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WOMEN IN ICT: GUIDELINES FOR EVALUATING INTERVENTION PROGRAMMES

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Abstract

Many intervention programmes to increase the number of women in theInformation and Communications Technology (ICT) profession have been implemented over the last twenty years. Detailed evaluations help us to determine the effectiveness of these programmes yet few comprehensive evaluations appear in the literature.The research reported here describes an investigation of the evaluation of the intervention programmes focusing on increasing the enrolment and retention of females in ICT in Australia. This paper describes an empirical study which explores how evaluation has been and might be conducted and concludes with guidelines for evaluation for those developing programmes for increasing the participation of women in ICT.The guidelines encourage evaluation to be considered early, highlight the importance of establishing objective outcomes and promote the publication of results to build knowledge for those planning programmes in the future. Further, the developed guidelines could adapted and used with other ICT intervention programs.

Keywords: Gender, female, ICT, social intervention programmes, evaluation, computing

1 Introduction/Background

The Information and Communications Technology (ICT) profession emerged in the 1950s with women involved at the outset. However the industry quickly became, and remains, male dominated (Game and Pringle 1984, Maslog-Levis 2005).

Australian statistics, consistent with those from other western developed nations, indicate that participation levels by women in ICT education and training have been low since the 1980s (DEST 2002). To attract girls to computing, and retain women once in the field requires ‘formal’ programmes specifically to address the factors discouraging participation (Wasburn and Miller 2006).Over the last twenty years in Australia and elsewhere (Suriya and Craig 2003), intervention programmes have been implemented by various industry groups, government departments and the education sector.However the gender balance has not improved. The effectiveness and impact of these programmes therefore needs to be considered yet it is rarely reported; information in the literature focuses on the process of the intervention programmes rather than outcomes based on objective evaluations.

A key question this research explored was how can intervention programmes be easily and objectively evaluated enabling others to learn from the experience?This paper presents guidelines for evaluating intervention programmes based on empirical research into intervention programmes; in particular programmes designed to encourage females to study and continue to work in ICT.In the context of this research women includes girls.The guidelines draw on theory and practice and provideguidancefor

those implementing intervention programmes to enable effective implementationand evaluation of their programmes.

2 Women in ICT - Intervention programmes

2.1 Types of Intervention Programmes

The first IFIP WG 9.1 working conference on Women, Work and Computerization was held in Italy in 1984 (Olerup et al. 1985).A number of reports of intervention strategies were presented at this conference.Since then, a large array of intervention programmes and strategies specifically to address the gender imbalance in ICT, have been reported. Table 1 provides examples of typical intervention programmes and initiatives conducted for various groups. For reasons of space similar interventions have been grouped together. Table 1 is drawn from interventions reported byCraig et al 1998,Gürer and Camp, 2002,Clayton and Lynch 2002 andKlawe et al. 2009.

School students	Higher Education students	Women in Industry
Education initiatives egchangingteaching styles, developing inclusive curriculum, single-sex classes. Providing equal access or affirmative action.	Providing support communities, extra or peer tutoring, bridging courses, role models and orientation sessions. Supporting single-sex classes.	Encouraging and supporting women through board readiness programmes and professional development.
Running activities such as 'Girls in Computing Days', computing workshops / camps / clubs.	Providing accurate information. Establishing mentoring and tele-mentoring programs.	Creating support communities / social networking, mentoring,tele-mentoring programs.
Raising teacher and/or parental awareness. Providing girls with accurate information.	Improving the curriculum and learning environment. Using pair-programming.	Promotion of workforce strategies and work-family balance.
Profiling successful women.	Scholarship or awards programme.	Recognition and awards.
Creation of engaging resources such as videos or web-sites.	Supporting women returnees.	Developing women-only lists.
Mentoring high school students.	Providing gender and ICT courses.	Conferences for women in ICT.

Table 1:Intervention programmes for different participants

Intervention programmes can be costly and time consuming. For example: a one day 'Girls in Computing' event in 2008 for 1400 secondary school girls was a year in the planning, involving 68 volunteers.Corporate sponsors contributed more than $150,000 AUD in cash and in-kind support (Craig et al 2008). Such activities implicitly assume that girls may change their expectations and career plans after a short positive experience with computing (Lindley 1995). While career decision-making research concludes that this can occur and is termed 'happenstance' or 'turning points' (Hodkinson and Sparkes 1997),there is no evidence to date to that it did happen in this instance.

2.2 Which programmeswere successful?

The literature reports on many different initiatives which aim to encourage more women into computing, however little research has been published on programme outcomes short or long term. Given the considerable efforts of many to increase the level of women's involvement in ICT, and the lack of objective evidence of success, leads us then to question the efficacy of the intervention programmes. Were any of the programmes successful?How can success be measured?

The international Gender and Science and Technology (GASAT) association was established in the early 1980s in response to concerns regarding gender, science and technology (Harding 1994).An analysis of the research papers related to gender and computing, presented at eleven GASAT

conferences (1981 – 2001) categorised the research described by these papers according to: access to learning, process of learning and outcomes of the teaching/learning process. It was found that:

> *The majority of the papers presented focused on various dimension of the "access" of females to computers or ICT.Approximately half of this number addressed issues associated with the "processes" of learning, but a much smaller number documented the "outcomes" of learning other than those associated with subsequent progression to more advanced courses or to careers in computer science or ICT.*(Parker 2004, p. 5)

This is consistent with the literature on women and computing where 'access' to computing and courses, and the 'process' of intervention programmes has been the focus, with little written about specific intervention programme outcomes. Where programmes were described as successful it was not always clear what criterion was used to measure success, or what success looked like.

The literature highlights no failed or unsuccessful programmes only some reporting of problems with programme implementation uncovered by evaluations.For example Willis et al.(2003) suggest that programmes implemented at many Australian Universities, experienced problems due to insecure funding, which resulted in intervention programmes being 'diluted or intermittent'.

Parker (2004) promotes the notion that for change to take place written reports on intervention programmes and presentations at conferences such as GASAT, need to be more precise; not just about the research itself but about the actual practice in the area of ICTs. Von Hellens and Nielsen (2006, p. xxxv) however express concern that the discipline is still too young to draw conclusions regarding the effectiveness of a large number of intervention programmes.Despite this, to learn of good practice elsewhere, and identify and replicate 'successful' programmes in other situations contributes to a knowledge base.For this to be possible it is necessary to not only adopt the outward aspects of a programme's success but to recognise what interplay of culture and organisation make it effective (Martin et al. 2004).It is important to understand why it was successful and in what context.Evaluating programmes can shed light on these aspects.

3 Evaluation

Evaluation is 'the process of obtaining and disseminating information of use in describing or understanding the particular programme, or making judgements and decisions relating to past, existing or potential programmes' (Australasian Evaluation Society 2002). Evaluation helps identify the most effective programmes and to learn from programmes which are not having the desired consequences.

Evaluation researchdiffersfrom applied research (Sarantakos 2005).Principles and methods that apply to research apply to evaluation (Weiss 1998).Both use the entire spectrum of data-collection methods such as surveys, interviews, document analyses, attitude inventories and so on.Weiss (1998) suggests that evaluation differs from other research endeavours in that evaluation draws its questions from stakeholders, such as policy makers, and often needs to be reported to a non-research audience.Evaluation also takes place in an action setting. Wadsworth (1997, p. 57) suggests that presently there are a 'bewildering range of ways presented for people to carry out evaluation' including summative, formative, process, output, outcome or impact evaluation.However, she clarifies this by indicating that many of these actually focus on a 'particular stage of the matter being evaluated' (Wadsworth 1997, p. 57) as if it were a separate section, than an entirely different type of evaluation.The literature provides a number of models and frameworks to assist in the process of evaluation.

An intervention programme needs to be 'grounded in good theory' (PERC n.d.).Successful programmes create change and are built on a solid knowledge of what works and the programme's theory.This theory is the set of assumptions and expectations that represent the rationale for what is done and why (Rossi et al. 1999).According to Chen (1990, p. 43) a program theory is 'a specification of what must be done to achieve the desired goals, and what other important aspects may also be anticipated and how these goals and impacts may be generated'.

Few programme evaluations, of interventions for women and ICT, were found in the literature.Lang (2007) reported that evaluation of programmes, particularly to help understand why they are not sustainable, is lacking from the literature.Other Australian research focused specifically on females moving into non-traditional areas of work, including ICT, suggests that evaluation of current strategies 'is generally lacking or piecemeal' (Lyon 2003, p. 3).Given the number and frequency of intervention programmes implemented, why are reports of evaluation lacking?Teague (1999) argues that one possible reason for this paucity is that if interventions are evaluated quantitatively, and there is no significant change, then the evaluations are not considered worth reporting.Alternatively it may be that evaluation was not formally undertaken due to a deliberate decision, lack of expertise or resources.Von Hellens et al. (2005, p. 2) suggest that intervention programmes for women in ICT are difficult to evaluate and limited resources frequently hinder deep analysis of programme outcomes.

3.1 The need for evaluation

Rossi et al. (1999) argues that given scarce resources it is even more important to evaluate the effectiveness of social intervention programmes.A gap exists in understanding the effects of intervention programmes because of the lack of published evaluations (Darke et al. 2002).To improve our understanding of which programmes are best, for whom, and in what context, a cumulative information base is necessary (Weiss 1998). Programme evaluations need to be conducted, results published and through publications each study adds to knowledge.Even when evaluation results show that a programme has had no effect, little effect or an unintended effect, dissemination of these results is important so that knowledge grows and 'ineffective programs are not unwittingly duplicated again and again' (Weiss 1998, p. 16).Equally, when the results from a programme are mixed, a published evaluation enables other people to learn which components of the programme were associated with the greater success.Detailed evaluations can point to programmes which should be replicated and those which should be modified or abandoned. To be influential in bringing about change will require providing policy-makers and practitioners with much more specific information (Parker 2004).

Evaluations can be of a qualitative or quantitative nature or a mixture of both.How a programme will be evaluated should be considered and incorporated into the design of every programme (Meyers 1981).However, Pawson and Tilley (1997, p. xiii) note that there is no single evaluation strategy that will answer all the questions of 'why a programme works, for whom and in what circumstances'.

Before an intervention can be evaluated numerous decisions must be made. For example: What is the purpose of the evaluation?Will an internal evaluator be used or is there a need to bring in an external consultant?Do the needs of multiple stakeholders (including the commissioner of the evaluation, the primary intended users and other interested parties) need to be incorporate into the evaluation process?What will be the criteria for judging the success of the programme?

An appropriate evaluation method needs to be chosen; task selection however, Patton (1987, p. 170) describes is 'perilous'.To conduct an effective evaluation of an intervention programme the evaluator needs a large repertoire of methods and techniques which can be used and modified for particular programmes.The evaluation design needs to be understandable, relevant and rigorous; and produce meaningful outcomes that are valid and reliable.Evaluation can involve assessment of one or more of five programme domains: a needs assessment; assessment of program theory; process evaluation; impact evaluation or an efficiency assessment.

Various authors argue the need for a greater focus on evaluation (Lyon 2003; Darke et al. 2002; Parker 2004).As highlighted earlier a lack of tools, funding and expertise for conducting evaluations are reasons why evaluation of female ICT intervention programmes are not occurring suggestingimplementable guidelines for those planning intervention strategies is needed.

4 The Research Method

Current evaluation theory helps in describing the evaluation processes at a high level but needs further refinement to make it operationalisable for areas such as intervention programmes.Our research aimed to understand how previous programmes focusing on women in ICT were undertaken and evaluatedand to develop guidelines specifically enabling those implementing such intervention programmes to undertake more useful and objective evaluations.The research was conducted in three phases.

4.1 Phase 1:A conceptual framework based on the literature

A conceptual framework for evaluation was developed by combining the key elements of evaluation that were identified in the literature using a logic model approach (see for example; Funnell 1997, Rossi et al. 1999, McLaughlin and Jordan 2004).

4.2 Phase 2:Case study

A case study consisting of 14 cases was conducted. Each case consisted of a cluster of intervention projects, referred to as a programme.The results of this empirical work were used to refine the framework and develop operational guidelines. A total of 17 major intervention programmes were conducted in Australia from 1994 to 2008.Miles and Huberman (1994) suggest that a multiple-case study requires clear choices about which cases to include within the study.The cases for this research were selected on the following basis:

- Oneprogramme objective was to increase the number of females in ICT.
- The programme was a sustained activity but could consist of one or more projects.
- The principal champion/instigator of the programme was prepared to participate.
- Programmes were chosen to provide diversity in location and focus.
- Time the programme ran for, assuming longer term programmes would be more successful.

Fourteen cases met the criteria:eight cases from universities, three from government bodies and three from the industry sector.More cases were from the university sector because of the proliferation of programmes in this sector.Some programmes and projects were completed others were ongoing.

Data were gathered on each case via detailed document and artefact analysis and by in-depth interviews with the instigator/leader/programme champion of each programme.Details about the intervention programme in context, the assumptions it was based on, the success of the programme from the perspective of the programme champion, the criteria used to measure success and any evidence of evaluation or the absence of evaluation was sought.

The analysis of each individual case was followed by a cross-case comparison.A total of 19 interviews were conducted as in some of the cases more than one person was interviewed. Additional data for each case came from documents and artefacts (consisting of 40 published and 10 unpublished papers, 17 reports, 32 surveys, 6 videos and 12 websites).All data was brought together in one NVivo project file enabling sorting, searching and linking.An initial set of categories for coding (nodes) was created based on the themes and concepts which had emerged.Having all the data in one project file enabled the creation of a meta-matrix as described by Miles and Huberman(1994) to facilitate an analysis for patterns in responses and opinions.Yin (1994) agrees that this approach is a good method for analysing multiple-case study data.Analysis of this data led to the creation of guidelines to support the conceptual framework.

4.3 Phase 3:Confirmation

The final stage of the research involved two confirmatory activities a workshop with 14 participants who had implemented a programme and lastly the framework was applied to another intervention

programme (which met the requirements for cases as detailed above). The implementation of the programme and its evaluation was observed, documents analysed and detailed discussions with the programme champion were held in order to test and refine the framework.

5 The Results

5.1 Development of the conceptual framework

A logic model is useful in explicitly stating the theory on which an intervention programme is based.A logic model can be shown with a graphical picture linking the logical connections between the programme's inputs, activities, short-term and medium-term outcomes and longer-term impacts.It enables investigation of these links to check whether the assumptions of how the programme works in context are sound (Davidson 2005).Logic models therefore help in determining; what to evaluate, the questions to be asked, the data to be collected, how it will be collected and when (UWEX 2003). The evaluation literature also identified a number of key elements that need to be considered when planning evaluations of any social programmes.For example clarifying the purpose of the evaluation, considering who is most appropriate to conduct the evaluation and being aware of the resources available. These key elements were combined with the logic model to provide the conceptual framework which informed the design of the case study investigation,Figure 1.

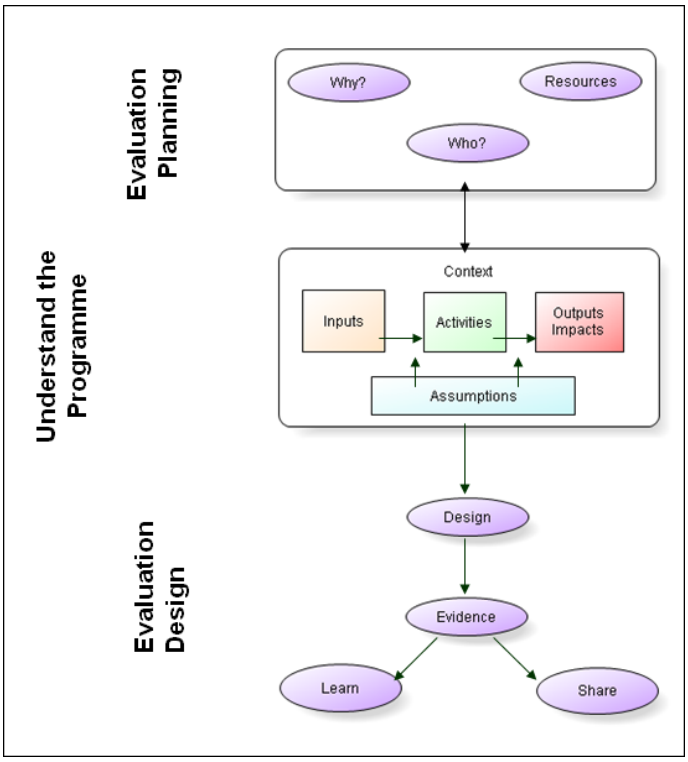

Figure 1 Conceptual Evaluation Framework

Evaluation needs to be considered as part of the design of the intervention programme, not as an after thought. A plan, which identifies who will be involved and why, within the constraints of the available resources, needs to be developed. The evaluation must be conducted within the context of programme activities and the assumptions made about those activities so that the success of activities can be measured. The empirical components of the case study included design, explore and refine the framework.

5.2 The Case Study

The 14 cases varied in their focus and audience with programmes developed in academia through universities, government initiatives, and industry bodiesacross Australia.At the conclusion of the research, six of the programmes were still highly active but in eight, activities had stopped, or were operating only at a minimal level.Collectively these intervention programmes resulted in many activities reaching large numbers of participants.The activities/projects implemented by the case entities as part of their intervention programmesare listed in Table 2. Similar activities have been grouped together and duplicate projects removed.In many cases success was measured by the program champions through a quantitative count such as increase in number of participants or the number of

articles published. More detail on the measures of success has been reported in an earlier paper (Craig et al 2009).This set of activities highlights the wide variety of programmes implemented.

Intervention programme activities conducted by the 14 cases	
• Awards program, Bursaries, Scholarships • Competitions • Creating parental awareness • Training of teachers • Computer clubs • Girls in Computing days • Role model events, Profiling successful women • Networking, Support community • Mentoring	• Residential summer school • Computer camp • Orientation camp • Curriculum change • Bridging Course • Creating suitable resources including videos and web sites • Women-only workshops and conferences • Institutional and other changes

Table 2: Intervention programme activities

5.2.1 The Programme Evaluations

The success of the programmes was investigated from the perspective of the programme champions and the evaluations performed. Using the three key components of the conceptual evaluation framework (Figure 1), the research findings are presented and discussed next.

1. Evaluation Planning

   The main reasons for conducting formal programme evaluation was if it was required by a funding agency, to demonstrate impact to sponsors or to measure participant satisfaction and thereby how the programme could be improved.

   Many of the programme champions commented that with limited time and energy implementing the program was the focus because they believed the program would be successful.When an evaluation was conducted a common concern was the difficulty of knowing what to evaluate and how it should be done.The case study revealed that few programme champions had the knowledge, time or interest to plan and implement a detailed evaluation of their programmes. Further, funding usually did not extend to evaluation.

   External evaluators were used for some projects (the government sector primarily) in most cases however, a small number of programme members volunteered to conduct the evaluation.

2. Understand the Program

   The assumption of how change might be expected to come about through the implemented activities was generally not considered in the planning of the programmes. Many champions had not thought through what success for the programme would be or how it should be measured. Champions wanted to influence career choices with many saying they wanted to raise awareness and inspire more girls to take ICT, some hoped to improve retention of female students in courses and others were concerned that ICT was portrayed as a backroom occupation which discouraged girls.

3. Evaluation Design:

   All programme champions considered their programmes successful.Almost all interviewees however mentioned individual instances of having made a difference in one persons' life and this they saw as success.Many expressed disappointment that the incredible time and effort needed to sustain these programmes (most are voluntary projects) resulted in limited change.

Approximately 75% of projects were not formally evaluated as programme champions focused most on programme implementation. Formal evaluation is where there was a specific plan to conduct evaluation as distinct from receiving anecdotal feedback or informal feedback.Where evaluation was considered it often focused on informal measures.If a formal evaluation was conducted a common concern was identifying appropriate criteria or evidence to use to measure programmesuccess.Consequently several evaluations measured activities (number of events, number of participants) rather than the impacts that had been assumed the programme would create(the programme's effect on participants, particularly long term).All the industry groups, some of the government entities but no universities used key performance indicators to measure their progress against.The level of financial resources varied considerably – both for conducting the programmes and for evaluation.A lack of funding, appropriate skills, time restrictions, and issues of ethics and privacy laws reduced the effectiveness of numerous evaluations.

Many evaluations were used by programme champions for their own purposes, and were not disseminated further.Informing the larger community of successful or unsuccessful programmes was often not considered.The government sector mostly distributed evaluations through web based reports; the university sector was more proactive writing up results for publication.

5.3 The Outcomes

The case study confirmed the need for the evaluationframework and allowed supporting guidelines for the design and implementation of evaluation of social intervention programmes such as those discussed, to be developed informed by theory and practice. A workshop was conducted with 14 participants and explored the critical elements of the framework. The results of the workshop confirmed the usefulness of the framework and led to the development of a set of guidelines.

Table 3 presents the final Evaluation Guidelines, based on the evaluation framework.Theseguidelines suggest that at the planning stage of any social intervention programme a logic model should be developed describing the underlying assumptions of how the programme is expected to work, and for whom.Multiple team members should brainstorm the assumptions to ensure that none are overlooked.

Questions can be asked such as: Is the model meaningful?Are the assumptions reasonable?Is the intervention within our capabilities and is it testable?The guidelines then direct the design of the evaluation, the evidence gathering, as well as ensuring that the critical elements of using and sharing of the results are considered.

A one-day workshop was the first confirmatory activity. It was held with a group of 14 educators all of whom had participated in implementing intervention projects aimed at encouraging women in ICT. Participants were given a series of activities designed to focus on how an intervention programme might be designed and how evaluations might be conducted. The framework was presented followed by in-depth discussion regarding its usability and usefulness. The participants confirmed the value of the guidelines with one commenting that

*[*By attending this workshop*] I have gained the confidence to develop evaluations that identify real outcomes. Not just collecting data for the sake of it. It will assist me not only in the context of girls and ICT but across a range of activities.*

The framework/guidelines were then applied to a new intervention programme being implemented, the second confirmatory activity. The assumptions behind the operation of the programme were uncovered through discussions with the programme champion. The theory of how change was going to come about as a result of the programme was then developed. The following comment from the programme champion suggests the guidelines were useful, easy to implement and how it contributed to the design of the programme.

Yes, yes, yes...I also like it because it means… it is like a tool I can think about. I don't need you, I don't need to call you and say how do I evaluate? But thinking about it I can write my own questions. YES!"

Phase	**Description**
Evaluation Planning:	
Why	At the start of designing an intervention programme consider the need to undertake evaluation of the programme: Why evaluate the proposed programme?
Who	Who requires the outcomes of any evaluation? Who will be the evaluation team? Will all stakeholders including multiple team members be involved?
Resources	What resources are available for the evaluation (e.g., volunteers, expertise, time, money, equipment)?
Understand the Programme:	
Context	What is the problem the programme sets out to solve? What change is expected after the implementation of the programme? Create a logic model showing the programme inputs, activities and expected outcomes/impacts. What are the assumptions (or theories) that will lead from the programme activities to the outcomes/impacts? Are the assumptions realistic? Over what time period are changes expected to occur? What level of change is required to define success?
Evaluation Design:	
Design	Describe how the evaluation will be conducted and the evaluation activities in the context of why the intervention programme is needed. Design the evaluation activities. What is being measured, how and when? For example: • The participants - who will be involved. • The results of the programme; the short and medium term outcomes in participants' knowledge, skills or behaviour. • The longer term outputs/impacts. • How the link between change and theory will be evaluated?
Evidence	How will the data be analysed? What evidence is needed and is it credible for assessing change? On what basis will conclusions be drawn and recommendations made?
Learn Share	How will the results be used in future? How will the lessons learned be shared? How will evaluation results contribute to the gender and IT literature and theory?

Table 3: Guidelines for evaluating intervention programmes

6 Discussion

The essence of any social programme is its expected impact.If the assumptions embodied in the theory of a particular programme are incorrect, the intended social benefits will not be realised (Rossi et al. 1999, p. 100).Without appropriate evaluation the assumptions on which a programme is built will not be identified and measuring success will be difficult.Our research identified a critical gap in the evaluation of social intervention programmesdesigned to encourage and support women in ICT.The research highlighted the wide range of intervention programmes implemented across Australia and the lack of consistent and objective criteria used by programme champions to evaluate their programmes.

Owen and Rogers (1999) suggest there is no basis for developing intervention programmes unless programme initiators use causal thinking.We argue that effective evaluation begins with the

development of a program theory. A program-theory driven evaluation is one where the evaluator constructs a program theory and uses this theory to guide the evaluation process.

What are the assumptions underlying the intervention programmes for women and computing?These will vary with each project but data from the case studies suggests assumptions are made, though not necessarily articulated as highlight in the following quotes:

> *A subsequent evaluation of the campaign, showed that while greater awareness of ICT careers had been achieved, this was unlikely to influence the eventual career choices of students. (Government document)*
>
> *So we talk about success criteria; attendance is not necessarily a criteria for success. They might be coming for all sorts of reasons. Freebies, day out of the office, day out of school, you name it. I think we have got to be very careful and have qualitative and quantitative measures to determine how successful this program really is.*(*Programme ChampionGovernment agency*)

Assumptions explain the link between short, medium and longer term outcomes and the expectations of how and why the intervention programme will achieve these.Assumptions, or underlying beliefs, must be implicitly stated to clarify what should be evaluated, and when, and improve the understanding of the programme so that it can inform social change.The assumptions can be supported by the literature, strengthening the case for the plausibility of the theory and the likelihood that the stated outcomes will be achieved.An advantage of this type of evaluation is that team members (and other stakeholders) are empowered to conduct the evaluation, and given limited resources for evaluation, it is more likely that evaluation will be conducted.It should be noted that evaluation is not a value-neutral activity and careful attention should be paid to insure biases of internal evaluators do not impact on the evaluation.

Having used the guidelines to understand what needs to be evaluated, and when, will still not ensure effective evaluation.Evaluation instruments developed and used, such as surveys or interviews, must be appropriate and the questions asked must measure what they are intended to measure and provide useful answers to be practical (Rossi et al.1999).The guidelines will not alleviate the necessity to work within the constraints of a particular programme, such as the lack of resources and time limitations.

Further research is needed, applying the guidelines to an intervention programme from inception to conclusion to further validate its usefulness.

7 Conclusion

The interviews and surveys with the participants of the two confirmatory cases confirm the usefulness of the evaluation framework.Whether intervention programmes for women in ICT are large or small, all have an underlying theory of how change is expected to occur.The framework encompasses a logic model for articulating this theory enabling the design of the evaluation and identification of what evidence should be gathered.Even before evaluation is conducted the model can be a valuable tool as the construction of the theory underlying a programme can expose simple and naive assumptions.Together with the other elements of evaluation described, the framework used in conjunction with the guiding questions should make a sound basis for informed evaluation of intervention programmes more widely but particularly any focusing on ICT.

To improve our understanding of which programmes are best, for whom, and in what context, a cumulative information base must be created (Weiss 1998).Not only do programme evaluations need to be conducted but, as the framework indicates, they need to be used and the results shared.By providing access to the results in the public domain each study will add to the knowledge base, enabling other practitioners to learn from successful interventions and apply elements appropriate to their local communities.Even when evaluation results show that an intervention programme has had no effect, minimal effect or an unintended effect, sharing these results is important.Only then will practitioners be able to stop unwittingly duplicating ineffective programs (Weiss 1998).Equally, when

the results from a programme are mixed, published evaluations enable others to learn which components of the programme were associated with the greater success.Evaluation needs to be given the priority it deserves and embraced as a serious endeavour.

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