L/Earning a Living: Practices and Recognition of
Women's On-the-Job Learning in the Information Technology Field

Shauna Butterwick and Kaela Jubas, University of British Columbia
Hong Zhu and Jen Liptrot, A Commitment to Training and Employment for Women

Introduction

The information technology (IT) field of both learning and work has been identified as central to the phenomenon of globalization, and has been subsequently investigated by researchers from different disciplinary approaches and perspectives. Across this research, a consistent observation is that, as it has taken hold in society and gained in status, the IT field has become increasingly, notably masculinized. Some feminist researchers have turned their attention to the gendered development of IT. Their studies have created awareness of the links between gender, IT, learning and work; however, they have tended to focus on women whose IT careers begin with formal IT-related post-secondary education, typically in computer science or engineering.

Our study, Women's Informal and Alternative Pathways to Jobs in the IT Sector, broadens the scholarship in this area. While much of the literature on gender and IT focuses on the niches seen as most central to this field – such as programming, software engineering, systems analysis, network administration and database development – we invited women working in a range of niches to participate in our study. Still relatively new and evolving rapidly, the IT field encompasses far more than that limited centre. Given their participation in the labour force and post-secondary education across industrialized countries, women are under-represented in the IT field, especially at its centre, as well as in the educational programs most associated with IT and most likely to lead to work at the centre of the field (Margolis & Fisher, 2002; Millar & Jagger, 2001; Turkle & Papert, 1990). Canadian research indicates that the women who do work in this field are most likely to be found in its wide peripheries (Habtu, 2003). With that in mind, we talked to women who were working as programmers, engineers, architects, analysts and network administrators, but we also talked to technical writers, librarians, secretaries and operations managers. We thought that they, too, had important stories to tell.

In this paper, we focus on stories of participants' informal learning. With the overall rise of credentialism, one sign of the highly individualized, market-driven approach encouraged by

neoliberal globalization, there are new questions about learning, both formal and informal: Where and how does learning happen? In an age of credentialism, how is uncredentialed knowledge conveyed by workers and recognized by employers? With the expansion and complexity of the IT field, how do workers know what they need to learn? In the IT field in particular, where so many female workers do not have formal credentials which seem related to their work, how does gender become amplified as a factor?

Putting the Pieces Together

Whether or not they had an IT-related credential of any sort, all participants discussed the importance of ongoing, informal learning. The rapid pace of change in the IT field makes such learning mandatory if technical knowledge and skills are going to be kept up-to-date. We see three ways in which this learning can be described: It is often, experiential, social and concrete.

Personal Experience

My second major strength is I learn very, very quickly, and I'm a self-learner. I don't require courses. I can learn and figure out what I need to do, through the internet or a book, whatever. Um, or my small circle of experts, which I utilize. (Brenda, Information and Technology Manager)

In some jobs, you know, some person would get a software program so I'd load it up, and then I'd play with it and figure out how to use it. So that happened. Sometimes, it was a combination of that and then I'd ask somebody, you know, some questions about how you did something and then they'd show me. (Melanie, Project Coordinator/Technical Writer)

Brenda and Melanie articulated a common understanding about the role of experience in their learning. The ability to learn as they go and to learn by doing was seen as crucial. The separation between learning and working falls away here, as learning becomes part of work and working contributes to their knowledge and skill base. Participants used images of playfulness, resourcefulness, creativity and sociability – all qualities which are not recorded on a resume, but

are valuable learning assets in an environment where knowledge and skills are here-today-gone-tomorrow.

Social Relations

My friends, my network, we all have this unwritten rule, if you discover something new, you have to share it. (Claire, Systems Analyst/Architect/ Programmer)

In the IT field, Claire is unique: With no IT-related credential, she has managed to build the knowledge, skills and reputation necessary to support a career in programming. Her social connections in the field, whether or not they share her workplace, are crucial supports in her learning and work achievements. Likewise, Melanie and Brenda, in their excerpts above, mentioned the importance of their networks in their learning.

Claire also mentioned a point that we have found very interesting: For several participants, part of the learning process extends to teaching. Participants felt good about contributing to the learning successes of their friends and co-workers. They also understood that, at some point, they would likely be the beneficiaries of such support. Their own knowledge and skills were solidified through the practice of teaching. Moreover, their own technical, work-related expertise – even in the absence of a formal credential – was affirmed when they taught others something new.

Some of the participants described working in a relatively solitary way, with few colleagues doing similar work in their workplaces. Networks often stretched beyond the workplace, to include people who had completed workshops, short courses or longer programs together, peers from former jobs, supportive supervisors or mentors and, for a few of the women we interviewed, organized IT-related networks or organizations. Sometimes, the workplace itself did foster social support and learning, as Elaine described:

Reading, my colleagues, our office is extremely open. We have no cubicles, no barriers. We have daily, weekly meetings where we talk about stuff and we're all sort of on the same page…. And I'm not afraid to ask people questions either. (Elaine, Account Manager/Web Designer)

Concrete Problems and Solutions

I would say I learned the most on my practicum.... I know it's...like the sense I got from the program I was in is that...this is the real world, you know...and actually it's not the real world. Like when you're learning it's a different thing then the real world.... (Marion, Network Support Coordinator)

Many participants, like Marion, expressed a preference for learning through concrete problem-solving exercises, rather than abstract, formula-driven exercises. The constant reiteration of this point by participants in our study is consistent with the findings from previous studies (Margolis & Fisher, 2002; Turkle & Papert, 1990). This was so for learning which occurred in the context of the workplace as well as courses or academic programs. Even participants, such as Carla, who had completed a formal IT-related credential thought that abstract knowledge might be helpful, but was not a replacement for experiential knowledge:

[L]earning what happens in the real world is very different then learning what happens in school and that's not to say...that I didn't get any value out of education...but...as I say.... Because the experience speaks volumes...reading a book and understanding it can help you but it's not like the experience. (Carla, Systems Administrator)

Predicting the Future: Knowing Now what You'll Need to Know Later

I guess the other thing is knowing enough about technology to know how to make wise decisions about the technology you want to focus on.... It can be hit or miss.... So you can limit yourself or enable yourself by the choices you make. So part of the education is knowing how to manage your career and knowing how to foresee enough in the future in order to enable you to make choices, how to recognize the direction technology might go and to see where your opportunities might be and see which ones are attractive to you. (H, Business Manager)

Because of the constant change in technology, the IT field requires more than ongoing learning; it also requires that workers try to predict what knowledge and skills will be in demand. Workers need to know today what they will need to know tomorrow. Of course, predictions are only best guesses. As the excerpt above suggests, there was a sense among some participants that learning mistakes in this field can have long-term costs. Although participants generally regarded the ongoing learning demands of the IT field as a welcome intellectual challenge that kept their jobs interesting and created constant opportunities, many acknowledged that the learning is also time-consuming and stressful.

The Politics of Learning and Recognition in the Workplace

While the learning discussed above tends to focus on identifying and developing technical IT-related knowledge and skills, there is a second kind of learning that is also ongoing for women working in the IT field. Typically overlooked, this learning is "informal and incidental, embedded in other activities, and tacit" (Foley, 2001, p. 85), but it is also "very powerful" (Foley, p. 72). Through this learning, participants have come to understand the immediate, intimate implications of issues such as gender and class relations, technology, and globalization.

Making a Name for Yourself
(When What Matters is the Initials that Follow the Name)

[Women] don't have the formal training, or they were hired into an admin position. But when an employer finds out that they have technical skills, then they use those skills, but still pay them the admin level of money. (R, Coordinator of an entrepreneurs project)

Within the IT field, as in the labour market more generally, women tend to work in lower-status positions or occupations and earn less money (Habtu, 2003; Millar & Jagger, 2001). A discourse of human capital development and credentialism supports the gender divisions within this field, because women are less likely than men to complete formal IT-related credentials.

As important as credentials are becoming, there are employers who recognize the value of experientially developed knowledge and skills. Carla, a Systems Administrator, talked about some employers' thoughts about this:

> *I was interviewing for jobs...and I can't tell you how many people who were hiring said to me, look at this stack of resumes here, I have 50, 60 resumes. They're all people who are so-called paper MSCEs, in other words, they have an MSCE, but they have no experience.... This one guy that I interviewed.... I remember he said to me...I won't even look at these. He goes, "Memorizing information in a book and going to pass the test means nothing when you're actually in there and you have to make a decision based on what you already know."*

Still, credentials are a growing concern, and the dilemma of conveying the depth and breadth of knowledge – often experientially developed – to potential employers is a common one for workers, including the participants in our study.

Dancing the Gender Jig

> *Make it more attractive for women? Yeah, busting up the old boys' network. I mean, it's still such an old boys' network, the domain of software. I mean, you go into a software company and the programming department is likely to be 80 per cent men. What do they joke about? They joke about, you know, they make offensive sexual comments. And, as a woman, you are, you end up being uncomfortable. But what can you say? You are completely in an environment where you...there isn't a space to say, "You know what,...I don't really like that." (Melanie, Project Coordinator/Technical Writer)*

Some of the participants in our study felt fortunate to be working in the IT field. Perceived as a new field, devoid of the sexism which has shaped more traditional fields of work and learning, IT might seem to hold greater promise and fewer barriers. Often, though, even formal IT-related credentials have not stopped traditional gender-based discrimination from

structuring the IT field in a similar way. Woodfield's (2000) account of her ethnographic study of a respected British high-tech firm notes that female IT workers are less likely than their male colleagues to be offered management responsibilities and job promotions, regardless of their credentials, skills and on-the-job performance. The generally masculine, often sexist social environment described by Melanie and other participants in our study clarifies just how pervasively gendered the field is.

We were fascinated by many participants' ability to articulate the complexities of gender, learning and recognition in the IT field, as they talked about the tensions which characterize contemporary learning and work, and the complicated responses that they had developed. During her interview, Esther talked about the expectations of long work hours, and how the tension between work and family life exemplifies these complications:

> *I don't think they're particularly good for anybody in practice a lot of the time,*
> *but I think that women are more realistic about balancing their work life, or more*
> *realistic and more demanding about the need to have a balanced work-life*
> *relationship. But with things like changes to the Employment Standards Act so*
> *that IT is exempt from overtime, I mean,…[it's] pretty hideous. It also tends to be*
> *a sector that has very poor benefits because after the, sort of, implosion of the*
> *field there are fewer large companies and what large companies are there are*
> *young…in the relative scheme of things. (Esther, Web Designer)*

The policy shift that Esther referred to – the removal of British Columbia workers classed as "high-tech" from Employment Standards legislation – was presented as gender-neutral even though it had profound, and profoundly gendered implications. Whenever possible, we talked women in their workplaces and, while many were pleasant and comfortable, we repeatedly saw or heard about some IT workplaces with showers and sleeping rooms. These amenities served the purposes of employers who expected workers to stay until the job was done, regardless of workers' non-work responsibilities and interests.

Coming to understand and deal with that potential, which for some participants was a reality of work, was another kind of learning for participants. Strategies and responses among participants who wanted to remain in the IT field and limit their exposure to its most unpleasant

aspects included moving out of the field's centre and into the periphery – as Melanie had done, going from a software development firm to the non-profit sector; starting a consulting business to regain control over daily work life; taking courses to bolster their confidence and credibility; deciding to thicken their psychic skins. For these participants, learning had certainly become part of work and work had become part of learning.

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Technology's positive impact on learning isn't discussed much, but it improves education in many ways for both students and teachers. School districts can adopt new technology knowing that they're making a sound investment in the future of their students. After all, technology's not going anywhere — it's a powerful asset in any modern classroom. Casey Brown is a high school French teacher with 19 years of classroom experience. She has a bachelor's degree in French Education and a master's degree in Education (Curriculum and Teacher Leadership). In her spare time, she enjoys traveling the world, writing, reading, and spending time with family. Learning tech skills in 2020? Here are 17 in-demand technologies to learn this year. Find out which skills are the highest paying, what these jobs entail, and the best way to get started. Learn more about the difference between AI and machine learning and what to do if you want a career in machine learning in this interview with CTO Allan Leinwand. For any company that collects customer information or deals with sensitive data of their own, keeping networks secure is paramount. When data breaches do happen, they can be big, newsworthy, and costly for the company to recover from. The number of data breaches increased by 50% in 2019, and companies famously hacked in the past include Sony, LinkedIn, Chipotle, and others. Dealing with the rapid expansion of the use of technology in higher education and widening student diversity, this fully updated and expanded edition includes new material on, for example, e-learning, lecturing to large groups, formative and summative assessment, and supervising research students. Part 1 examines teaching and supervising in higher education, focusing on a range of approaches and contexts. Part 3 considers approaches to demonstrating and enhancing practice. He publishes widely on teaching and learning in higher education, and is co-editor (with Joe Kyle) of Effective Learning and Teaching in Mathematics and its Applications, also published by Routledge. Information technology is a rapidly evolving field. No matter what industry you're looking into, most modern businesses need people with general skills and knowledge of how to support information technology activities in the workplace. With a Certificate III in Information, Digital Media and Technology (ICT30115), you can find work in the areas of technical support, network administration, web technologies software applications, and digital media and technologies. You could be employed in roles such as 2. Variety. One of the most exciting aspects of having a career in information technology is how it overlaps with so many industries. This means you can find work in just about any sector you like - the possibilities are endless. You might find yourself pursuing a Information Technology is the concept involving the development, maintenance, and use of computer systems, software, and networks for the processing and distribution of data. Often in the context of a business or other enterprise. IT is considered to be a subset of information and communications technology (ICT). Machine Learning: This is a field of computer science that gives computer systems the ability to "learn" (i.e., progressively improve performance on a specific task) with data, without being explicitly programmed.