Women choose IT study but where is the support?

Alison Hunter
Manukau Institute of Technology, New Zealand
ahunter@manukau.ac.nz

Raewyn Boersen
Facilitas, New Zealand
raewyn.boersen@gmail.com


Abstract

This paper reports the narratives of a small group of women studying IT in a large urban polytechnic in New Zealand. The study examined the influences contributing to the women's choice of study, the women's perceptions of the benefits of IT study and their views regarding reasons for women being under-represented in IT. Based on an assumption that women choosing a male dominated field of study could experience challenges such as negativity or isolation, we also investigated the emotional support the women received for their choice. Findings regarding the first three matters were in accord with results from studies conducted elsewhere, but findings regarding the emotional support the women received for choosing to study IT were surprising. The majority of women had experienced negative reactions from friends and family which meant they needed courage to pursue their chosen study path.

Keywords

women, study, career, support

1. Introduction

This paper reports on a study conducted in 2015 that investigated the experiences and perceptions of a group of women studying toward an IT qualification in a large urban polytechnic in New Zealand. A similar investigation was conducted in 2014 with a different group of women and findings from that study were reported in Hunter and Boersen (2015). The purpose of these studies has been to try to determine how more women may be encouraged to choose to pursue a career in IT, given the ongoing under-representation of women in New Zealand's IT industry. A brief summary of findings from the 2014 study is included in Section 2.1 below for comparison purposes.

2. Context and Literature

Two marked features of New Zealand's IT industry are that women have always been in the minority and that roles within the industry are significantly segregated by gender (Hunter, 2012). Beardon (1985) noted that in the 1970s and early 1980s women working in the IT industry were most often employed in lower status positions or given work that men had abandoned: "Jobs have been deskilled down to the level where women are allowed to do them" (p. 115). Forty years later, similar under-
representation and segregation still exists. For example, in 2013 67% of database administrators and 60% of ICT trainers were women, whereas only 10% of software engineers were women (Statistics New Zealand, 2014).

Comparable under-representation of women is noticeable in IT programmes provided by tertiary institutions. For instance, of the 9670 domestic students studying towards an IT bachelor degree in 2015, 24% were women (Education Counts Statistics, 2016b) and in the same year only 20% of bachelor degrees in IT were awarded to women (Education Counts Statistics, 2016a). Very similar proportions were recorded in 2015 for women studying towards, or completing, diplomas in IT (Levels 5 to 7) (Education Counts Statistics, 2016a, 2016b).

There have been many efforts over the last 20 or so years to address the disproportionately low numbers of women in IT study and work. Much of the focus has been on enlisting teenage girls about IT, so that on leaving school they will study IT and eventually work in the IT industry. Many interventions with this purpose have been established, for example the Programming Challenge for Girls, ShadowTech Day, and DigiGirlz. These interventions use a variety of methods to showcase the attractiveness of IT careers and engage younger girls in IT.

However many women studying IT are not school leavers. In 2015, only 18% of the women studying towards a bachelor degree in IT were aged under 20 (Education Counts Statistics, 2016b). These women appear to be following a traditional pathway from school into the industry. But in comparison, 30% of the women were aged 25 or more (including 9% aged 40 plus) (Education Counts Statistics, 2016b), indicating that there is considerable interest in an IT career from non-school leavers. These are women following a "non-traditional" pathway into an IT career (Ballard, Scales, & Edwards, 2006). They will have a variety of backgrounds; some will be mothers, some will have qualifications and/or work experience in other fields, and others may have never studied or been in paid employment before. Valenduc's (2011) term "postponed entry paths" identified three such non-traditional pathways into IT work: from being unemployed, from taking a career break, or by opting for a career change. It is common for women to take up IT work via non-traditional pathways (Barker & Aspray, 2006), including in New Zealand. For example, a study conducted by Crump, Logan, and McIlroy (2007) found that 47% of 70 women interviewed had entered New Zealand's IT industry through non-traditional pathways. As Ballard et al. (2006) have pointed out, women working in other fields have much to offer the IT industry and as such, they should be targeted in IT marketing and recruitment. We agreed with this observation in Hunter and Boersen (2015).

Regardless of the particular pathways taken, there are many attractive benefits available to women who choose an IT career. These include greater employability, a variety of interesting roles, attractive salaries, and opportunities to indulge a love of technology. But there are also recognised negative aspects. One of these is the difficulty of balancing family commitments with the demands of IT work (Eccles, 2013; Griffiths, Moore, & Richardson, 2007; Hunter, 2012). Some women interviewed in New Zealand expressed doubt that having children would be possible for them, given the demands of their work (Crump et al., 2007; Meyer, 2007), and in the UK, family commitments are thought to be one reason for the high number of women leaving the industry (Griffiths & Moore, 2010). Other negative aspects of IT work, often leading to women leaving the industry, include feeling under-appreciated, being over-looked for promotion, feeling alienated, having to continually prove their capability, and having their femininity questioned (Griffiths & Moore, 2010; Herman, 2011).

As minority participants in both IT work and study, girls and women are more likely to flourish if they have peer groups that are supportive of their interest in IT (Leaper, 2015). Peer groups such as classmates, friends, and colleagues are an important social influence; they both "inform and reinforce values" (Leaper, 2015, p. 169). When peer groups denigrate women's participation in IT (e.g. through stereotypical expectations or sexist comments), this can lead to girls choosing not to study IT or if they are already working, to women leaving the industry. Family also play an important role in either supporting or opposing a young woman's choice of IT as a career goal (Adya & Kaiser, 2005). In order for women to maintain belief in their chosen path and defuse any opposition, it is important for there to be suitable female role models and supportive programs available that affirm their choice (Leaper, 2015).

### 2.1 Findings from the 2014 Study
In 2014 we found that our participants had chosen IT study for mainly pragmatic reasons. Although they found learning about IT enjoyable and stimulating, their primary motivation was to enter a career that would provide a rewarding future for themselves and their families. The women recognised the rewards and opportunities a career in IT would offer them but they did not have well-defined career plans. In addition, the women believed (unrealistically, we argued) that they would be treated equitably in the IT industry and would be able to combine motherhood with work in flexible, work-from-home arrangements. As a result of this study we recommended in Hunter and Boersen (2015) that industry groups and educational institutions should specifically target adult women in their drives to recruit more IT professionals.

3. Research Questions

The aim of this research was to investigate in more detail than we had achieved in our 2014 study, reasons why women choose an IT career. Again we recruited a small cohort of female IT students and investigated factors that influenced them to choose this study path. We decided to focus on the women's perceptions regarding the benefits of an IT career, the emotional support the women received for their choice and their views as to why they have so few female student peers. This information could then be used to inform those who are responsible for recruiting women students into tertiary IT courses and an eventual career in the IT.

Our specific questions were:

- Who or what influenced the women's decision to study IT?
- What did the women perceive to be the benefits of studying IT?
- Who emotionally supported the women in their choice of study?
- What did the women believe were the reasons for there being so few other women studying IT?

4. Methodology

The study was conducted using semi-structured focus group interviews with women studying towards a level six diploma or bachelor degree in IT.

We selected a qualitative methodology as this would allow us to explore the personal experiences and perceptions that our participants might wish to share with us. Focus group interviews are considered appropriate for this purpose, particularly when there already exists some connection between the participants (Liamputtong & Ezzy, 2005) - as was the case in this instance. This methodology and our small sample size prevented any statistical analyses and also precludes any generalisation of results. Despite this, we believe that our findings will be of interest to organisations working to attract more women into IT careers.

4.1 Participants

All female students studying towards an IT level six diploma or degree, 37 in total, were invited to participate in the focus group and nine chose to do so. Some of the women were school leavers, and others were taking a "postponed entry path" (Valenduc, 2011) or "non-traditional path" (Ballard et al., 2006) towards an IT career.

4.2 Procedure - Ethics

Ethical approval for the study was obtained from the institution's Research Ethics Committee. The issue of a power relationship between the primary researcher and the participants was avoided by arranging for an independent person to undertake the ethical consent process and focus group facilitation. An independent transcriber was also employed.

4.3 Procedure - Focus Group

The focus group session ran for 1 hour 15 minutes, with refreshments offered to participants beforehand. Discussions were audio-recorded and the recording was later transcribed and anonymised.

4.4 Analysis
The transcriber provided us with a table clearly identifying the facilitator's questions and the participants' responses in columns 1 and 2 of the table respectively. This presented the data set in an easily readable format which allowed us to record coding decisions in subsequent columns.

Our analysis comprised a data-driven thematic analysis of the focus group recording. Thematic analysis is "a method for identifying, analysing and reporting patterns (themes) in the data" (Braun & Clarke, 2006, p. 79). It also typically involves interpretation beyond the surface meaning of data (Braun & Clarke, 2006).

Following the process recommended by Braun and Clarke (2006), we searched across the entire data set to generate initial codes by "coding interesting features of the data in a systematic fashion" (p. 87). We then rationalised these initial codes to identify a manageable number of themes that could be aligned with our research questions. For example, we decided that "Success at School" and "Career Information Sessions" could be classified as a theme "Influence of Secondary School"; a theme that related to our first research question.

Our final set of themes differed from those identified in 2014, as expected, given that we now had a different group of participants and more focused questions.

5. Findings and Discussion

In this section we present and discuss findings relating to our four research questions.

5.1 Influences on the Decision to Study IT

Our participants' narratives regarding their decision to study IT revealed several themes. These were not exclusive and often a number of factors influenced the women's decisions.

Passionate about IT

Most of the women reported being passionate about, or having an affinity with IT. They described their enjoyment of both learning and IT.

> I just intuitively can understand programs and so it just seems like a natural thing to ... go in to IT.

> I chose IT because I just love computers ...

> I was doing IT because I enjoyed it ...

> I'm someone who has always enjoyed learning ... and because IT is something that is always growing there is always something new to learn.

Having an interest in IT dated back many years for some women, but child-rearing and/or the need to earn delayed their study. Completing an IT qualification was unfinished business for these women. They were following a postponed entry path into IT.

> I decided I wanted to get into game development. I had thought about it over 20 years ago, but never really pursued it and I did web page programming 17 years ago, but I got pregnant ... so I never continued.

> I studied IT [in] about 2005 ... [but] I had another child on the way, and during that transition I decided to go back to work.

In comparison to our 2014 participants, these women expressed greater enjoyment of IT and did not express concern about the challenge of constant technological change.

Needing a new career

A desire for a career change was an important driver for some women, rather than an IT career specifically. IT was a serendipitously good choice for these women.

> Job was getting a bit stale, so I just decided to resign and go back to school.

> I was in a completely different field ... spent twenty years in it, decided I was getting a little bit too old ... so I decided to go and learn about computers.
Parental influence

Some younger women were influenced by their parents to study IT, even though they had not studied it at school. Again, it turned out to be a good choice.

I was actually pushed into it by my mum ... my mum said just go for it ... just give it a try, you never know you might like it ... [and] I do like it!

As a kid ... I’d always jump on the computer any chance I got, and just mess around ... like Microsoft paint and drawing squiggles ... I’d never done computer programming, anything really to do with computers academically ... but once I got here ... I knew that it was the right place ...

These narratives highlight the important role parents have in guiding their children towards careers. When recruiting students it would therefore be prudent to ensure that parents are given appropriate IT career information. This matter had not arisen in 2014.

A sensible choice

The fact that IT skills are a standard requirement for all jobs nowadays was another factor influencing some of the women to study IT. Their choice was pragmatic, with employment being the main goal. This theme was similarly raised in 2014.

I knew if I wanted to change into any job ... I would have to learn how to use a computer.

Going into any field ... understanding the basic computer would be something that you would have to learn...

Influence of secondary school

For some of the younger women, studying IT at tertiary level was a continuation of successful secondary study.

I chose IT because when I was in high school, I took IT from year nine to my last year ... I was good at it.

I did IT through all my years [at school].

Career information sessions were also influential for some younger women.

In my last year of high school I got so many presentations coming in from different businesses, IT and they were all saying they want women ... 

I came here [the technical institute] on open day ...

These narratives signal the importance of quality IT teaching in schools and industry and/or tertiary provider programmes encouraging secondary students to consider an IT career. This was another finding that had not surfaced in 2014.

5.2 Perceived Benefits of Studying IT

Responding to questions regarding the benefits they could expect from studying IT, our participants concentrated on the great opportunities the sector offers.

Great career opportunities

As we had found in 2014, our participants were aware that the IT industry provides many opportunities. They were confident they would get a job after graduating and could choose from many different roles. There would be opportunities to advance or even start their own business.

I heard that the IT industry was huge, and they were offering a lot of opportunities out there for women ... when we finish studying we’ll get a job straight away.

Maybe just having a lot of opportunities instead of just having one job, there’s so many jobs you get to choose.

When I heard that there are so many opportunities out there ... I was like
okay, this is really good ... I can actually be successful in this and move up in the workplace ... In IT you know the demand is there.

When I was reading about the degree I thought ... so this can take you somewhere ... I could go straight into the IT industry or if I want to go somewhere else and I have the skills ... I'm secure.

I actually want to start my own business.

The facilitator noticed that there were some factors the women had not mentioned; for example, attractive salaries are often cited as a drawcard into the industry. She therefore asked them: "What about money"? Responses indicated that the women were well aware of the attractiveness of IT salaries in comparison to other careers.

I mean I wanted to be a teacher so... (laughs)... I mean really ...

I come from hospitality so..... (laughs)

The facilitator also noticed that the women had not mentioned the impact of family on IT work, and so asked: "Did anyone think about having a family - could you continue to work in IT if you had a family"? Some of the women already had older children, but for others it appeared that the possible impact of having a family was something they had either not considered or were not concerned about in relation to IT work. In comparison, some of the women in 2014 thought that the IT industry offered widespread work from home opportunities for mothers.

5.3 Emotional Support for Choice

Given that by choosing to study IT our participants had decided something very different to most other women, we proposed that it would be important for them to be emotionally supported in their choice. This was a matter we had not addressed in 2014.

The women first indicated that to choose IT required a certain amount of courage; for example, courage to confront the predominance of men in the industry:

Having that courage to step up and decide that, yep, I know this is a man lead industry but I want to go in there anyway ...

To choose IT at a vulnerable time in a teenage girls' life also took courage:

With all the insecurities and stuff girls especially are having in high school, at that point where you're deciding what you want to do with your life ... [it's] a really big thing when you're ... going out there and making themselves more obvious.

This comment reflected the vulnerability teenage girls may feel by not conforming to peer group expectations. As Leaper (2015) has explained, girls "may experience rejection and hostility from their peers" if their choices conflict with the values of the "in-group" (p. 168). A certain toughness is required to withstand this rejection.

When asked specifically about the support they received for their choice of IT study, our participants spoke about class mates, family and friends, and other women.

Class mates

In the classes these women attend there is typically a marked gender imbalance, with (mainly young) men comprising at least 80% of the class. For the younger women in particular, the men could be patronising and over-confident.

Some of the guys come up to me and be like, "hey, do you need some help with this, I can do this, let me show you how". I notice that they don't go around to any of the other people ... and do that ... I always found that annoying, because I've noticed I'm just as good ... as they are ...

We would do some assignments and then all the boys would put us [women] down ... and next thing you know we'll get the highest mark in the class.

The impact of these comments was to undermine a woman's confidence.

The guys have a very casual way about dealing with things, like oh this is so
However, in contrast the older women were more confident and did not find their male classmates to be unsupportive. Their confidence was not undermined by accepting help from men.

If I need help the guys are usually pretty good ... there's more than enough of them to ask and they are usually all pretty supportive and helpful ...

I found them very helpful ... I don't know if it's an age thing that they kind of, you know, the old person is in the room so let's go help her...

It is understandable that many young men may relate differently to young women than to older women (and vice versa). It is also not surprising that younger women could find it more difficult to assert themselves in a male dominated classroom.

**Friends and family**

Some of the women had friends and family who, although surprised when told of the woman's choice to study IT, were positive and supportive.

I got a lot of "what are you doing that for", but not in the negative sense. It was [that's] "amazing, awesome, well done, good for you".

My friends ... were like "damn you're brave ... you'll be good at it" ... No one was negative.

My friends ... were all very encouraging and I actually get them asking how am I getting on. So yeah very encouraging.

However most of the women had friends or family who were at best indifferent and at worst unsupportive of their choice. Reactions these women experienced included put-downs, family disruption, and stereotypical comments.

My family weren't [supportive], my family were so judgmental. I don't talk to half of them now ...

My brother came back and says oh what do you want do that for, what can you offer IT...

[My friends were saying] ... business is more men, why do you want to go in there while in nursing there aren't many men ...

They looked at me and ... they were telling me, oh I thought you weren't a geek...

A lot of my friends ... were kind of just like what are you doing, why are you going there. But I mean I enjoyed IT so it didn't really bother me, but they were just ... they weren't negative about it, but they were kind of just like neutral, they weren't overly happy about it...

I didn't tell a lot of people ... I just say I'm studying IT, they're like, oh wow IT, but it's like you get a sense, oh you're sticking to your stereotype, well done.

Some of the women reported feeling that they could not tell their friends about their decision to study IT.

I didn't tell them [my friends] because they all have babies ... I just told my family and they were, oh what a geek; that was it.

I haven't told any of my friends ... [Why not?] Because they'll probably mock...

At this point the facilitator commented that the older women seemed less challenged than the younger women; they could be more open about their choice, whereas the younger women seemed to be more wary. Two of the older women responded:

Because when you get to our age you don't give a crap what people think.

I don't care, I do me...
Several women explained the situation, reintroducing the issue of vulnerability and conformity to peer group expectations.

*It's because young people nowadays, it's all about acceptance, I want to be accepted by my friends, I want to be accepted by society and do something that's cool.*

I want to be in the know; I don't want to be outside.

*But at the end of the day, you have to know that being out of that, being outside of that herd is what's going to get you the opportunities, that's going to get you the better jobs.*

**Support from other women**

The importance of women supporting each other in their choice to study IT was also raised. Women can gain confidence from female peers and role models.

*I have a friend ... they had an open day for engineering ... I saw she was the only girl in the entire engineering paper, so I was like, you know, if she can do it, if she can stand out, I can do it too.*

*I think it's just super important for women to [find] strength within other women, so actually get together with these things. It's just so important nowadays because women are so doubtful that they can do it and if there's a man doing it, oh they don't need me ... it's like you know just help your fellow sisters, we can see more women in the IT field.*

The findings in section 5.3 were largely unforeseen. Although we expected the women to have mixed experiences with their male classmates, we did not anticipate the almost complete lack of support from friends and family that most of our participants experienced. The findings revealed women experiencing rejection, mockery, disbelief and family disruption, and this resulted in them feeling unable to share significant life decisions. Many of our participants made the decision to study IT in the absence of emotional support.

**5.4 Reasons for so few women studying IT**

The women offered several suggestions regarding the low numbers of women studying IT.

**IT is difficult**

Some of the women suggested that IT is generally thought to be difficult.

*I think there's the perception that it's hard.*

*So many of our friends go, oh, you're in IT, that's seriously hard.*

Whether these comments refer to IT being considered "too hard" for women in particular was not clear. If IT is considered to be "hard", then women who lack confidence in their abilities are likely to forego an IT career. On the other hand, women who succeed in IT could experience a confidence boost and pride in their achievement, if IT is regarded as being difficult.

**Femininity and stereotypes**

The women were also aware of common views relating to femininity and stereotypical expectations of suitable occupations for women.

*It's not a very feminine field.*

*Women not expected to be good at it.*

*You expect IT people to be men.*

Perceptions that IT is somehow unfeminine could be counteracted by more publicity about, and celebration of the many women flourishing in the industry.

**Teacher influence**
Teachers were also recognised as being in a powerful position to influence students. Any negative comments can put women off pursuing IT. As one participant reported:

> *When I was in high school I wanted to do the programming class ... I went and talked to the head teacher ... I'd like to do the internet technologies class. "Oh you mean the business management, word processing?" And I'm like no, I have the algebra qualifications listed in the course requirements, I want to learn how to do coding. "Oh, it's really hard"... So in the end I didn't do it, because ... if you don't expect me to do well and you don't want to encourage me...*

Any reinforcement by teachers of stereotypes that discourage girls from pursuing an IT career is clearly unacceptable, and is hopefully not common. Principals need to be aware of this possibility and school career advisors have a responsibility to ensure students are given appropriate career advice.

**IT is still (relatively) new**

The women also toyed with the idea that the lack of women in IT might be due to IT being a (relatively) new and fast-changing field that is not well understood.

> *It's considered to be new still...*

> *It's still in its infancy...*

That IT work is not widely understood has been argued by many scholars, for example see Hunter (2012) but this does not account for the under-representation of women in the field. However it does highlight the need for the IT industry and tertiary institutions to promote and explain the many facets of IT work more effectively, so as to encourage more students (male and female) to choose an IT career.

Our participants in 2014 had somewhat different suggestions regarding the low numbers of women studying IT, but women's lack of confidence with IT and schools discouraging girls from pursuing IT were mentioned by both focus groups.

**6. Conclusions**

The women in this study comprised two broad groups. Some of the younger women had not long finished school, while the more mature women had previously worked in other fields and/or raised children. Many of the women chose to study IT because they were passionate about IT and enjoyed learning, and others who had been focussed on employment rather than IT work specifically, found that their choice of IT was a serendipitously rewarding one. Parents and positive school experiences were also influential in some of the younger women's choice of study. Targeting parents with IT career information would therefore be advisable, in addition to ensuring quality IT programmes in schools.

The women were aware that the IT industry offers many opportunities. They believed that it would be easy to get a job after graduating and were mindful of the many different IT roles available. They also felt that there would be opportunities to advance in an IT career and/or start one's own business. Although the attractiveness of IT salaries was understood by some of the women, this was not identified as a factor influencing their choice. The potential impact IT work on motherhood was not a factor the younger women seem to have considered.

With regards reasons for there being so few women choosing an IT career, our participants offered four suggestions: that IT is considered to be "hard", a perception that to work in IT is unfeminine, that negative stereotypes held by some teachers put girls off IT, and finally, that there was a general lack of understanding of IT work. These are longstanding issues that need to be effectively addressed by the key parties aiming to attract more women (and men) into the IT industry.

The most noteworthy finding of this study was that the women received very little emotional support for their choice to study IT. Many experienced negative, sometimes even derisive comments from friends and family, and others, perhaps expecting that might happen, did not tell anyone about their decision to study IT. Many of the younger women needed courage to choose a career option very different to that of their peers at a time in their lives when they felt a need to conform to peer group norms. The more mature women were more resilient and found it easier to dismiss negative reactions to their choice of IT. For all the women, choosing IT study
negatively affected their personal relationships to a certain degree. It is therefore not surprising that these women valued the support they received from their fellow female students and that they recognised the importance of female role models for all women studying towards IT career.

We reiterate our previous recommendation (Hunter and Boersen, 2014) that mature women seeking a career change or returning to the workforce after child-rearing have much to offer the IT industry, and therefore should be specifically targeted in IT recruitment drives.

**References**


