computer operating system. To be truly on the Internet, your computer must have TCP/IP software.

See Also: IP Number, Internet, UNIX

**Telnet** The command and program used to login from one Internet site to another. The telnet command/program gets you to the login: prompt of another host.

**Terabyte** 1000 gigabytes.

See Also: Byte, Kilobyte

**Terminal** A device that allows you to send commands to a computer somewhere else. At a minimum, this usually means a keyboard and a display screen and some simple
circuitry. Usually you will use terminal software in a personal computer - the software pretends to be (emulates) a physical terminal and allows you to type commands to a computer somewhere else.

**Terminal Server** A special purpose computer that has places to plug in many modems on one side, and a connection to a LAN or host machine on the other side. Thus the terminal server does the work of answering the calls and passes the connections on to the appropriate node. Most terminal servers can provide PPP or SLIP services if connected to the Internet.

See Also: LAN, Modem, Host, Node, PPP, SLIP

**UDP** (User Datagram Protocol) -- One of the protocols for data transfer that is part of the TCP/IP suite of protocols. UDP is a “stateless” protocol in that UDP makes no provision for acknowledgement of packets received.

See Also: TCP/IP

**UNIX** A computer operating system (the basic software running on a computer, underneath things like word processors and spreadsheets). UNIX is designed to be used by many people at the same time (it is multi-user) and has TCP/IP built-in. It is the most common operating system for servers on the Internet.

**URL** (Uniform Resource Locator) -- The standard way to give the address of any resource on the Internet that is part of the World Wide Web (WWW). A URL looks like this: http://www.matisse.net/seminars.html or telnet://well.sf.ca.us or new: newusers.questions etc. The most common way to use a URL is to enter into a WWW browser program, such as Netscape, or Lynx.

See Also: Browser, WWW

**USENET** A world-wide system of discussion groups, with comments passed among hundreds of thousands of machines. Not all USENET machines are on the Internet, maybe half. USENET is completely decentralized, with over 10,000 discussion areas, called newsgroups.

See Also: Newsgroup
UUENCODE (Unix to Unix Encoding) -- A method for converting files from Binary to ASCII (text) so that they can be sent across the Internet via e-mail.

See Also: Binhex, MIME

Veronica (Very Easy Rodent Oriented Net-wide Index to Computerized Archives) -- Developed at the University of Nevada, Veronica is a constantly updated database of the names of almost every menu item on thousands of gopher servers. The Veronica database can be searched from most major gopher menus.

See Also: Gopher

VPN (Virtual Private Network) -- Usually refers to a network in which some of the parts are connected using the public Internet, but the data sent across the Internet is encrypted, so the entire network is "virtually" private.
A typical example would be a company network where there are two offices in different cities. Using the Internet the two offices merge their networks into one network, but encrypt traffic that uses the Internet link.

See Also: Internet, Network

WAIS (Wide Area Information Servers) -- A commercial software package that allows the indexing of huge quantities of information, and then making those indices searchable across networks such as the Internet. A prominent feature of WAIS is that the search results are ranked (scored) according to how relevant the hits are, and that subsequent searches can find more stuff like that last batch and thus refine the search process.

WAN (Wide Area Network) -- Any internet or network that covers an area larger than a single building or campus.

See Also: Internet, internet, LAN, Network

Web See: WWW

WWW (World Wide Web) -- Frequently used (incorrectly) when referring to "The Internet", WWW has two major meanings - First, loosely used: the whole constellation of resources that can be accessed using Gopher, FTP, HTTP, telnet, USENET, WAIS
and some other tools. Second, the universe of hypertext servers (HTTP servers) which are the servers that allow text, graphics, sound files, etc. to be mixed together.

See Also: Browser, FTP, Gopher, HTTP, Internet, Telnet, URL, WAIS

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