Perhaps It's Time for a Fresh Approach to ICT Gender Research?

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The aim of this paper is to demonstrate the value of the adoption of a feminist epistemology in information, communication and technology (ICT) gender research. Much of the research undertaken in ICT in relation to gender issues adopts a positivist philosophy with some notable exceptions. A feminist research approach is rarely used in ICT gender research. This is despite the fact that it is generally accepted that the ICT workplace is "gendered" and embodies a tacit masculine norm. This paper uses a case study that examines the imbalance in Tasmanian (Australia) ICT workplaces with a particular emphasis on the common characteristics of women currently working within the industry and the factors that could impact on women moving to or being placed in ICT positions. Clearly a research approach that enables the researchers to explore the perspective of the research participant and as a consequence offer some insights into the declining gender balance in the field offers significant benefits.

ACM Classification: K7 (The Computing Profession), K7.0 (General).

1. INTRODUCTION

This paper is a revision of one presented at the Information Systems Foundations workshop conducted at the ANU, Canberra, in July, 2004 (Webb and Young, 2004).

Since the inception of the ICT industry women have been an under represented human resource (Nielsen, von Hellens and Wong, 2000; Panteli *et al*, 1999; Ahuja, 2002; The Women in Science Engineering and Technology Advisory Group, 1995). In addition many women who gain professional qualifications in the area and enter the industry do not remain (O'Neill and Walker, 2001). The problem has been attributed to a number of factors: a dominant male culture in the ICT field (Pringle *et al*, 2000; von Hellens, Nielsen and Trauth 2001), a lack of mentoring opportunities for women (Teague, 2000; Ahuja, 2000), a competitive work atmosphere where men are more aggressive in presenting themselves (Cuny and Aspray, 2000), difficulties balancing work and family responsibilities (Ahuja, 2002; APESMA, 2002) and a perception of ICT as a solitary and isolating career (Nielsen, von Hellens and Wong 2001; Pringle *et al*, 2000).

The on-going gendered environment in ICT has been defined as the perpetuation of the "old corporate boys' club syndrome" (O'Neill and Walker, 2001). This implies that while women are not precluded from entering the industry, little action is taken to recruit them or foster their career

advancement opportunities through involvement in managerial decision-making. This situation is exacerbated by the lack of suitable and willing mentors and mentoring opportunities available for women within the industry (Teague 2000; Ahuja 2000).

With some notable exceptions much of the research to date examining gender issues in ICT is framed within a positivist philosophy and uses quantitative methods. The value of this stream of research is the measurement and quantification of the extent of the gender imbalance in the industry. Generally the focus is on attempting to put in place policies and strategies to address the problem (Pringle *et al*, 2000). However this approach has been criticised because it largely seeks to "add more women" and fails to acknowledge and address the need to change the gendered culture in ICT workplaces if, indeed, this is possible (Adam, Howcroft and Richardson, 2002).

There are fewer examples of research that use a subjectivist approach and a qualitative method focussing on the gender imbalance in the ICT industry. There are even less examples of research that have explicitly adopted a feminist research approach.

Adam (2001) argues that the adoption of feminist theory in the study of gender within ICT has the potential to reap benefits in three ways. These are:

1. Support for ICT commitment to social and cultural aspects;
2. Commitment to emancipatory action that results in the revelation of previously hidden viewpoints thus contributing to knowledge; and
3. Emphasis upon the minority or repressed being involved in the development of their own methods for liberation.

In response, the aim of this paper is to adopt a feminist epistemology to demonstrate that it has the capability to build a rich insight into the experiences of women currently working successfully in the IT industry in Tasmania. In the short term it is not feasible to expect a change in the dominance of a male culture gender imbalance in ICT. However reporting the experiences of women who have achieved in the industry is a positive move to weaken the extent of this domination and potentially attract women in larger numbers to careers in the ICT field.

2. BACKGROUND

The aim in this section of the paper is to define ICT, briefly outline the nature of ICT as an emerging discipline, the imbalance of women in the ICT industry, the scope of ICT gender research and then to offer an insight into feminist research. From this background the research questions posed in this paper are then presented.

2.1 Defining ICT

The field of ICT is complex, diverse and lacks clarity of definition, for these reasons, it is not surprising that the ICT research community has embraced the social and organisational issues as valid and acceptable research areas (Adam, 2001).

For the purpose of this paper a broad definition of ICT has been adopted. A woman has been considered to be working in an ICT role if the work she does contributes to or supports the use of a computer system, a view consistent with Ahuja (2002). Support of a computer system is not limited to technology and can take a multitude of forms including policy development or customer support.

2.2 ICT as an emerging discipline

As a relatively recent discipline, ICT draws on a range of reference disciplines (Robinson and Richardson, 1999). The primary reference disciplines have been identified as computer science,

management science, organisational science, cognitive science and economics. Secondary reference disciplines are sociology, information science, linguistics, anthropology, ergonomics and systems science (Khazanchi and Munkvold, 2000). This implies that research from an ICT perspective draws on a wide range of domains of study, strategies and methods (Marble, 2000; Robinson and Richardson, 1999). Because of this ICT is often criticised for its diversity and fragmentation that are seen as precluding an ability to become a mature discipline with a cumulative research tradition (Robinson and Richardson, 1999).

At the same time ICT has been acknowledged as having "subject matter that is so central to contemporary society" (Robinson and Richardson, 1999) that is subjected to continuous change (O'Donovan and Roode, 2002). While there is pressure for ICT to consolidate, this does not imply that ICT research should be static but open to innovative ways of doing research. The application of a feminist epistemology as demonstrated in this paper is one such example. The aim in adopting this approach is not to offer an alternative epistemology but to show that in ICT gender research a feminist approach can be beneficially applied (Adam and Richardson, 2001).

2.3 The imbalance of women in the ICT industry

In most Western countries women remain a minority in the ICT industry (Trauth, Nielsen and von Hellens, 2003). UK women were found to be a minority in all areas of the industry (Panteli *et al*, 1999). In European countries only 25% of those working in the ICT industry are women, while in the United States the figure has been reported as low as 20% (Ahuja, 2002). All indications are that the situation in Australia follows these patterns. In contrast to other areas within science and technology such as engineering, where numbers of women studying and working are increasing, the number of women studying and entering the ICT industry is actually declining (The Women in Science Engineering and Technology Advisory Group, 1995; Panteli *et al*, 1999; Cukier, Shortt and Devine, 2002).

Little research has been done within the ICT industry that has explored the experience of women and how it can be used to address the continuing problem of gender imbalance. "Most research on women in the information technology (IT) industry has been concerned with practical questions: measuring disadvantage, establishing causes, and attempting to put in place policies and strategies that will rectify the situation" (Pringle *et al*, 2000).

2.4 The scope of ICT gender research

Much of the literature considering gender issues in ICT is framed within a positivist philosophy and uses quantitative methods to examine the research problem (Ahuja, 2002; Igbaria and Baroudi, 1995; Holmes, 1998; Khazanchi, 1995; Truman and Baroudi, 1994; Baroudi and Igbaria, 1994; Frenkel, 1991). The positivist research epistemology is the dominant ICT research epistemology in the United States and Australia (Orlikowski and Baroudi, 1991; Ridley and Keen, 1998). While this research identifies the extent of the gender imbalance, it is largely based on dichotomising ICT professionals on the basis of biological sex. This means that females are seen as a stereotypical group and individual differences are not considered (Adam, Howcroft and Richardson, 2002). Accordingly the effectiveness of this approach is limited as it precludes the opportunity to gain any insight into the personal experiences of women who have become ICT professionals and subsequently continue to successfully work in the industry.

There is little evidence of ICT gender focussed research based on a subjectivist approach using qualitative methods (Pringle *et al*, 2000; O'Neill and Walker, 2001; von Hellens *et al*, 2001; Trauth, 2002; Webb, 2002). Within these examples while Trauth (2002) and Webb (2002) are explicitly

presented as feminist research, the work reported by Pringle *et al* (2000) implicitly adopted this stance. The interpretivist research philosophy is subjectivist and includes the researcher as an integral part of the research situation. It acknowledges that the values, intentions and background of the researcher will impact on the outcomes of the study. The researcher actively sets out to get inside the research problem and understand the whole from within (Neuman, 2000). While subjectivist research cannot usually be generalised to the wider community it can, and does, have the capacity to highlight areas and issues that may benefit from further investigation and discussion. A reasonable argument could be mounted for the adoption of this epistemic position in the conduct of ICT gender research. It is likely that a researcher employing this epistemology will produce creditable results. However it is our belief that the feminist epistemology has more to offer in terms of participation of, and rapport with, the participants and flexibility of the research methods and techniques.

2.5 Feminist research

Feminist research is defined not by a methodology rather it is an epistemology. This means that feminist researchers can use a range of research methods and techniques. There is no agreed definition of feminist research. Alcoff (2000) writes, "there is no coherent characterization of experience, social position, or standpoint that encompass the differences among women". A fundamental of feminist research is that it is conducted for women rather than on women (Reinharz, 1992; Reynolds, 1993). It involves a broad and dynamic theory within which numerous positions exist (Millen, 1997). Central to feminist research are goals of social change and improved representation (Humphries, 1997). It must also be believed that women have been oppressed and not treated fairly and that there is action that can be taken (Grimshaw 1986). Further, the role of the researcher and the researcher's rapport and familiarity with the participant is also important in feminist research (Reinharz, 1992). Feminist research lends itself to the use of qualitative methods enabling the researcher to explore the personal perspectives of women as individuals. While quantitative research methods and a feminist epistemology are not mutually exclusive it would be uncommon to find quantitative methods, with a focus on hard, numerical data, used for feminist research (Stanley 1990; Neuman 2000).

Feminist research often uses case studies to analyse change in a situation over a period of time, the significance of a situation for the future and the connections between components of a situation (Reinharz, 1992). The use of semi-structured interviewing in feminist research is significant. It enables the use of open questions and provides the capacity to encourage participants to give lengthy and full responses in their own words. "Feminist researchers find interviewing appealing for reasons over and above the assets noted by social scientists who defend qualitative methods against positivist criticism" (Reinharz, 1992). Semi-structured interviews are seen as offering access to people's ideas, thoughts, and memories and real life experiences in their own words rather than the words of the researcher (Reinharz, 1992; Dallimore, 2000). To achieve this outcome it is important that considerable rapport is developed between the researcher and the participant, as this is a fundamental prerequisite in feminist research.

From this background the research presented in this paper draws on a feminist epistemology to demonstrate that it is an appropriate approach in ICT gender research. In so doing it is acknowledged that there is gender imbalance in information systems workplaces and it is likely that there are factors at work that inhibit and or reduce the likelihood that women will participate in equal numbers. It may be that oppression exists and that this has contributed to the inequality. Further, it is recognised that, due to the exploratory nature of the research, no immediate change would occur

as a result of this study. It may, however, lead to further research and subsequent actions to effect change and therefore meets yet another criterion, in adding support for a feminist stance. As such, when these conditions are true they represent the subtle distinction between a feminist epistemology and an interpretivist approach.

The aim of the research presented in this paper is to disclose common characteristics of women currently working within the industry and to consider the factors that impact on women moving to or being placed in ICT positions. To address this objective the following questions are posed:

- *What are the factors influencing the careers of women in ICT in Tasmania?*
- *What are the characteristics of women working in ICT roles in Tasmania?*

A feminist epistemology underpinned the pursuit of the original research objective and for this paper the following aim will be considered:

To explore the value of a feminist epistemology for ICT gender research.

3. METHOD

To demonstrate the application of a feminist epistemology within ICT gender research, the research presented in this paper uses qualitative research methods and a case study approach involving semi-structured interviews conducted with women who are successfully working in the ICT industry in Tasmania. The adoption of a case study strategy is supported by the view of Reinharz (1992) that feminists use case studies primarily to analyse the significance of a situation. While there is an absence of feminist research that directly relates to gender imbalance within the ICT industry, in Tasmania, this research is founded on an assumption that the situation in this State will mirror discriminatory work place practices found elsewhere.

3.1 Participant recruitment

To recruit participants for the case study the primary researcher attended a social event hosted by the Women in Information Technology Tasmania (WIITT) group. WIITT is a special interest group under the auspices of the Australian Computer Society (ACS). At this event she was able to address the group and provide an outline of the research and invite the women in attendance to volunteer to participate. A brochure providing an overview of the research and the participants' contribution was made available at the event. Within a feminist research perspective this personal approach was an important initial step in the development of rapport with potential participants.

At this gathering between six to nine volunteers were sought to participate in interviews. This number of interviews was established with reference to the limitations of the time and the resources available in this research. From the qualitative literature the number of interviews is dependent upon the projected depth of analysis and the proposed representativeness of the research (Connell, Lynch and Waring, 2001). Eisenhardt (1989) states, "Finally, while there is no ideal number of cases, a number between 4 and 10 cases usually works well".

That evening six women volunteered to participate. It was interesting to observe that most women approached or who approached the researcher during the course of the evening expressed their interest in the research but also expressed their reservations regarding the relevance of their contribution. Comments like "*I don't think I'm the right person to speak to*" or "*I'm not sure if I really do the right kind of work – I'm not very technical*" were common, although a few questions generally proved that the women were indeed employed in the ICT sector. Comments such as these

are perhaps indicative of the fundamental difference in approach that women exhibit compared to men in similar roles in the industry.

The choice of research participants was based on the following criteria. The women needed to be currently working in ICT in either the public or private sectors in Hobart, readily accessible and willing to take part in the research and available for an interview during the research time requirements.

Subsequent to the WIITT social event two more women volunteered to participate. This brought the total number of volunteers to eight. This number of interviews is consistent with the number commonly found within qualitative ICT research (Urquhart, 1999; de Salas, 2002; Marshall and McKay, 2004). The potential participants were contacted shortly after the WIITT event to thank them for their offer of participation and to let them know that they would be contacted again to organise the interview. They all expressed their ongoing support for the research. In keeping with a feminist epistemology this second personal contact was yet another occasion to build rapport with the women who were prepared to contribute to the research.

3.2 Data Collection

Data collection was based on the use of semi-structured interviews that aimed to encourage participants to provide their own views and perspectives of their experiences working in an ICT work environment. A combination of open and closed questions was used. The majority of the questions began with 'how' or 'what' as a reminder to keep the question broad and open, and were worded to encourage descriptive replies, for example, "*How did you get into information systems?*" and "*What do you envisage for yourself in your professional career?*"

A pre-prepared interview guide was also used to stimulate discussion. This was based on the personal experience and understanding of the primary researcher gained from working for a number of years in the ICT industry. It provided a solid starting position, and offered the ability, when appropriate, to pursue responses with probing questions.

3.2.1 Pilot Interview

Prior to the main interviews a pilot interview was conducted to ensure the questions were easily understood, to test the application of the interview guide and assess the pace necessary to complete the interview. The pilot took place with a female ICT professional who had lengthy experience working in the ICT sector in Tasmania. It was completed within the projected sixty-minute timeframe and the interview schedule worked effectively in encouraging the woman to relate her personal experiences of working in the ICT industry.

3.2.2 Main interviews

The eight main interviews took place in June and July 2002 and were conducted at venues and times suitable to the participants. To maximise the level of comfort and increase the likelihood of full, comprehensive and frank responses, the women taking part were assured the interviews would be treated as confidential and no identifying information would be incorporated into transcripts or subsequent analysis.

With the permission of the participants the interviews were tape recorded to enable the researcher to capture the exchange with a high degree of accuracy. None of the participants declined to have the interviews recorded. The intention was, where the participant indicated their willingness to do so, that the transcripts would be provided to them for checking. This approach was used to fulfil a validity test involving collaboration.

3.2.3 Data coding

Each interview was transcribed into Microsoft Word within 48 hours of completion. This was done to complete the task while the memory of the researcher was still fresh thereby reducing the risk of error in the transcription should any words be indistinct on the tape. This approach proved to be very successful with all but one of the tape recordings. The exceptional recording was indistinct in parts due to high levels of background noise in combination with a very softly spoken participant. Because the transcription was completed in a timely manner the majority of data from this interview was recovered.

3.2.4 Data Analysis

The aim of coding in qualitative analysis is to shatter the data and then manipulate it into groupings that can be compared and regrouped (Maxwell, 1996). In coding the data an inductive, three-stage bottom up coding process was adopted: open, axial and selective. Open coding is the first pass through the data and results in the identification of relevant codes. These codes are the categorisation of the data according to the themes and concepts contained therein. In the second pass, or axial coding, the researcher examines the codes to identify how the categories identified during the open coding stage relate to each other. The final stage is selective coding. In this stage the refined themes that arise during the axial coding are re-examined to try and determine the most important themes identified with reference to the research topic. The interview transcripts are then revisited to confirm or contrast the existence of the themes by extraction of supporting quotations from the data.

4. FINDINGS

The analysis and interpretation revealed three major themes in the data: *supermum factor, serendipity* and *culture*. The major themes incorporated ten sub-themes and are summarised in Table 1.

Table 1: Research findings

Major themes	Sub-themes
Supermum factor	societal expectation; work family balance; support
Serendipity	skills; adaptive behaviour; outlook
Culture	paucity; definition; gender traits; distinction

Even though relationships were revealed both within themes and between themes, for clarity and simplicity, each theme and the underlying sub-themes will now be presented individually.

In this section support for the themes will be presented through use of quotations drawn from the data transcriptions. Due to the space limitations of this paper the quotations provided represent only a few examples from the findings. The use of quotations to support interpretation follows an established technique used to demonstrate the validity of the findings in qualitative research (Whittemore, 2001). It also provides the women participants a voice to examine, explain and explore the findings (Broido and Manning, 2002).

4.1 Supermum Factor

The *Supermum factor* can be interpreted as the external influences on the work choice of the women. As shown in Table 2 it contains three sub-themes: social expectation, work family balance and support. The supermum aspect of the findings recognises the impact and value of support from

both the family and from employers in helping to achieve a sustainable balance between work and family. It acknowledges the struggle experienced by women striving for excellence in both the work and family areas of their life within a framework of societal expectation. The data subtly demonstrated the existence and impact of societal expectation and also illustrated the changing nature of societal expectation. The amount and form of support provided to the women was also impacted by societal expectation.

Table 2: Supermum sub-themes

	Illustrations from the data
Social expectation	*Participant #6: "she actually had to leave work at the end of the year she got married"*
	Participant #3: "And I think that... as women are starting to or as society is starting to accept that... its not automatic for women to have short term careers and go off and have families during their twenties
Work and family balance	*Participant #3: "it has been damn hard to combine a family with study and with full-time work and I think that's a real, I think that the community and the industry could reap so many benefits if they allowed a little flexibility"*
Support	*Participant #6 "and my husband I suppose one of the great things I've had in my working life is I've got a really great husband"*

4.2 Serendipity

This theme encapsulates the skills, qualities and attitudes of the participants as represented by the data. The Oxford Paperback Dictionary defines serendipity as:

> *"the making of pleasant discoveries by accident"* (Pollard 2000).

It has been so named because of the strong sense of the role of fate or luck expressed by the women who participated in this research.

> *Participant #6: "well it's just… serendipity. I mean that's how life is isn't it?"*

In reality it can be demonstrated from the data that luck probably contributed less to the women's progress and success in their careers than did the skills, outlook and the adaptive behaviours these women used to survive and thrive even though they are a minority in a male dominated environment. The sub-themes, along with supporting quotations from the data, are shown in Table 3. While there were examples of a range of skills in the data (interpersonal communications, problem solving/analytical skills and skills in maths and science) there did not appear to be a core skill set among the women. However the outlook of the participants and any subsequent adaptive behaviours are not occurring independently of the skill set of the individual women.

The outlook sub-theme was arguably the most exciting finding in the research, revealing as it did a set of common qualities shared by the women participating in this research. It highlighted some strong aspects including displaying a positive attitude, excitement and enthusiasm for their work and life. The women welcomed change and opportunity to the extent that some participants spoke of the need for stimulation and a commitment to continuous learning. Paradoxically there was

also a sense of insecurity and lack of confidence among the participants. There was also some evidence of self-awareness and the recognition that insecurity and lack of confidence were not justified when skill and ability were considered.

The fact that the women taking part in this research use adaptive behaviours in their workplaces was clearly demonstrated in the data.

Table 3: Serendipity sub-themes

	Illustrations from the data
Skills	*Participant #1: "and I get on equally well drinking at the pub with the riggers as I do talking to, when you're doing a customer presentation and talking to management."*
	Participant #2: "... but I am a fairly, you know, organised kinda person so just organise yourself and you get by"
	Participant #7: "I have a degree in maths and physics"
Outlook	*Participant #4: "I sort of suddenly began to realise that it was within my reach to do something that was ... in demand and current like to me it just seemed so ... oh so exciting so ... my mind was set then"*
	Participant #4: "and yet ... it was so easy when I did it"
Adaptive behaviours	*Participant #6: "because lovely though they are, if you were a real sensitive sort you would find some of their jokes really appalling"*

4.3 Culture

As shown in Table 4, the final main theme *Culture* is based on a four sub-themes: paucity of women in ICT, definition of ICT, gender traits and the distinction in approach and support. These sub-themes combine to create the environment within which the women carry out their ICT work related activities.

In this research there was some sense that the low numbers of women in ICT may have impacted on the culture and environment within the ICT workplace. Potentially it has served to perpetuate the dominant male culture. The nebulous nature of ICT was revealed by the data with no common perception among the women participating in the research. From the data it was clear that there was a perception that men and women, in general do have subtle inherent differences and this impacted on the way they operate and interact. There was also recognition that the description of gender traits relies heavily on generalisation and stereotyping.

The distinction sub-theme encompasses discriminatory behaviour that the participants had experienced. A common view from the data was that the women had not personally experienced barriers within their workplaces, although they acknowledged the existence of barriers in a more general sense.

Table 4: Culture: sub-themes

	Illustrations from the data
Paucity of women in ICT	*Participant #2: " Yeah no, I suppose after 30 something years you get used to working in that environment."*
Definition	*Participant #8: "... this is where I struggle a bit with being classified as being in information technology" (this participant included, among other responsibilities, management of a WAN as part of her duties)*

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Gender traits	Participant #2: "So then most women I suppose its part of being a woman, you kinda have a bit more…you accept that you're going to be asked questions and you're prepared for it more whereas guys seem not to like that kind of thing."
Distinction	Participant #6: "and he actually complimented me by telling me I was almost a bloke, almost a man, as far as my work went, you know"

5. VALIDITY

Feminist research has been accused, in a similar way to interpretivism and critical social science, of being wanting in the area of validity (Dallimore, 2000). To address the issue in the present research, with reference to Dallimore (2000) and Neuman (2000) collaboration, natural history, and member validation were applied.

In purposefully building rapport with participants, as consistent with a feminist approach, the researcher addressed validity through collaboration. The relevant industry experience of the researcher helped to frame the questions and assisted in drawing out rich and detailed responses. This personal interest could be perceived as providing potential for bias. This was readily acknowledged and in so doing the likelihood that it would be successfully managed was increased. Validity can also be demonstrated in the manner that the findings truly represent the views of the participants. In this research participants were offered the transcript to review and provide feedback on its accuracy. Only one woman chose to review the transcript and that participant did not request any changes to its content.

In the present research the researchers have provided a detailed description of research philosophy, processes, methods and approaches in order to meet compliance with a natural history test of validity (Neuman, 2000). They set out to faithfully record all aspects of the research to ensure validity in the eyes of other readers.

The final method of validation used within this research was that of member validation. It can be demonstrated when the findings of the research are provided to the participants to gauge their ability to identify their situation reflected in the findings. Member validation can be difficult to achieve. Despite a truthful portrayal participants may have personal motivations for disagreeing with the findings. This was not the case in the present research:

"Thank you … for sending me your findings. I can identify with a lot of what you say especially 'It would appear from the data that being valued, encouraged and supported in their family and career was important…"

and:

"I can definitely identify with the findings of your research and with the other women interviewed. Especially the serendipity theme – we all think we're just lucky but in reality we're pretty damn good aren't we?"

6. DISCUSSION

The results of the research suggest that for the group of women participating in this research the answers to the two questions, posed earlier in this paper, are interconnected. That is, one factor influencing the placement of these women into ICT roles in Tasmania seems to be their ability to

adopt adaptive behaviours, their view of themselves as lucky and their openness to recognise and seize new opportunities.

While it is not possible to generalise from the results of this research to the industry, due to the small number of participants and the exploratory nature of the study, this research does suggest that it is likely that there are common characteristics shared by the women who participated in this study. These include a combination of the skills and outlook that enable the women to adapt to the male dominated culture, to the impact of societal expectations and to identify and pursue new career opportunities.

In addressing the objective of this research paper the application of a feminist research approach has proved to be beneficial. It could be argued that some of the factors influencing the careers of women in ICT and the characteristics of these women may have been identified using a positivist research approach, and others obtained from the use of a qualitative approach.

However, it is proposed that the findings have extended this area of research to uncover subtle factors and characteristics of individual participants that could only come from the use of a feminist approach. Central to this is that the research was conducted for women, not on women. In addition, in the context of feminist research the extent of rapport and element of trust between the participants and the researcher in this present research was clearly very good. Unless this exists then participants do not feel comfortable in giving comprehensive, open and truthful responses. The high level of rapport and trust is evidenced by the fact that the only woman who asked to read the transcription of the data subsequently did not request any changes to her interview dialogue. In addition the remaining participants obviously had confidence in the researcher to the point that they did not want to review the transcription of their interviews. There was also a general consensus that the women readily identified themselves with the findings of the research. This implies that the women taking part in the research were given a voice and not just treated as a stereotypical group based on their biological sex. As such this research has provided a new perspective with the ability to extend understanding in ICT gender research.

A number of factors were identified that influence the careers of women in ICT workplaces. One significant factor was that of societal expectation. While this was acknowledged as changing, it can still place considerable pressure on women who are attempting to balance work and family in pursuit of a career, the supermum. The findings have shown that support was crucial for the women in their career endeavours. However it became evident from the transcripts that sometimes the extent of this support was less than ideal. An example from one participant supports this view. While she acknowledged the support of her husband, there was still an expectation that she was responsible for going home to make dinner. Potentially this could imply that while the husband was prepared to be supportive, societal expectation was still influential with a clear division of labour on the basis of gender.

The women contributing to this research were a highly intelligent group holding tertiary qualifications, not necessarily in ICT, but in maths, physics or science. They were willing and interested in taking part in this research even though initially they were unclear about the alignment of their role within ICT. As highlighted in the findings the sub-theme outlook was arguably the most exciting result in the research. While a core skill set was not found among the women participants, when those they had were combined with a positive outlook the women, as individuals, were able to use adaptive behaviours to succeed and thrive in what was often a discriminatory work environment. The women readily acknowledged that they were a minority in the ICT industry with many of the participants dismissing the male culture dominance as of no consequence.

7. CONCLUSIONS

Clearly a research approach that enables the researcher to explore the perspective of the research participant and as a consequence offer some insight into the declining gender balance in the field offers significant benefits.

Adopting a feminist research approach enabled the primary researcher to:

- develop and establish a rapport with the participants to a level and depth that would be difficult with alternative approaches first in a convivial social situation and then on a personal one-on-one basis;
- inform the research process based on her own experience and to extend and explore issues with participants based upon that experience resulting in richer data and a greater insight into the research problem; and
- gain a richer and more detailed insight into the research problem through the explicit adoption of a research approach that supports women in challenging and confronting a situation that requires social change.

This paper has provided an example of research conducted using a feminist epistemology and qualitative research methods to demonstrate that it is a viable alternative in ICT gender research. It was beneficial in conducting this research as it enabled the researcher to explore the research problem more fully and in greater depth. The individual women participants were given a voice and as a group their combined wisdom was illuminating. However as acknowledged at the beginning of this paper, due to the exploratory nature of the research, no immediate change will occur as a result of this study.

Perhaps now the time is right for researchers studying gender issues within ICT to consider potentially useful alternative approaches to the more conventional ways. The worsening gender imbalance in the ICT discipline demands new and innovative approaches and the need to ensure the views of women are adequately represented in the workforce should provide a powerful catalyst for action.

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