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Exploring the Gender Divide: Perceptions of IT Professionals in New Zealand

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26. EXPLORING THE GENDER DIVIDE: PERCEPTIONS OF IT PROFESSIONALS IN NEW ZEALAND

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Abstract

The continuing shortage of IT professionals is a global problem and is exacerbated by the lack of women, representing nearly half the potential workforce, who are attracted to the industry. This paper contributes to the growing body of literature by examining the perspectives and experiences of both male and female IT professionals in New Zealand. Using a narrative inquiry methodology the study examines the perceptions of men and women regarding the inability of the IT industry to attract more female graduates. Data analysis is carried out through the lens of Individual Differences Theory to identify key factors influencing the make-up of the IT sector in New Zealand. The study finds that while there is a positive view of women's role in IT, there remains a powerful influence from stereotyping of the sector and those who work in it.

Keywords

Individual Differences Theory, gender balance, IT industry, Women in IT

1. Introduction

> *"It's predicted that some 21 million IT jobs would be created globally by 2012 but only 17 million will have the skills to fill the vacancies. In NZ we will require around 125,000 ICT employees by 2012, with current levels sitting at around 41,000 employees" (Cunliffe, New Zealand Minister of ICT, 2007, p.7).*

The New Zealand Information Technology (IT) industry is experiencing a 'genuine skill shortage' (Department of Labour, 2007) with the demand for IT professionals expected to continue growing while the number of IT graduates continues to decline. New Zealand is not alone in experiencing a shortfall of IT professionals and in this climate of skills shortage, it is a matter of concern that the drop in student numbers is particularly prevalent amongst women. In Australia, for example, women represent half of the workforce (Australian Women Online, 2008), but account for less than one fifth of IT graduates (von Hellens & Nielsen, 2005). Similarly, reports from Statistics New Zealand (2001, 2006) show that IT workers represent 4.7% of the working population with females accounting for only 1% of that number, with the majority at the 'skilled' rather than 'highly skilled' or managerial levels. This grouping reflects Hembry & Presley's (2006, p.1) identification of the 'polarised pattern of female representation in the IT sector' where women are over-represented in data entry and desktop publishing roles,

but ‘accounted for only 11 per cent of systems technicians and 16 per cent of applications engineers’. As companies seek to improve the mix in their workforce women are being actively sought by employers, ‘but there are simply not enough trained women applying’ (Hembry & Presley, 2006, p.1). There are several factors that are held to influence the low take-up of IT degrees, and subsequent careers, by women including the perception that ‘ICT is boring’ (Anderson, Timms & Courtney, 2006), social and cultural issues (von Hellens & Nielsen, 2005), lack of role models (Trauth, 2002) and an overwhelmingly male environment (Baroudi & Igbaria, 1995). The issue of the gender imbalance in the IT sector has been the focus of many studies including Trauth, Quesenberry and Morgan (2004) in the US and Crump, Logan and McIlroy, (2007) in New Zealand. Nevertheless, there remain many issues to be addressed and this paper contributes to the growing body of literature by examining the perspectives and experiences of both male and female IT professionals in New Zealand. The study uses narrative inquiry to examine the importance of a gender-balanced work environment and the factors that affect achieving such a balance. This NZ study generalises the findings back to theory and presents some outcomes that may be applied to a wider population.

2. Gender and IT

There is a growing body of research concerning the lack of women in managerial positions in the IT industry. The unsuitability of the IT workplace, the deeply ingrained masculine culture of IT, the long hours, “presenteeism”, and difficulties with obtaining part-time employment are seen as barriers to improving the work-gender imbalance (Griffiths & Moore, 2006; Moore, Griffiths, & Richardson, 2005). Other research identifies different perspectives of computer technology where women are seen as computer-phobic or computer reticent (Turkle in Christensen, Knezek, & Overall, 2005). Boys who are perceived to excel at computing are designated as ‘nerds’, ‘geeks’ or ‘trainspotter types’ with a lack of the social skills that are held to be so valued by girls (Lee, 2005). This emphasising of the IT gender divide may be a generalised version of reality, but it appears such misconceptions of the industry are a powerful influence on career choice. Lee (2005) argues that where females have a family member or friend in the IT industry, they have a more accurate view of available careers in IT, underpinning Trauth’s (2002) identification of the importance of role models. Further studies suggest that women’s lack of enthusiasm for an IT career are also influenced by the negative occupational culture in IT (Sumner & Niederman, 2004) and lack of career information for a technology orientated career (Morris, 2002). Hargittai & Shafer (2006) report that another contributory factor is women’s lack confidence in their own abilities, which leads them to assess their skills at a lower level than their male peers.

Adam, Howcroft and Richardson (2004), note that “gender is a vital social factor shaping organisation life and thus it is inconceivable that the interaction of users with information systems is not in some way shaped by the ‘gendered’ spheres we inhabit”. They argue that the topic of gender is not studied adequately and lacks theorisation and that quantitative studies exhibit “strong tendencies of essentialising gender characteristics making men’s and women’s characters and behaviour seem fixed and predetermined” (p.228). They further argue that using quantitative studies comparing men and women by gender forces them into “polarised masculine and feminine categories therefore emphasising the differences between the two” (p.229). In one such quantitative study, Igbaria and Chidambaram (1997) use male characteristics as the norm from which to measure and females are just not ‘measuring up’. Crump et al., (2007) also consider the perception of the masculine images of technology. They take a broader view in

considering different roles in IT as being male or female, using a social constructivist framework to explore the relationships between women and the society in which they interact. This framework is one of three theories that have a strong influence in gender and IT research.

2.1 Social constructivist theory

The social constructivist theory holds that the social construction of IT is a male dominated area, and therefore is contrary to the social construction of female identity (Trauth, et al, 2004). The result of the societal perceptions of IT as male dominated, which Lee calls 'gendering from the outside' (2005), is that females are less attracted to the technical workplace which in turn reinforces the identification of computing as 'men's work' (Trauth, 2002). IT then becomes more attractive to certain types of people, mainly males, just as other areas like childcare or nursing have traditionally been constructed as female domains. External factors influence how people absorb, process and use information and their perspective is affected by daily routines and the larger social and cultural organization which "defines divisions of labour, power and culture" (Crump et al, 2007, p.352). Therefore, after years of male and female stereotyping and despite a social revolution in gender equality, men and women still have different views on their respective skills and abilities.

2.2 The essentialist perspective

In contrast, the essentialist perspective asserts that it is inherent differences between the nature of men and women that influences reactions to divisions of labour. This theory holds that biological determinants dictate reaction to IT and therefore women will require different methods of training than men to enter the IT workforce (Trauth, 2002). Gender is seen as a dichotomous variable, that there are distinct male and female characteristics, and so gender becomes a measuring tool and enforces the gender stereotyping within the industry (Venkatesh & Morris, 2000). This theory can be considered as the 'separate but equal theory', but the typical roles of women in IT, emphasizing soft skills, tend to be less than equal compared with more technical male roles. The latter roles have higher status thus facilitating a smoother path to senior positions (Crump et al, 2007). There is some evidence that characteristics generally associated with males are usually valued higher than those associated with females (Adam et al, 2004). Adam et al. argue that many quantitative studies view gender as a distinct variable that is used to emphasize male and female characteristics and have identified gender differences as variables that are "fixed and probably biological" (2004, p.228). This leads to the view that gender differences are a given and reinforces the stereotypes that exist. "Statistical studies, which cite gender differences can be analyzed endlessly, but at some point one needs to consider the deeper, underlying reasons for women's absence from the technical sphere" (Adam et al, 2004, p229).

2.3 The theory of individual differences

Both previous theories view gender and technology as fixed variables and as such, assume that women in IT, as a group, are different from men in IT. Regardless of whether this difference is for social, cultural or psychological reasons, there seems to be a gap in the theoretical options that are available to examine gender and IT (Trauth et al, 2004). In an alternative theory, the Theory of Individual Differences, Trauth et al. (2004) draw on previous research on gender and IT, investigation of the skills and knowledge of IT workers, and from psychological literature on individual differences. The theory "looks at men and women as individuals, who experience a

range of different socio-cultural influences which shape their inclination to participate in IT in a variety of ways" (Trauth et al, 2004, p.116). In a sense, this theory is a middle ground between essentialism and social constructivist theory and argues that factors that influence a woman's decision to enter into IT are a combination of personal characteristics and experiences. The theory calls for the need for an individual to be studied as part of their relations with other individuals and recognition that stereotypes can be perceived differently from person to person. It addresses the need to develop an alternative understanding of the way in which social shaping of gender and IT operates at an individual level using the key constructs given in Table 1.

Personal Data	Demographic Data	Age Ethnicity Gender Nationality Race Religion Sexual orientation
	Lifestyle Data	Children Family background Family work background Spouse/partner
	Workplace Data	Career characteristics Industry Job Title Technical Level Type of IT work
Shaping and Influencing Factors	Personal Characteristics	Education Interests & Abilities Personality traits IT identity Gender identity
	Personal Influences	Exposure to computing Educational experiences Life experiences Role models & mentors
Environmental Context	Cultural attitudes & values	Attitude towards women, women working, women working in IT Academic attitudes towards women (in general, IT) Workplace attitudes towards women (in general, IT)
	Geographic data	Location Population History
	Economic Data	Employment overall Information economy employment
	Policy Data	Relevant laws and policies

Table 1: Framework of the Theory of Individual Differences
Source: (Trauth et al, 2004)

The theory "focuses on the individual differences among women and how they relate to the needs and characteristics of IT work and the IT workplace" (Trauth et al, 2004, p.114). The original study also looked at the similarities among men and women as individuals, and determined that their individual experiences are the factors that shape their inclination to get involved in the IT industry (Trauth et al, 2004). This study builds on the original empirical research into women's experiences to look at the experiences of both women and men within the industry and examines their perceptions of IT as a career for women.

3. Research method

Crump et al, (2007) suggest that further research involving both male and female IT professionals is required to enable comparison between individuals' perceptions and provide a broader view of the topic to aid better understanding of issues to be addressed. Previous studies

in this area have been largely quantitative and view gender as a variable to measure the differences between the sexes. Crump et al., argue that a qualitative study should "explore the social, cultural and political nature of education, training and work in relation to IS and gender." (2007, p.351). This study uses narrative inquiry to explore these issues within the Auckland region of New Zealand where over a third of NZ's population live and which is the dominant IT business centre. Narrative inquiry entails the documentation and analysis of a personal recital of facts relating to the narrator. Hunter & Tan (2001) previously used this method to examine career paths of IT professionals and it resonates with Trauth et al.'s (2004) recognition of individuals' experiences as key to understanding their actions. The interview techniques used in this method allows the interviewee freedom to express their viewpoint, yet gives the researcher a basis and structure that allows for some consistency (Hunter, 2007). "The narrative inquiry approach facilitates documenting stories that are contextually rich and temporally bounded" (Hunter, 2007, p.7). Interviews were conducted with 6 male and 6 female IT professionals and addressed the participants' current roles in IT based around the 10 years of working history that led up to their role in the industry today. Questions were developed from themes that had been previously developed by Hunter (2006) and informed by the conceptual framework of Individual Differences (Table 1). An iterative cycle of analysis enabled a refining of themes that are presented with the key headings from the Theory of Individual Differences.

4. The narratives

The findings from the interviews follow the concepts of the Individual Differences Theory framework where personal data is followed by influencing factors and the context of the IT industry that includes cultural attitudes and values as well as economic factors.

4.1 Personal data

The interviews began with participants prompted to share their personal history, education, and previous work experience. All 12 participants currently work within the IT industry in Auckland where their positions range from senior level management to mid-level IT professionals. Table 2 gives details of their employment background and gender.

Participant	Organisation	Position	Gender
Participant one	Large IT organisation	CIO	Male
Participant two	Large IT organisation	Team leader	Female
Participant three	Medium IT organisation	CEO	Male
Participant four	Large IT organization	Managing Director	Female
Participant five	Various organisations	IT professional	Male
Participant six	Large IT dept	IT professional	Female
Participant seven	Large IT dept	Project Manager	Male
Participant eight	Various organisations	IT professional	Male
Participant nine	Large IT dept	CIO	Female
Participant ten	Large IT dept	Team leader	Male
Participant eleven	Large IT dept	IT professional	Female
Participant twelve	Large IT dept	IT professional	Female

Table 2: Interview Participant List

Eight of the participants have a university degree, with four studying in a field relating to IT (Telecommunications, IT, Science and Technology). These four were the only participants to 'choose' IT as a career, while the other eight 'got into IT by accident'. All interviewees take part in ongoing training as part of their career. This training includes leadership and technical training as well as sales or marketing courses. Some continued on with university study after they had started in their career in the IT industry. Of the 12 participants interviewed, 8 were born and raised in New Zealand. While the other 4 participants were born overseas, they have all been in New Zealand for a period of 5 years or more.

4.2. Influencing factors and achievements

Following the narrative about personal data, the interviewee was guided to focus on the issues that influenced their career in IT. They were also encouraged to describe the highlights of their career and any major accomplishments they had achieved.

4.2.1 The gender balance in the IT industry

All participants related concerns about the low representation of women in IT. All the men regretted the lack of women in the industry with one example cited of an organisation with 3 women out of 100 employees. Another male believed a gender-balanced workplace is better focused with more efficient and effective teamwork. While the women participants also recognised the imbalance, comments focused on the need for women to get used to being a minority in IT rather than the potential contribution that women could make. For women science graduates, the minority status was well established and they appeared to appreciate the added visibility that it gave them.

4.2.2 Knowledge, skills and opportunities

The men interviewed were very positive about the level of women's skills, and while there was general consensus that women had better softer skills, there were several corroborating comments that it was the concept of technology as a male skill that was more powerful than the reality. Women were deemed to choose the less technical route because they do not like the '*geeky stuff'* and are actually better at project manager roles because they had better multitasking skills, a view also expounded by two of the women. Overall, women saw skills as an issue only when it came to keeping up to date with technology during a career break to have a family.

Eight interviewees mentioned people who influenced their move into IT and 3 specifically identified a mentor who directly affected their choice of IT as a career. When prompted about highlights or accomplishments, participants' answers ranged from the excitement of rising to challenges such as building a small business into a global organization to growing leadership skills. Half of the women did not respond to the prompt, which may reflect the literature that suggests that women are not confident of their achievements within the workplace (Hargittai & Shafer, 2006). Many women commented that being the only female "*in a bunch of male CVs*" was a definite advantage, as more recruiters in the industry were looking for females to balance work teams. One man felt that some women may not be comfortable working in a team as the only female as they might not be taken seriously, or fear rejection when trying to establish a career. This view was contradicted by 3 of the women. Generally, women felt they were being selected on their skill, that gender did not play a role, and that IT offered variety and unexpected

roles that opened up new opportunities. The women enjoyed the intellectual challenges and flexibility offered by a career in IT.

4.2.3 Perception of the industry

Participants expressed concern that the public's preconceived notions of a career in IT are seriously flawed. This raised barriers not only to recruiting women but to overall recruitment levels. One female remarked "*it's a big problem, the perception of what people think a career in IT means".* Another said "*we need to be clearer about the industry. Women are more interested in the outcome and what kind of difference they can make.*" This was reinforced by a third female who believes that the industry's image needs to promote the difference IT makes to society and if people "*can see how IT can fit into something that is exciting, what you can do with it, the places you can go. That is a big part that people miss*". All but one interviewee reflected on their perceptions of working in the industry as exciting, flexible, "*kind of sexy*" with lots of really interesting possibilities. As technology is changing very fast the job can be stressful but this added a fascination to the work and participants were both amused and concerned at the negative image that the IT industry projects. These negative images included terms such as *boring, limited, geeky, unsociable,* and *stressful*. There was also comment that the IT industry did not have a recognisable structure that enabled younger people to identify career paths.

4.3 Environmental context

In discussing aspects of the IT environment, participants tended to be positive in their attitudes to the work and to male and female colleague. Almost every participant recommended '*getting into IT*' and enjoyed their jobs despite the long hours and stress. The industry needed to convey to young people the benefits of being involved in IT and how exciting it can be and '*there were not enough people driving that message home'*. Participants mentioned the '*people aspect'* of their jobs and how common the misconceptions are that IT is only computers. They believe that IT provides flexibility, challenges your mind, and there are always new problems to think through and solve. There is lots of potential for "*going up fast"* and the women particularly remarked on the environment of constant change and excitement, the new challenges, and the opportunity to learn new things and to travel.

However, observations on the environment of the IT industry in NZ were more critical. Businesses are seen to have a culture of perceiving IT as a cost reduction exercise that lowers the status of IT professionals. The failure to see IT at a higher conceptual level led to little understanding of how to use it for strategic advantage, leading to a lag behind the rest of the world. The structure of NZ business is traditional with, for example, more women as human resource managers than IT professionals and there was comment that few women are pushing for larger leadership roles. As in other parts of the world, women are taking up law and medicine in increasing numbers and this was attributed to these careers being very well defined. IT did not have the same status as a career, which was felt to be important to women. Participants were not able to suggest ways of increasing the recruitment of women to IT in NZ although it was stated that '*more women should be applying and would be successful if they did'*.

In discussing the future of IT, there was considerable agreement in participants' view of the future IT, with no comments relating to gender. Perceptions were based around the need for a clearer definition of what IT as a career means. Although one participant saw it as '*a dying*

profession', with work becoming more focused on specialist businesses, another felt that the situation would not really change as technology offered viable solutions for businesses.

5. Discussion – Is Gender Really an Issue?

The differences between male and female views in this study are sometimes quite stark. For example, women focused on the great opportunities and challenges available for establishing an IT career. In contrast male participants thought women may not want to get into IT because of the perceived lack of equal opportunity and '*they may feel they don't get equal opportunities, so don't even try*'. In earlier research women reportedly saw themselves as 'undervalued' (Von Hellens and Nielsen, 2001), but in this study it was the men who articulated this concern about women. Nevertheless, participants were positive about IT as a career and lamented the lack of women in the recruitment pool, although for individual women this could be an advantage. In contrast the men wanted more women involved, but felt that they may have a perception that they were a '*bunch of smelly guys with no social skills, who talked about cars all day*' and might not be comfortable in this environment.

As in other studies, interviewees tended to identify certain roles as either 'male' or 'female' (Crump et al. 2007). This was not necessarily a negative view, but rather a recognition of different inherent skills, which underpins the key concept of the essentialist theory. Comments referred to the less technical background of women and that females choose and are better suited to less technical roles. One male noted '*there are fewer women in the infrastructure side than in programming*'. Another that '*not many women seem to have a good technical background'*, and added that this was a disadvantage in the industry because '*the best practitioners have that technical base*'. It should be noted that the men tended to have a more technical education and if considered through the lens of the theory of individual differences, there are equally strong arguments that the lack of 'technical fit' may arise from early individual experiences. Again, the many comments regarding women being better at multitasking and soft skills may arise from socio-cultural influences that have not been identified in this research.

Another identified gendered theme was the perceived obligation for women to choose between children and their profession. This either/or choice tended to be a male view while women focused on disadvantages of a career break rather than a choice between family and career. This perhaps indicates that men adhere to the view that child raising remains a female responsibility. While gender roles still seem to exist within middle to senior management of the IT profession in New Zealand these roles did not carry negative connotations and there was a positive belief that men and women worked well together in the industry. The men believed that women brought workplace improvements in terms of better teamwork, more focus and greater efficiencies. There was some consensus from the women that females need to be stronger, to have drive and understanding, and that '*if you are out for something easy, you won't be able to cope*'.

A strong theme to emerge was the importance of being mentored in early career and of the value of role models in making career decisions. Three quarters of the participants identified the presence of a key person in their individual careers and while the need for mentors is well documented as a driver for overcoming misconceptions and encouraging women into IT careers (Trauth, 2002), it appears to be equally of value to men. Role models help overcome the lack of clarity around career opportunities in IT, which deters women from choosing IT as a career and

reflects the preconceived notions that girls have of the 'geek' culture of IT as identified by Anderson et al (2006). The women interviewed were particularly strong in this view as they felt that '*women are more interested in the outcome* [of their work] *and what kind of difference they can make*' and that women do not realise the '*amazing value they can offer to IT*'. The future of the IT industry raised concerns with several participants, particularly as NZ was seen to be behind '*the rest of the world'*, in both technology and in how businesses use and value technology.

6. Conclusions

Using the Individual Differences Theory as a basis on which to consider the narratives of men and women in the IT profession it was possible to see that factors that influence participants are as varied as the experiences themselves. This emphasises the importance on focusing on "the individual differences among women and how they relate to the needs and characteristics of IT work and the IT workplace" (Trauth et al, 2004, p.114). However, despite the very positive view of IT as a career for women, there remains significant evidence of a gendered perception of roles within the industry. IT workers still adhere to stereotypical assumptions that men and women have different strengths. Participants agreed that women have better multi-tasking and soft skills, while men have better technical skills, but no-one posited the idea that differences may result from social, educational or early, individual experiences. While this perhaps indicates the power of the essentialist theory of gender identity, this finding does not reflect the actions and perceptions of self as encountered in the interviews. There is a contradiction in the perceptions, for example, of a female CIO who identifies traditionally female constructs in a discussion on women in IT while at the same time holds an executive role in a global IT firm. This appears to reflect the depth of cultural beliefs in gender stereotyping that persists even into an individual's professional role that contradicts that very stereotype.

Another significant factor is the women's attitudes. There were many positive comments regarding the benefits of a balanced workforce, and women interviewees did not report discrimination in the workplace. On the contrary, they felt they had higher visibility than their male colleagues when it came to career opportunities. However, the study participants believed that women outside the IT industry perceived it as male dominated, difficult and unsociable. It is noteworthy that the women in the study were slower to identify their successes and were more reticent about how they had met challenges and aimed for promotion. This lack of confidence to self promote may again be deeply ingrained in the cultural inheritance of the women despite their identifiable successes in their own careers.

Finally, this study found many concerns about the ongoing misconceptions of the IT industry with no consensus in the wider population as to what working as an IT professional really means in terms of tasks, roles and skills. Further research is strongly encouraged to examine exactly how IT is seen in society to allow for a more coherent image to be projected and promoted. This would have a twofold benefit. Research outcomes could be used as a platform for provoking greater examination and development of more structured and varied industry career paths by IT professional bodies. Such studies would also be useful in supporting the design and delivery of more appropriate educational courses at secondary and tertiary levels that could be effectively

marketed to overcome the negative, uninformed perceptions that currently exist in much of the education sector.

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