AGENTS OF CHANGE:
WOMEN CREATING WEB PAGES

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AGENTS OF CHANGE: WOMEN CREATING WEB PAGES

by

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Abstract

The Internet as a social phenomenon has only just begun to affect the everyday lives of individuals. Studies of women's use of personal computers suggest that women may be less likely than men to engage in Internet usage. Various surveys support the fact that there are currently more men than women using the Internet. While there are women who do not use the Internet there are also women who have become intensely engaged in it. Women who make intensive use of the Internet have been labelled as grrrls and their presence is particularly visible on the World Wide Web (WWW).

In an attempt to understand how the 1980s view of women as hesitant computer users gave way to the technologically competent grrrl image, this thesis examines the experiences of some of the women who create web pages, and the world of women web page designers. Findings address who these women are, how they learned to create web pages, and their experiences as WWW page designers.

Clement and Shade's (1996) access rainbow, which addresses the social and technical factors needed to access the Internet, and actor network theory which looks at the translation of power between humans and non-humans (e.g. machines), provide a theoretical and political context for the investigation.

Perceptions about the visibility of gender on the Internet emerged from the sixty-seven participant responses to an on-line survey. These perceptions have been categorized as women

as agents of inequality (women who see gender as inescapable on the Internet) and women as agents of choice (women who see gender as an individual choice on the Internet). Results suggest that these perceptions might be related to age.

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Chapter One: Introduction

1.1 Personal Background

In 1982, at age 16 I taught myself how to create a computer program using the computer language, BASIC. At age 18 my first full time job included the use of a computer. At 25, I used a personal computer for the first time to create an essay for a university course and my world changed. I had been familiar with computers for nearly ten years, but I had rarely encountered men using computers until I was 25. My first experience using a personal computer to write an essay was in a small university computing lab where I was the only woman. In this setting, when I used the computer I got the impression that I was invading male territory and that I had better behave or I would be kicked out. I am embarrassed to admit it now, but at the time, I typed as quietly as I possibly could because I did not want to disturb anyone or draw attention to myself. After nearly ten years using computers, I felt intimidated when I walked into this room full of men and technology.

Working in computer labs at both the University of Calgary as an undergraduate student and Memorial University of Newfoundland as a graduate student was intimidating. The primary problem at both universities was the manner in which the staff offered computer help. On several occasions when I requested help, the help desk person (typically a young man) would lean over in front of me and start typing on the keyboard without saying excuse me or asking me to move. Upon completing his task, he would just walk away without explaining what he had done or without giving me the opportunity to ask any further questions. This dismissal of

me as a computer user still leaves me furious.[1]

Part of my previous confidence around computers returned when my undergraduate women's studies class at the University of Calgary was taken into a computer lab to learn how to use electronic mail (e-mail).[2] The all woman setting, the professor (Dr. Barbara Crow) and the formal training session did me a world of good - I again felt like I had the right to be using computers. Through e-mail I found other women in cyberspace. I subscribed to an Internet women's group which was run from Sweden. The thought of being able to communicate with people all over the world was a heady experience. Suddenly the world as I knew it had expanded.

Soon after our e-mail course, the professor offered a workshop about how to navigate or surf the World Wide Web (WWW) and create web pages. At that time, Internet technology improved and users were given the ability to view not only text but pictures as well. When I discovered the ability to look at pictures as well as read information from around the world I became further enthralled with the WWW. The ability to create web pages was amazing. I finally understood what artists must feel when I could create something (web pages) using the computer - and boldly show it to the rest of the world.

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[1] I have also encountered computer help people at both universities who were very good. These people were generally older male full-time permanent employees rather than young male student workers.

[2] See glossary for definition of underlined words.

Through these classes at the University of Calgary I also learned how to find other women's web pages. The most memorable page I found was the geekgirl site (figure 1). The pictures and articles on this page were powerful in their representation of women and girls as daring technological experts. The original geekgirl page presented a picture of a 1920's

Figure 1. "Grrrls Need Modems" from the geekgirl web site. HTTP://www.geekgirl.com.au. Last visited November 24, 1998. Copyright geekgirl 1998. Reprinted with permission.

version of a young woman wearing a telephone operator headset with the words "grrrls need modems" circling the picture.[3] This web page and others like it label these women as grrrls,

[3] A definition of grrrls and modems can be found in the glossary.

subsequently announcing that it was normal for women and girls to be using and creating with, technology.

The grrrl image had a profound effect upon me, and I began to notice an increasing number of web sites that contributed to this image, such as the Cybergrrl, Nerdgirl and Barbiegrrl sites to name only a few. Inevitably each site also provided references or links to similar web sites. After visiting a number of these web sites, it became apparent to me that an informal grrrl network was emerging. Wakeford (1997) suggests that this on-line grrrl movement was a reflection of the musical and artistic grrrl movement of the time. She categorized the on-line grrrl movement in two ways: first as a "direct response to certain images of computing culture, and specific patterns of activities on the Web itself (such as the man who set up a page linking up pages of "Babes on the Web")" and second, with the use of words (e.g. grrrl instead of girl) as "codes to explicitly subvert the easy appropriation of women, and to resist stereotypes" (p. 60). The proliferation of women as grrrls on the WWW suggests that they have technical and cultural knowledge of the Internet, and are aware of the negative on-line stereotypes regarding women. I would suggest that it is the on-line coded subversive action (such as designing web pages) in response to female stereotypes, which makes women become grrrls.

Inspired by the positive grrrl image on the Internet, I shared my discovery with other women friends and colleagues. I encountered most of my friends and colleagues off-line in face-to-face discussions. Generally, with these women I would begin the conversation in person by

discussing a new web site I had discovered, or I would discuss a new way of using e-mail to communicate with other people. The responses from women off-line about the Internet were unexpected. I found that the majority of women I talked to about the WWW indicated that they were either uncomfortable with computers, were not computer literate or not techies. Implicit in many of these women's responses to my enthusiasm about the Internet were suggestions that computers and/or the Internet were too complicated for them to learn and that learning required skills and time that they did not have. The views of women who did not use the Internet were almost opposite to those women who did.

From my interactions with women about the Internet, I realized a difference in attitudes had emerged between women Internet users and non-users. Women or grrrls using the Internet generally depicted the Internet as fun and challenging. In contrast, the women not using the Internet saw it as a complex and sometimes overwhelming technical process. This contrast, when combined with my personal experience provided an opportunity for academic research about women using -- and creating content for -- the Internet.

1.2 Research Background - The Process of Discovery

Personal experience suggested that women who used the Internet viewed it differently than those women who did not use it. This difference informed the development of my research plan. Kirby and Mckenna (1989) state that relating the researcher's process of discovery is an important step in the final presentation of the research. The authors suggest that there are essential parts to presenting research, one of which is to describe the process of discovery.

According to Kirby and Mckenna, the process of discovery includes a) descriptions of the inception of the study and b) the conceptual frameworks invoked by the researcher (after which a discussion of the research plan, data collection and analysis takes place). Describing the inception of the study and the conceptual baggage invoked allows for two things according to Kirby and Mckenna (1989): demystification of the way in which knowledge is created, and an accounting for the experience of the researcher. In this instance, describing the entire research process affords the opportunity to see how the research process came about and the successes and failures inherent in the process. Describing my conceptual baggage fulfills Kirby and Mckenna's requirements by "accounting for the experience of the researcher in the research, of giving priority to the voices of the participants, of an egalitarian research process and of contextualizing the research" (Kirby and McKenna, 1989, p.21). In this section I will present the process of discovery I undertook in formulating my research questions. I will begin with a description of the inception of the study and continue throughout the thesis to discuss my own experiences as a way of contextualizing the research.

The Inception of the Study

Integrating my personal experience and conceptual baggage into a research strategy required a review of existing literature, theories and methodologies related to women's use of the Internet. During this review, I needed to formulate my research question and develop a plan for implementing and subsequently analysing the research. I began this process by searching for literature about women and the Internet.

Searching the Internet, in 1995, I discovered the University of Maryland's Women's Studies web site (HTTP://www.inform.umd.edu/EdRes/Topic/WomensStudies) which referenced (or linked) to only a few academic papers about women and the Internet.[4] While there were several self-published articles on the Internet, the printed and rigorously refereed academic materials about women's use of the Internet, were infrequent. At the time, most of the published material discussing women and the Internet could only be found in newspapers and magazines. And, the newspaper stories about women and the Internet tended to focus upon the bizarre happenings of women on-line. For example, the first article I ever came across on this topic was published February 3, 1996 in St. John's *The Evening Telegram* by the Associated Press (p.77). The headline ran "Husband's divorce lawsuit accuses wife of on-line adultery" a title which at the time seemed bizarre. I was finally able to find more relevant literature discussing women and the Internet in an issue of Herizons, a Canadian feminist magazine. Virtual sisterhood was the theme for this particular issue. In this issue were several articles about women and the Internet. Of special importance was an article by Crow and Tauscher (1995) which raised political issues about women's ability to access the Internet. It was the only newspaper or magazine article I encountered at the time which acknowledged that there were issues pertaining to women and the Internet. I was also fortunate to receive a copy of my

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[4] Since 1995, the amount of information about women and the Internet has rapidly increased, and the University of Maryland Women's Studies site is now one of the best web sites to find links to a variety of issues that pertain to women. The information is also updated frequently - a service that makes the information on the site even more useful.

thesis supervisor's dissertation (Balka, 1991) entitled Womantalk goes on-line: The use of computer networks in the context of feminist social change which provided valuable background information about the Internet and was one of the first in-depth academic discussions about feminism and computer networks.

In 1996, the Internet was still new to the public and little research had been done regarding women Internet users, so I expanded my search to include literature about women and computers.[5] Fortunately, there was an abundance of literature pertaining to women, computers and technology dating back to the introduction of the personal computer in the 1980s (Benston, 1983; Cockburn, 1983; Gutek & Bikson, 1985; Lockhead, 1985; Turkle, 1984; and Zimmerman, 1983). Generally, this literature suggested that women and girls were not using computers as much as boys and men and the reasons for the difference in use between men and women varied. Zimmerman (1983) warned women to be wary of technology lest it oppress them even further. Most of this literature about women and computers described women in negative relationships with computers in particular, and technology in general.

None of the literature positively described women in relation to computers or hinted at the fun, challenging grrrl attitude portrayed by women I had encountered while using the Internet. The absence of a dynamic and positive attitude toward women and computers in general made me question why the Internet was greeted so enthusiastically by many women Internet users. What had changed now that women were claiming technological competence on

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[5] Computers are generally the physical devices by which people access the Internet.

the Internet? These changes in women's interactions with computers in relation to the Internet, and gaps in information related to women's Internet use are the focus of this thesis.

It is important to investigate these differences in published literature and information about women and the Internet because changes or gaps in information and events are recognized as important starting points for methodological and theoretical enquiry. Star (1991) and Smith (1992) specifically address gaps in information as valid starting points from which to begin research. Star (1991), in a paper discussing actor network theory (ANT), suggests that research can be performed in areas which have not already been labelled. In other words, research is best performed at points where there are gaps in information or where an event or process has not yet been defined or studied.[6] Smith (1987) suggests that gaps are the starting point for methods of inquiries and defines these gaps as lines of fault, as the "actual or potential disjuncture between experiences and the forms in which experiences are socially expressed" (p. 50). Smith (1992) provides a relevant discussion for this research by stating that women's experience can be a point of methodological enquiry. She suggests that enquiry should be "directed towards exploring and explicating what she [women] does not know - the social relations and organization pervading her world but invisible in it" (p. 91). My own Internet experience and the gap in attitudes of women who use and do not use the Internet subsequently became the starting points for my research.

Researching gaps (or differences in information) can also influence the purpose of

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[6] I will deal with Star's concept further in the chapter on actor network theory.

research. Marshall and Rossman (1995) discuss the importance of creating a research strategy which includes defining the purpose of the research. The authors offer four often overlapping research purposes: to explore, to explain, to describe and to predict. In considering these rationales for research I realized that my research would have two purposes. First the research would be exploratory as it sought to "investigate little-understood phenomena" (Marshall & Rossman, 1995, p.41). The research would explore views of women's use of the Internet by women Internet users and how these women gained access to the traditionally male domain of technology. Second, this research would be descriptive: it would "document the phenomenon of interest" (Marshall & Rossman, 1995, p.41). I wanted to discover if the introduction of the Internet as a new technology, and in particular the programming or creation of web pages, had changed women's attitudes and perceptions of themselves in relation to their use of technology. I wanted to find out how in 1996, prior to the advent of easy to use WWW programming tools, women accessed computer resources, overcame any personal obstacles in using the WWW and how they developed the skill to use the technology that their counterparts off-line had seen as so intimidating. I wanted to find out if women creating web pages were consciously challenging the role of technology in women's lives as the grrrl images on the World Wide Web suggested. Defining this research as exploratory allowed me to acknowledge gaps in information regarding women and the Internet and to pursue unaddressed questions. Conducting descriptive research would allow me to document the processes women web page designers engaged in as they learned their design skills. Undertaking descriptive research

allowed me to further investigate gaps in information about women and the Internet by labelling "the salient behaviours, events, beliefs, attitudes, structures, and processes occurring in this phenomenon" (Marshall & Rossman, 1995, p.41). In this research I wanted to find out how women designing web pages had challenged and moved from the expectation of women off-line being intimidated by technology, to women who actively engage with the technology of the Internet to create web pages.

Conceptual Baggage

In formulating this research I also made assumptions about the women I wanted to research. I expected these women to be similar to the grrrl image I had encountered on web pages. I anticipated that the women I was studying enjoyed the challenge of technology, that they would recognize that women have not always had access to technology, and that they would be actively and sometimes politically challenging their role as women in relation to technology. I expected that women aligning themselves with the grrrl image would be on average in their twenties. As a researcher, I also believed that the women would accept me as one of the grrrls because I presented myself as a web page designer. Finally, I expected most of the participants to be self-taught designers and to be creating web pages for the creative enjoyment of it rather than as part of a job. These expectations combined with my previously defined research purposes lead me to formulate the following research questions.

1.3 Research Questions

- Who are the women designing WWW pages? What age are these women? What is their level of education? What was their computer background and training? How often

did they use the Internet? What was their computer work area like? Did they define themselves as web designers? Did the women believe barriers such as race, class and gender were present on the Internet and/or affected web page design?[7]

- How did these women learn to create WWW pages? How did these women access knowledge and training required to create web pages? What technology did the women use in creating web pages?

- What experiences did these women have during the process of creating WWW pages? What did women enjoy about creating web pages? What did they dislike? Why did these women begin creating web pages? Did these women collaborate for web page design? What design standards should be in place regarding web page design? What did participants think about their own design skills? Did creating web pages affect women's lives, particularly in relation to other technology?

1.4 Overview of Thesis

In this chapter I have introduced the process of discovery which lead me to research women, skill and web page design, and I have highlighted the difference in views held by women who use and who do not use the Internet. The contrasting views of women Internet and non Internet users has been a catalyst to this research. I outlined the grrrl image I discovered on web pages. This positive grrrl image challenged previous research and ideas about the role of women in relation to technology. Invoking the grrrl image, I discussed the absence of positive literature about women and computers and, the absence of literature analysing women and the Internet. I also engaged in a dialogue about the importance of 'gaps' as a valid focal point for

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[7] For the purpose of this thesis I define gender as an overlapping interplay of social behaviour (woman/man) and biology (female/male). Gender is an important issue for this thesis because technology has been historically seen as a male or man's domain and this thesis explores the process and experiences of women/females within this domain.

research. Preparing to research these gaps I defined the purpose of this work as exploratory and descriptive. I outlined three primary questions that will be addressed: who are the women designing web pages? how have they gained their skills? and what have their experiences been in the process of creating web pages? In the remainder of the thesis, these three questions will be addressed through a discussion of: theoretical influences that have shaped this research; accessing the Internet; research methodology; and a look at responses from 67 participants to an on-line survey.

Chapter two provides a vital discussion about the elements needed to access the Internet because assumptions are often made about the ease by which individuals gain access to the Internet. I introduce Clement and Shade's (1996) access rainbow, which says that there are seven multi-dimensional social and technical layers required to access the Internet, as part of a discussion about women web page designers. The use of the access rainbow in relation to women web pages designers gives possible insight into the processes by which women access the Internet and subsequently create web pages.

Chapter three expands upon a review of the existing literature pertaining to women and the Internet under the auspice of the social construction of technology. Introduced in this chapter is the idea that technology is not a neutral tool but instead has human values ascribed to it. Part of these human values inscribed in the technology are the generally negative assumptions made about women and technology. The access rainbow is reintroduced in this chapter to illustrate how assumptions about gender and technology can also affect access to

the Internet.

Chapter four presents a theoretical framework for this thesis. In this chapter I review Actor network theory (ANT). This theory presents a way of knowing the world including the interaction between humans and non-humans (e.g. machines). I present the two main ideas of ANT as they relate to this thesis: power as an effect and the agency of actors. I also introduce problems with ANT and I subsequently modify the theory for the purposes of this thesis. I conclude this chapter with a discussion of ANT and the networks of gender.

Research methodology used for this thesis is presented in chapter five. I begin the chapter with a look at the initially proposed research design and the sequence of events which lead to a change in the methodology. An on-line survey eventually became the primary instrument for data collection. I also discuss the procedure by which data was collected, ethical considerations, the analysis of the data and the strengths and weaknesses that come from a reliance on qualitative research and data.

Chapter six presents the results of the on-line survey. The results are then offered, in relation to the three main research questions, under four headings: the respondents; women creating WWW pages; learning to create web pages, and women's experiences during web page design. The most interesting results were found in relation to the age of the participants, their level of education, their perception of gender on the Internet and descriptions about their work environment.

Chapter seven offers a discussion of the results from chapter six, focussing specifically

upon the themes that emerged from the data. The themes which emerged relate to characteristics and tone of the participant's responses, perceptions about gender and the Internet, age and education and the relation of these variables to responses, personal disclosure and pride in technology, and learning to create web pages and the access rainbow. In this chapter I categorize participants as agents of inequality and agents of choice in response to a discussion about age and perception of gender on the Internet.

Chapter eight concludes with a review of the research and issues that emerged from the research. This chapter discusses the visibility of gender on the Internet, women web page designers as agents of inequality and agents of choice, issues related to working from the home and implications for future research.

Chapter Two: The Access Rainbow - Examining Pre-requisites for Internet Access

2.1 Introduction

Various elements are required to gain access to the Internet. This chapter examines the elements or pre-requisites needed to access the Internet - specifically, those elements that relate to women creating web pages. The elements or pre-requisites to Internet access are both social and technical. A discussion of social and technical elements for Internet access creates a model which enhances investigation into the topic of this thesis - to find out how women learn to create web pages. In this chapter I will introduce Clement and Shade's (1996) Access Rainbow which consists of the following seven layers: governance/policy; literacy/social facilitation; service providers; content/services; software tools; devices and carriage facilities. Using the access rainbow model I will also discuss issues pertaining to women who create web pages. I conclude the chapter by suggesting that the introduction of social factors into a technological equation presents a more complete account of the Internet.

2.2 The Access Rainbow

Clement and Shade's (1996) access rainbow facilitates discussions about Internet access for all citizens. Access to the Internet as a basic right for all citizens is referred to as universal access. Discussions about access to the Internet in Canada formally began with the

creation of the Information Highway Advisory Council (IHAC).[8] One of the recommendations from the IHAC (1995a) final report was that there should be "local availability of basic access facilities for the delivery of Information Highway services at reasonable cost, regardless of geographical location; equitable opportunity for all, including people with disabilities and groups with special needs, to access and use the Information Highway" (p. 170). And the IHAC (1995b) stated that "the Information Highway should allow us to address the differences in knowledge of, access to and use of new technologies within society, including the different realities of men and women" (p. 3). Access to the Internet, according to Clement and Shade (1996) has the potential to be defined in different ways by different stakeholders (such as industry, government and the general public). In response, the access rainbow conceptualizes a model of seven layers of social and technical elements that influence access to the Internet: governance/policy; literacy/social facilitation; service providers; content/services; software tools; devices and carriage facilities. I will discuss each of these layers as pre-requisites for access to the Internet.

The layers of the access rainbow are inter-related and flow from the broad social elements (governance) to the specific technical requirements for Internet access (carriage facilities). Governance/policy is the top most layer of the access rainbow. This layer is concerned with how the Internet is governed and the subsequent policies and procedures

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[8] Clement and Shade's access rainbow model emerged from discussions about access to the Internet in Canada. The IHAC was unique in that it acknowledged gender as an access issue.

implemented. Acceptance of the Internet by a governing body can substantially facilitate access to the Internet. I would also suggest that policies and procedures can affect norms and beliefs about the Internet, and vice versa. A discussion of social factors influencing pre-requisites for Internet access is important because policies, procedures, norms and beliefs can affect all other layers of the access rainbow.

Policies and procedures enacted by public and private institutions can have a direct effect upon access to the Internet. For example, the Internet began as a military emergency communications system in the 1960s (Rheingold, 1994). Global changes in policies and procedures, primarily implemented by the United States, have transformed the Internet from a military-based, to a research-based and finally to a commercially-based telecommunications system. For example, the decision by the United States Government to open up Internet access to business has globally changed Internet usage. When I first began using the Internet in 1993 there was no business advertising present on it. The Internet was primarily not-for-profit communication. In the early 1990s, the Acceptable Use Policy was modified by the United States Government to gradually allow businesses to make use of the National Science Foundations' computer network (NSFnet) (Balka 1997).[9] The change in the acceptable use policy created an environment that now supports and encourages business web pages. Today,

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[9] The acceptable use policy initially prohibited use of the Internet for commercial purposes. However in 1991, the National Research and Education Network (NREN) was established in the US to create a high speed education and research network, at the same time affecting the acceptable use policy by opening up the Internet for commercial use (December and Randall, 1994).

the creation of a web page has become almost mandatory for businesses, organizations and institutions. For example, web addresses for businesses generally end in .com and growth in this area has increased so much that it is often possible to guess the web address for businesses (e.g. IKEA's address is www.ikea.com). The demand from the business sector may have directly influenced the increasing number of web page designers. This demand for web page designers may have also played a part in motivating women to learn how to create web pages. The next layer in the access rainbow is literacy/social facilitation. This layer includes "the skills people need to take full advantage of information/communications facilities: basic literacy, numeracy, computer literacy, access to education and training, technical support, assistance from friends, colleagues, and neighbourhood 'experts'"(Clement and Shade, 1996, p.6). This section is the most crucial element pertaining to this research - to understand how women web page designers access the knowledge and support systems (formal and informal) required to learn to create web pages.

The skills required to use the Internet and create web pages involve first learning how to use computers. A computer can become a large paperweight if people do not know how to turn it on, how to use it or how to find help. Norman (1988) says computers are "an area where all the major difficulties of design can be found in profusion... designers of computer systems seem particularly oblivious to the needs of users" (p.177). In other words, using a computer is not always an intuitive or easy process. To a person who has little computer experience, the information and skill required to operate a computer can be overwhelming. Skill, especially as it

relates to technology, is a concept that is often taken for granted (Fleming, 1994). It is therefore important to be explicit about the skill and knowledge needed to use computers and the Internet.

The first and most basic level of computer skill is computer literacy. Computer literacy is the ability to retain a minimal knowledge about the functions of computer hardware, such as the location of the button that turns the computer on, or the realization that the CD-ROM drive is not in fact a built-in cup holder. Many jokes currently abound on the Internet about 'stupid users' and the ways in which they operate their computers. (One such joke tells of a computer user calling into a computer help line, and the computer support person discovering that the customer has been using the CD-ROM drive, which slides out when opened, as a cup holder.) The abundance of these 'stupid user' jokes implicitly emphasizes the complexity of knowledge needed to operate a computer. The fact that many of us find these jokes funny suggests that at some point in the past we have also made silly computer mistakes. It is the presence of these mistakes that solidifies the need for computer literacy.

Computer skill also involves, usually informally, learning and understanding computer concepts. These concepts include developing an understanding of how the computer hardware and software work together. Many years ago I used my first word processing software. I did not realise that I needed to save my work as a computer file. I just assumed that like a typewriter the words would remain permanently on the computer. It took me many tries to figure out why I could not find my writing on the computer and when I figured out that I

needed to save my file, my understanding of how computers worked deepened. This knowledge about computer concepts can also include understanding how peripheral hardware such as a printer or modem works in conjunction with the computer. Conflicts in computer hardware and software are quite common. Software and/or hardware from one manufacturer may not be compatible with that of another manufacturer. Understanding the interaction of hardware and software can be valuable when encountering computer problems.

Computer skill becomes more specialized as computer users determine the purpose of their interaction with the computer. This involves learning specific and sometimes complex software programs in order to perform tasks using word processing, spreadsheet, accounting, databases, multimedia or games software. To further complicate the learning process, all programs are slightly different from one another and require users to adapt every time they encounter new software. Larger computer software companies also contribute to this complexity by frequently releasing new versions or upgrades of their software in an attempt to create a newer and better product, and newer and bigger markets. The constant barrage of new computer technology also requires constant vigilance from the user to keep their computer skills up-to-date.

In addition to computer literacy, comprehension of computer concepts and specialization of computer skills are needed to access the Internet. The first Internet skill is learning how to connect to the Internet usually from work, school or home to a computer network (usually through an Information Service Provider, or ISP). Next one must learn how to

use a variety of Internet software such as e-mail software (e.g, Eudora) and World Wide Web browsers (e.g, Netscape). The third skill needed to successfully communicate using the Internet is an understanding of Internet culture such as learning *not* to send e-mail that was intended to be private to a public e-mail group.

Connecting to the Internet, using Internet software and communicating using the Internet becomes more sophisticated and specialized as users expand their Internet communication needs. For example, Ross (1996) researched the influence of computer skill upon a computer conferencing course. Results suggested that while most students encountered computer communication problems, those with weaker computer communication skills missed instructions, became discouraged and decreased their frequency of communications. As more services and methods of communication are offered via the Internet, and because the computer consumer market changes faster than most people can keep up with, access to knowledge and training become essential.

Access to knowledge about computers and training to acquire computer skills is problematic and involves issues of control over time and resources. Formal computer training is available but is usually costly. Informal training using books, magazines and other people is an option but can be overwhelming and confusing for the new or even experienced computer user. Help from other people can be unreliable (if you can find other people who are willing to help). The Internet is a wonderful resource for information but it is cumbersome to find specific and reliable information. The exception to the exception to these problems is the reliable work of

competent librarians. Formal or informal training is essential to learning how to access the Internet. However, access to knowledge and technology resources are predicated upon what society, individuals and networks of institutions deem important. Subsequently most new computer users are left sorely in need of computer help.

Service Providers (or ISPs) are the next layer in Clement and Shade's (1996) access rainbow. Service providers are the organizations, businesses schools and institutions that allow users access to their networked computers (computers which are connected to the Internet). These services are usually offered for free (or a nominal cost) in places such as public libraries or through Freenets. The services can also be offered as part of school, institution or business. Private information service providers (ISPs), such as Sympatico, America On-Line (AOL) or the local cable company, are all fee-based Internet service providers. In order to adequately create, upload and download computer files when creating web pages versus just using the Internet, additional Internet time is required. If women creating web pages (especially as part of self-employment) are required to pay for their access to the Internet, their economic status may deter them from spending time on-line and working using the Internet. Whereas institutions such as universities and large companies offer free Internet access to individuals as part of either a student or employee relationship subsequently increasing the likelihood of individuals being on-line.

Content and services available on the Internet are one of the middle layers in Clement and Shade's (1996) access rainbow. This layer deals with the usefulness and the ability to easily

access information available on the Internet. For example, many people expand upon their Internet skills and knowledge (including how to create web pages) by using the Internet to access information published on web sites. At the moment most of this information is free, however, there is an increasing trend to have Internet users pay for access to publications and databases. The requirement to pay for information may affect the opportunity for individuals to informally learn to create web pages.

Software Tools, as another layer of the access rainbow, begins to introduce the more technical aspects of access to the Internet. Clement and Shade (1996) in their model focus upon issues of usability in this layer by questioning how easy the Internet software is to learn and operate. They also suggest that we consider which software is the most effective and which software is interoperable. In evaluating software tools, this layer also directly addresses how women web page designers learn to create web pages. There are many software programs which now allow users to design web pages without requiring that the user have much Internet or computer programming experience. Although such programs are time saving and afford the opportunity for novices to create web pages, many of these programs have problems and are not flexible enough to perform more complex web page designs. The cost of the tools can also be outrageous and require constant upgrading.

Devices, the next layer of Clement and Shade's (1996) access rainbow, refers to the physical devices that individuals use to access the Internet. These devices include computers and work spaces and/or workstations. The first device needed to access the Internet is a computer.

A computer consists of two things: hardware and software. Computer hardware refers to the monitor, keyboard, and computer box which holds all the smaller pieces of hardware such as modems. Balka (1997) refers to hardware as "the parts of your computer that you can see and touch" and software as "computer programs; a set of instructions, or recipes that tell your hardware what to do, but are intangible in the sense that you cannot touch them" (p. 148 & 150). An example of software used to access the Internet is a World Wide Web browser. Unfortunately, both the hardware and software associated with computers can be quite expensive and a lack of money can restrict access at both at organizational and an individual level.

Another issue for the devices layer of the access rainbow is whether or not the devices are adaptable to a variety of human needs. For example, the most common computer requires at least the use of hands and sight. There are modifications that can be made to computers to adapt to human needs but generally these changes further increase the cost of a computer. In 1995, as an undergraduate student I did research for a project about the equipment required to enable differently-abled students attending the University of Calgary to use computers. At the time, the specially modified computers available at the university were outdated and in short supply compared to the rest of the computers on campus. One modification that enabled some differently-abled students to use computers was a program called Dragon Dictate. This program allowed users to speak instead of type into the computer. Without adapted software and

hardware some differently-abled students would have been unable to use a computer.[10]

Other issues are also present regarding devices for Internet access. Graphically based software increasingly used on the Internet poses an additional barrier for many visually impaired computer users. Poorly designed work spaces create health problems for users, such as, wrist-related repetitive strain injuries (RSI). And, an ergonomically designed chair, desk, keyboard and mouse, while preventing many computer-related health problems, may be too expensive for many people. Sharing space at school, work or home can affect time spent using a computer. For example, at one time as a single-parent student I had to move my computer into my kitchen for peace and quiet in order to write a paper. Physical location and computer tools can affect access to the Internet.[11]

The final and most technical layer of Clement and Shade's access rainbow is Carriage Facilities. Carriage facilities refer to the network that carries and stores the information communicated on the Internet. These facilities are the backbone of a computer network. A computer network allows users to connect to other computer networks over a distance. At a work or school site the connection to another computer may consist of physical wiring to

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[10] The cost of specially adapted hardware and software also plays a part in providing access to computers for differently-abled students. Ironically the Dragon dictate software we researched in our study in 1995, which allowed students to speak into the computer, has been released and marketed to the public in 1997/8 as a novelty computer tool.

[11] The physical location of computers can be seen as a gender issue and is touched upon briefly later in this thesis. The sharing and location of computers in relation to gender is a topic for further research.

another computer (or server) if the computer is nearby. Across farther distances where direct wiring is not possible, methods of communication such as telephone lines, fibre optic cables and satellite services may be used. Included in a discussion of carriage facilities is the physical infrastructure which is often taken for granted. I define infrastructure as the formally structured services supporting society and technology. Examples of infrastructure are electricity and telecommunications services. Without the ability to generate power, computers are just large and expensive paperweights. And, the networks of computers that make up the Internet cannot communicate with each other if the phone lines (the most common Internet infrastructure at the moment) are not working. For example, the ice storms in Quebec in 1998 brought many businesses to a halt for weeks. It took me a week to get through to one web page which was located in Montreal because the electrical and telephone infrastructure had temporarily collapsed. Geographic isolation and the cost of utilities and infrastructures also present challenges to computer use and Internet access. As the most technical aspect of the access rainbow, carriage facilities are also one of the most essential. Without an infrastructure supporting the connection to the Internet there is simply no accessing the Internet.

The access rainbow provides a detailed model for looking at the inter-related social and technical aspects of Internet access. Each layer of the model is inter-connected to other layers. Without the support of government and institutions access to the Internet can be barred. Without the physical networks and infrastructures supporting the Internet, there is no possible way to access the Internet. And, more specifically related to this thesis, if literacy and social

facilitation, service providers, content and services, software tools, and devices are not accessible, then the opportunity for people in general, and women in particular, to create web pages, decreases.

2.3 Limitations of the Access Rainbow

While addressing many of the issues related to universal access and the Internet, Clement and Shade's (1996) access rainbow has limitations. The access rainbow addresses a variety of inequalities that exist in relation to the Internet, but it does not account for more intangible elements such as attitudes and beliefs, which in turn affect decisions about access to the Internet. Attitudes and beliefs can influence Internet access much like the elements of governance located on the top level of the access rainbow influence access. For example, if the Internet is seen as an unattainable complicated piece of technology, many people, possibly including many of the women I have talked to who do not use the Internet, will not believe it is worth the effort to learn. If computers, and technology in general are believed to be more of a 'male thing', then a 'common sense' belief may develop for women *not* to want to use the Internet. Social beliefs inform decisions about all other elements of Internet access and usage.

Confidence and a favourable perception of computers as a technology are also part of the attitudes required for people to gain access to the Internet. It takes more than just skill for people to use computers (Mager & Pipe, 1970). "Perceptions of computers and computing ability both influence, and are influenced by, stereotypes of those who use them" (Colley, Henry, Holmes & James, 1996, p.329). The negatively or positively perceived stereotype of the

computer scientist, requirements for mathematical skill, and prior computer experiences can influence individual computer usage. If a computer user is defined negatively by terms such as 'nerd' or 'geek', then it is likely fewer people will use computers.[12] Conversely, the negative term 'geek' has recently been reclaimed by sites such as geekgirl (as discussed in chapter one) where the term 'geek' is seen in a positive light.

Negative perceptions of computers can also result in computer anxiety. Computer anxiety is defined as "the fear or apprehension felt by individuals when they use computers, or when they consider the possibility of computer utilization" (Simonson, Maurer, Montag-Torardi, & Whitaker, 1987, p.238). Rosen and Maguire (1990) state that, on average, 25% of all people "feel less than completely comfortable with computers" (p.180). A study by Reznich (1996) suggests that the most important aspect of overcoming fear of computers (computer anxiety/computer phobia) is to actually get people to sit down in front of the computer, using external motivational rewards to get them there. It may be that the women I talked to who did not use the Internet would describe themselves as having computer anxiety. It is also possible that women using the Internet also have computer anxiety but, unlike their counterparts off-line, have a better support system and are able to overcome it..

Personal issues of computer anxiety or stereotypes about who is supposed to be using the Internet also contribute to the creation and reinforcement of norms and beliefs that may

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[12] I would also suggest that these stereotypes have been perpetuated by popular culture. Examples include the movie Nerds and the cartoon The Simpsons.

discourage women users. These beliefs can reciprocate influence upon Internet policies and procedures in general, and can in turn affect decisions about physical access to computers and decisions about access to knowledge and training. For example, women may devalue their use of the Internet in relation to men in public settings such as libraries. Prevailing beliefs that creating access to the Internet in libraries will result in use for all may fail to recognize gendered use patterns and may perpetuate inequities in access. Recognition of such inequities might result in programs that provide women with protected access to the Internet, for example, through women-only Internet times at libraries. It is difficult to analyse any one aspect or layer of the Internet without also acknowledging the other intervening layers of access.

2.4 Summary

As Clement and Shade's (1996) access rainbow suggests, the use of technology occurs within a wider social context. Developing an overview of technology as a social phenomenon or social construction (the topic of chapter three) is a good place to start an exploration of women web page designers. By looking at how women create web pages we can explore the specific elements and events contributing to their success.

Chapter Three: The Social Construction of Technology

3.1 Introduction

When I first began trying to understand the difference in opinions about the Internet held by women who did and did not use the Internet, I searched for existing literature that might explain why differences existed. In 1995, a search of Memorial University's library social science, humanities and education CD-rom databases and books using the keyword *Internet* returned five results.[13] The low number of library holdings about the Internet in 1995 indicated two things. First, it suggested that hardly any research regarding social aspects of the Internet was available at Memorial University. Second, the search indicated that I was going to have to expand my quest for literature to other areas relevant to women and the Internet. I broadened my search to include two areas: the sociology and social construction of technology, and the topic of women and computers. In this chapter I will discuss how the sociology of technology emerged to challenge assumptions about the neutrality of technology. It suggests that the creation and use of technology is a process influenced by human values (which are influenced by socio-economic factors). Building upon a discussion of technology and human values, I will then

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[13] This search focussed on popular rather than academic publications. At that time, numerous academic articles about social aspects of the Internet existed. I continued performing these searches over the years until today in 1998, the number of results returned has grown exponentially into the thousands.

focus upon how values about gender have influenced women's access to technology in general and in particular computers. I will conclude with a discussion about how human values influence women in relation to the Internet.

3.2 The Sociology of Technology

The sociology of technology as an academic discipline developed in the 1960s. While technology and society literature existed prior to 1960, the combination of the Vietnam war/peace movement, the civil rights movement, and the environmental movement lead more people to begin questioning the relationships between society and technology (Teich, 1993). In this section I will first introduce concepts from the sociology of technology, including the relationship of technology to science and then I will discuss assumptions or stereotypes about the role of technology in society.

The sociology of technology challenges assumptions and myths about technology. There are three primary assumptions or stereotypes about the role of technology in society. The first assumption is similar to traditional views about science. Reflecting the techniques of the scientific method, technology has historically been seen as an extension or practical application of science (Bereano, 1978; Franklin, 1990; Norman, 1993; Teich 1993). Science is predicated upon the idea of a rational, value-free and knowable truth. The scientific method invokes a supposedly systematic and objective procedure for obtaining this knowable truth (Harding, 1991). The presumption that science is objective and value-free has also emerged as an

assumption about technology. It is assumed that technology is a neutral tool, that comes to exist as a completed object independent of human values (Bush 1983). It is not hard to see problems with this view. For example, although a web page is only a collection of computer files, the purpose and presentation of the page are influenced by human values and societal policies and procedures - its creation is not neutral.

The view that technology is progress is another popular assumption about technology and society (Bereano, 1978; Bush, 1983). This assumption positively values technology. It sees technology as a way of making our lives better and our work easier. For example, the Internet has been hailed as a new democratic tool - a method by which everyone can communicate their ideas (Sclove, 1995). Unfortunately as discussed previously in relation to Clement and Shade's (1996) access rainbow, not everyone can access the Internet.

Technological determinism, the third assumption about society and technology, sees technology as the determinant of society. Menzies (1996) says that "others assume that technology is deterministic, that it is a force like nature ('creative gales of destruction' being a popular phrase here) and so big and powerful that only huge institutions like government can grapple with it, and even they can do little more than mitigate its effects" (p. 27). Technology is viewed as an external force and something we have no control over.

These three assumptions about technology offer insights into the way people interact with technology. There are grains of truth in each of the assumptions (Bush, 1983). However, technology is a complex process from the point of design through to the point of use and

repair. Menzies (1996) defines technology as a social construction: "its design, organization, and use reflects the values and priorities of the people who control it in all its phases, from design to end use. After the design has been implemented, the system organized, and the infrastructure put in place, the technology then becomes deterministic, imposing values and biases built into it" (p.27). It is the awareness that technology can in fact be controlled and influenced by societal values which directly challenges the myths about technology. The control and influence of societal values in relation to women and computers will be discussed in the next section.

3.3 Gender and the Sociology of Technology: Women and Computers

Attitudes about gender influence the use of technology, including computers and the Internet. Academic discourse about attitudes toward gender and technology arose from 1960s discussions about society and technology (Cockburn & Ormrod, 1993). The social construction of technology as a field of study tries to demystify the processes involved in the creation of technology. If we expand the earlier discussion of technology as a social process influenced by human values, we can also include values about gender as part of that process. Many writers have focussed on the relationship between women and technology. Topics addressed have included discussions about reproductive technologies (Corea, 1985; Firestone, 1970; Klein, 1989; Overall, 1989), machines in the home (Cowan, 1983; Oakley, 1974), technology and the division of labour (Cockburn 1983), and the participation of women in the creation and history of technology (Wajcman 1991). For example, in an in-depth case study Cockburn and

Ormrod (1993) follow the design, production, sale and consumption of microwave ovens. Throughout the process definite expectations existed from both men and women about gender and the division of labour in relation to the microwave. During the production stage engineers (who were mostly men) designed the microwave from a 'how many functions can we create' perspective. The (mostly women) home economists in the test kitchens looked at the microwave after the fact from a usability perspective. When the microwave moved from production to retail sales it changed "from being a more or less masculine engineered product to being a 'family' white good, on the way to its anticipated home, a feminine kitchen environment" (Cockburn and Ormrod, 1993, p. 156). Reflecting upon their research process, Cockburn and Ormrod also offer the following insight about women and technology:

> When during the three years of this research, we told people we were engaged in a sociology of the microwave oven, it invariably drew a smile. At first this was unnerving. We began to smile ourselves, disarmingly in anticipation. It made us feel a little shamefaced, apologetic: this could not be serious sociology. Then we remembered that nobody had smiled when the subject of research had been computer-aided design or nuclear magnetic resonance scanning. And then the penny dropped. The smiles were precisely a part of our research material. They said, in effect, microwave = domestic = feminine = unimportant. (p.171)

This quote sums up the primary values associated with gender and technology - the assumption that men intuitively know technology and therefore should be in control of the more powerful project orientated technology (such as computers) and, that women subsequently do not belong in the process of designing and creating technology. Women are viewed as consumers of technologies - technologies that are perceived as less powerful and less important such as microwave ovens. Generally, whenever women begin to use a technology that previously was

considered a masculine domain, the value of the work with that technology is decreased.[14]

Use of and attitudes toward computers are also gendered. In the early 1980s the personal computer (PC) was introduced into the consumer market and men and women began to use it on a daily basis. Early studies about the effect of computers on society showed gender differences in computer attitudes and use. Kirkup (1992) discusses how the origin of personal computers consists of a gendered history. Personal computers were first available to electronics hobbyists, a group to which few women belonged. These hobbyists tinkered with computers by taking them apart and putting them together again as an exploration of how the computer worked. Kirkup suggests that women did not participate in this hobby because generally, women's hobbies require less money and time than men's hobbies and also tend to focus on practical end results rather than the process of creating. Expanding upon the hobbyist mentality, Kirkup suggests that games available for the computer were militaristic and geared towards boys and men. As a result, a computer was usually brought into the home for boys, rather than girls. Similar situations were reflected in studies of work and educational uses of computers (Lockheed, 1985).

Turkle (1995) suggests that women do not use the computer because it becomes a personal and cultural symbol of what women are not. Gutek and Bikson (1985) suggest that although both men and women use computers at work, women tend to be less satisfied in their

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[14] Cockburn (1983) in her book Brothers: male dominance and technological change provides an excellent example of the effect gender has had on the use of technology in the newspaper printing industry.

jobs primarily because they have less control over their work and their work is more routinized than men's work. Access to computers in schools also emerged as a gendered issue (Hawkins 1985; Lockheed, 1985; Sutton 1991). Lockheed (1985) suggests that gender differences in computer use exist for different purposes. Lockheed discusses three different applications of computers: computer as a programme of study, the computer for recreation, and the computer as a general purpose tool. Lockheed also suggests that the computer as a programme of study is predominantly male dominated for several reasons:

- Math is socialized as a male domain;
- The rules of programming (i.e., winning/competitiveness) are not compatible with female values;
- Boys are more likely to have the required cognitive skills;
- Parental economic and personal support is seen as less relevant for girls; and,
- Teachers unconsciously discriminate against girls in classes.

Lockheed suggests that the computer used for recreation is again dominated by males because:

- Computer games are sex-stereotyped;
- Motivational contingencies such as loud noises and shooting appeal more to males;
- Physical game spaces are male dominated;
- Parents do not purchase games for girls as frequently as they do for boys; and,
- Children perceive computers to be more appropriate for boys than girls.

Finally, Lockheed asserts that girls are using the computer as a tool for two reasons: first, tool software such as word processing is not sex-stereotyped, and second the computer as a tool is more relevant to future activities and occupations. And, I would add that girls may be more interested in computers as tools for the end result or a completed project. Arch and Cummins (1989) found that for females, prior computer use positively influenced their attitudes

and interactions with computers. Callan (1996) acknowledges the concerns about gender and computers but suggests that in the 1990s women have become more comfortable and frequent computer users and subsequently the next area of research should be about gender and the Internet.

3.4 Gender and the Access Rainbow

Spender (1995) offers warnings regarding women and the Internet. First, she emphasizes the future importance of the Internet. She compares the introduction of the Internet to the inception of the printing press saying that failure to embrace the change to an information society will usher society into obsolescence and will cause us to become a polarized society of the information poor and the information rich. Spender also recognizes that, generally, the atmosphere for women on-line continues to reflect offline attitudes toward women and that it is equally important for women to become involved in all aspects of the production and use of the Internet. She draws a parallel with men and women driving: if there is a choice about who will be in control of the car, it is usually the man who ends up driving (p.169). Other authors express similar concerns about women accessing the Internet (Balka 1997). Although access is important, some women are instead challenging previous ideas about women, technology, computers and the Internet.

Women are challenging myths about gender and technology through their use of the Internet. In particular, women are responding to on-line issues associated with the Internet (Cherny & Weise, 1996). Sinclair (1996) defines these women as *net chicks* and says net chicks

are about "having a modem. It's about being a grrrl with a capital R-I-O-T. It's about using your keyboard to navigate through the thousands of worlds floating in cyberspace. It's about becoming empowered by your access to and knowledge of the Internet" (p.6). Gilbert and Kile (1996) call these Internet savvy women SurferGrrrls as a "counter to the 'nice girls do not hack around with computers' message that society (still!) sends out, despite the educational system's extensive lip service to getting girls involved with math and science" (p. 6). The adaptation of the word girl comes from young American black women in the late 1980s saying "You go, guuuuurlll!" It was then transformed by singer and activist Kathleen Hanna as a young-feminist reclamation. Gilbert and Kile (1996) say using the term grrrl:

> puts the growl back in our pussycat throats. 'Grrrl' is intended to recall the naughty, confident and curious ten-year-olds we were before society made it clear it was time to stop being loud and playing with boys and concentrate on learning 'to girl', that is, to be a proper lady so that boys would like us. (p.5)

These net chicks and surfergrrrls see the negative myths about gender and technology as self-fulfilling prophecies, where defining yourself as, for example, an online victim of harassment - will end up with you becoming a victim. Gilbert and Kile's (1996) cyborgrrl oath sums up this reclamation:

> We are wired women. We would rather be cyborgs than goddesses. We have made a special vow to help guide our sisters, our mothers, our daughters and our friends into a cyberscape of their own. We promise to support them - however initially techno phobic - as they apprentice themselves in that realm. We live by the geekgirl code: "The keyboard is a greater equalizer than a Glock .45." We are wired into Chaos and Gaia. We swell the listservs, we proliferate in the Usenet groups, we weave the Web, we chat and MOO, we upload and download, we help build and nurture our chosen online communities. We help imagine and create new applications and forms, always looking to that next

> horizon, always thoughtful about the interface of embodied humankind and the electronic projection of the highest mental faculties of our species. In the name of global good and human freedom, we vow never to surrender the Internet and its successors to dangerous, self-perpetuating myths of the technological incompetence of women. (p. 239)

The grrrl attitude challenges the norm of women as passive technological users. It attempts to secure the right for women to be daring and technologically competent.

3.5 Summary

My search for literature discussing women and the Internet was initially limited and required further exploration into related disciplines. In particular, the search expanded to literature about technology and society, women and technology, and women and computers. The literature confirmed the symbiotic relationship between technology and society. It supported notions about Internet access as presented in Clement and Shade's (1996) access rainbow. The literature also suggested that assumptions about technology can influence attitudes, beliefs, policies and procedures. In turn, these attitudes and assumptions can influence the creation of technology and access to it. Much of the literature about women and computers confirms assumptions about women's use of computers by suggesting that boys are more naturally suited to computer use which influences the distribution of technological resources such as computers and access to them.

A review of literature is particularly important when contrasting the difference between the women and computer literature and the grrrl image portrayed on World Wide Web pages. The literature about women and computers often presents women as incompetent computer

users. In comparison, the grrrl image evident on Internet web pages demands recognition of women as technologically competent. However, neither of these reports adequately describes the transformation that girls and women must undertake in the process of becoming technologically competent. Without understanding *how* women change, we implicitly invoke a type of gendered technological determinism which boxes women into unchanging categories of technophobe or grrrl.

Without understanding the process by which women change in relation to technology, the images of women as technophobe or grrrl are one dimensional, mutually exclusive and elitist. A gap in information about *how* women change still exists. How could we presume that understanding women and technology would be so easy when the discussion of pre-requisites for Internet access predicts the complexity of relationships between humans, society and technology? Although this literature review has touched upon issues related to women and the Internet it has not gone far enough. The research presented here bridges the gap in information by surveying women who have subtly denounced the declaration of females as technophobic. The research specifically looks at women who create web pages. The next two chapters present the theoretical and methodological context of this research. The theory presented in chapter four offers a way of viewing, understanding and explaining the complex relationships between humans, society and technology and the methods presented in chapter five construct the practical framework used to explore women's skills and experiences creating web pages.

Chapter Four : Theoretical Framework

4.1 Introduction

This chapter deals with the theoretical framework upon which this research rests. The theories in this chapter act as tools to help understand the complexity of pre-requisites to Internet access and the design of web pages. Specifically, these theories guided my exploration of the everyday world of women creating web pages. The first theory in this framework is actor network theory (ANT). ANT expands a discussion of humans, society and technology. ANT introduces flexible and ever-changing networks of actors as a way of analysing relationships between people and technology. However, ANT has been criticized as overly concerned with documenting the historical development of technology, while remaining oblivious to the politics of the everyday (Winner, 1992).

I will begin this chapter with a discussion of ANT. The primary idea that ANT brings to this research consists of two segments. It suggests first, that the world exists as networks within networks and each of us, as well as technology, is an empowered actor within these networks (Latour, 1986). Second, our empowerment as actors constantly influences other actor networks so that networks are always either changing or have the potential to change. I then turn to criticisms of ANT and examples of how ANT has been modified by theorists to include subjective and political issues. I conclude by suggesting that despite its limitations ANT provides a useful framework for understanding women web page designers as agents of change.

4.2 Actor network Theory

Actor network theory is a new proposition that challenges the way we conceptualize power and the structure of society. Actor network theory addresses two central themes. It suggests that 1) power is an effect of negotiations between actors, and 2) that actors (humans and non-humans) have agency. Law (1991) suggests that the purpose of the actor network theorist is "to study these materials and methods, to understand how they realize themselves, and to note that it could and often should be otherwise" (p.390). Seen in this light, any technology can be viewed as a reflection of processes where power relations and agency result in a particular device. I will further elaborate on the themes of power as an effect of negotiations between actors, and the agency of human and nonhuman actors.

Power as an effect

Latour (1986) discusses power as the effect of a collective action. He suggests that "the amount of power one exercises varies not according to the power someone has, but to the number of other people who enter into the composition" (p.265). For example, a dictator has no power unless others are willing to listen, follow and enforce the dictator's will. The dictator is said to be attributed with power once actors take the time and energy to stop and listen. In doing so they effectively interpret the dictator's message. Actor network theory calls these processes translation (Akrich & Latour, 1992).

Translation is where "the spread in time and space of anything - claims, artefacts, goods - is in the hands of the people; each of these people may act in many different ways,

letting the token drop, or modifying it, or deflecting it, or betraying it, or adding to it, or appropriating it" (Latour 1986, p. 267). Translation is of importance when talking about technology and in particular computers. If I had maintained the local cultural condition which prescribed that men had more right to computer access and knowledge than women in my university computer lab, then I may have never learned how to access the Internet. In ANT, the myth that computers are a male domain is considered a *prescription* or a way of interacting with non-humans (Akrich & Latour, 1992). If I gave importance to this prescription then a) this myth would continue to become important and b) I might never have learned how to access the Internet. Instead I consider myself to have engaged and translated the prescription (that only certain people can use computers) into a more appropriate prescription for my individual needs which states that anyone (not just men) can learn and should have access to computers.

It is the emphasis on translation, on the processes involved with the interaction of ideas and objects, that actor network theory explores. ANT looks at the specific incidents and ideas that occur in the creation or innovation of something, and shows the network of processes, the steps, choices and accidents that were performed during the process of negotiation (Latour, 1986). This is an important process for exploring the ways in which women have learned to create web pages. Each layer of Clement and Shade's (1996) access rainbow can be viewed in ANT as individual networks. For example, a computer is its own network of hardware and software and is translated into a powerful machine that meets our communication needs when we use the Internet. Telecommunication infrastructures are networks and become powerful

when people rely upon them. Each individual is also a network of personal knowledge and experience. The women who have learned to create web pages are also networks, composed of their own skills and experiences. In the process of learning to create web pages, these women as individual actor networks have had to encounter each of the layers of the access rainbow including the computer, infrastructure, learning processes, and societal norms. And in the process, these women have translated these layers by accepting, rejecting, modifying or appropriating them.

It is also important to realize that even though a process or innovation seems to have reached a completion or a closure, it has only become more stable and at anytime could change (Latour, 1986). It becomes stable because the number of actors involved with it has increased. And, each actor who interacts with the so-called finished object, is in fact giving it power and translating the object from the actor's own personal or unique perspective. When women decide to learn to create web pages they are explicitly or implicitly acknowledging the prescription that women can navigate the pre-requisites required to access the Internet.

Translation and power may be difficult to grasp because they imply that nothing is stable, that everything from the abstract to the material are networks which are continually changing (especially as non-humans such as machines are changed in relation to human needs). This realization may leave the reader with an overwhelming sense of instability and loss of control. To help understand the concept of networks and translation I will relate Latour's (1997) discussion of the properties of translation. The properties of networks challenge the way

in which power is conceptualized through space and time. Latour (1997) discusses four ways of conceptualizing translation as: far/close, small/large scale, inside/outside and local/global.

For Latour (1997), far/close refers to the ability to place less importance on these binary concepts (far/close) in the translation of networks. The non-humans or machines that we encounter afford or translate human needs in relation to space and time. In other words non-humans can supposedly make life easier for humans. For example, one of the reasons I began creating web pages was to advertise my women's studies group as a University of Calgary student club. I wanted to advertise the group without having to put posters up all around campus. The web page saved me the time of first creating the posters, and then walking around campus to pin them up.

Other women may have started creating web pages to also compress space and save time by teleworking - or working from home. Many women creating web pages no longer have to take the extra travel time to go into an office to meet with a client. These women can use electronic mail or video conferencing which can sometimes be as real and as powerful as an in-person conversation. Generally, with the Internet we do not have to worry about actually being with another person in order to communicate or translate a message. Proxemics are no longer as important and are instead replaced by associations of actor networks. In the case of women web page designers proxemics are replaced by associations of people, computers and networks.

Small scale/Large scale refers to a lack of hierarchy. Latour (1997) describes a network as never inherently bigger or smaller than another network. All networks have the same

potential. It is the number of other networks associated with a network that makes it appear bigger or smaller. For example, when I created a web page for the women's studies group, I had to inform the main web designer in charge of the University of Calgary home page to add a reference (or link) to the page. I also had to inform members of the women's studies group about how to find the page on the Internet. The page was of no use to anyone until people knew where to find it on the Internet. In this way, the web page I created became associated with other networks.

Inside/Outside refers to a refusal to accept the concept of outside(r) in relation to networks (Latour, 1997). We are either part of the network or we are not. Even if we reject the network, we have been part of it, at least for the time it takes us to consider rejecting it. The women I talked to who did not use the Internet are still part of the network. Their ability to respond to discussions about the Internet indicates that these women are aware of, at least in a general sense, the Internet and they have decided not to interact with it. Translation can result in a negative action as well as a positive action.

Latour (1997) also presents local/global as the paradox of a network that can become global and yet remain local at the same time. The idea of a global network allows us to see a more intensely connected world without losing sight of the local networks. This local/global paradox offers the ability to understand the world better by being able to trace development backward and forward through networks. It also affords the opportunity to look at events/networks to understand why and how a network loses or gains importance. For example,

the motivation for women learning to create web pages could exist at a local and global level. At a global level, the need for businesses to present company web pages may motivate women to create web pages. At a local level, designing web pages may give these women a creative outlet.

Power, as seen in these four properties above, is not restricted by time and space within networks, but is instead fluid and constantly changing in accordance with the importance placed on actors and networks. This leads us to the next area of ANT - agency or the ability to act which is shared by all those involved in networks.

Agency of actors (human and nonhuman)

The agency of actors is a central idea of actor network theory. Actors are defined as humans and non-humans (e.g. machines, animals and architecture) (Law, 1991). This definition challenges traditional sociological thought because non-humans are assigned the same potential as humans to emerge as, act upon or influence networks. The primary goal of this proposition is to present the possibility that non-humans play an integral part in the world by mediating our lives and networks. When web pages are created, the technology of the Internet mediates how and why the pages are created. When I first began creating web pages, most people did not have access to a World Wide Web browser that could accommodate pictures, so I had to be careful about putting too many pictures (or graphics) on my web pages or else some people would not be able to view the web page at all.

Law (1991) says that "if human beings form a social network, it is not because they

interact with human beings *and* endless other materials too . . . if these materials were to disappear then so too would what we sometimes call the social order"(p.383). It is the composition of networks that also gives us agency as individuals. "People are who they are because they are a patterned network of heterogenous materials... an actor is also always a network" (Law 1991, p.383-384). In other words our agency is derived from networks that make us what we are. But, we also contribute to making other networks, and we have the potential and the agency to influence other networks, and this agency and potential is also contained in non-human objects such as machines. For example, I have taught (or acted upon) other women to use the Internet. Depending upon whether these individuals had access to graphics or text-based World Wide Web browsers (non-human actors), my teaching method varied. These browsers, at least to begin with, would influence how these women acted upon the Internet.

Problems with actor network theory

Actor network theory is not without its critics. The primary criticism of ANT has to do with its lack of political analysis and its tendency to focus primarily on those actors which have large amounts of power given to them. Haraway (1997) challenges ANT as a science-in-action. Haraway claims that ANT is a mimetic, self-fulfilling prophecy, that this science-in-action only strengthens the status quo. Haraway says: "the reader is taught how to resist both the scientist's and the false science studies scholars's recruiting pitches. The prize is not getting stuck in the maze but exiting the space of technoscience a victor, with the strongest story"

(p.34). This tendency subsequently ignores and silences peripheral networks and associations. Winner (1992) criticizes ANT by saying it will "offer no judgement on what it all means, other than to notice that some technological projects succeed and others fail, that new forms of power arise while other forms decline" (p. 448).[16]

Star (1991) anticipates these criticisms by offering an example of her allergies to onions and eating at McDonald's. Every time Star tries to eat at McDonald's (a geographically common and powerful network) she has to order food without onions because she is allergic to them. But, the order almost always fails and she ends up scraping the onions off the food. Star suggests that the work of having to scrape off the onions is subversive because it is a network process that is not yet labeled. In other words, there is a recognition that a new and heterogenous network may evolve from this work. Defining unlabeled areas or pointing out where the networks between humans and non-humans need to be changed, is a subversive and political act. Lee and Brown (1994) suggest that it is at the "hot spot" of activity (the process where a network is subverted) that ANT has its greatest political hope.

While Haraway (1997) does not completely throw ANT (or science-in-action) out the window she does offer the following:

> The point is to make a difference in the world, to cast our lot for some ways of life and not others. To do that, one must be in the action, be finite and dirty, not transcendent and clean. Knowledge-making technologies, including crafting subject positions and ways of inhabiting such positions, must be made relentlessly visible and open to critical intervention. (p.36)

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[16]See Cockburn and Ormrod (1993) for additional criticisms of ANT.

ANT needs to be adapted to recognize a) the subjective or the everyday experience humans encounter in relation to non-humans and b) a recognition of the politics (personal and otherwise) involved in the decision-making process of affording non-humans the ability to translate human needs.

In this thesis, a modified ANT offers a way in which to examine the way in which to examine the processes involved in women creating web pages through a discussion about these women's interactions with non-humans such as those used for the Internet A modified ANT also offers a place for the subjective researcher's reflections. This also supports the need for subjectivity presented in Kirby and McKenna's (1989) work, referenced in chapter one. The researcher is identified as a local network which can never be separated from the process of research as a network. The researcher can never be an outsider because they are contributing to the importance of the network they are studying simply by paying attention to it. As I will discuss later in the section about research methods, I first attempted to perform research as a participant using the Pandoraz listserv, but instead found myself changing my informal role to that of formal researcher. ANT offered me the reassurance that I was still personally involved in the research process because I was making the decisions about the research, and that as an individual network I was still interacting from behind the scenes with the research participants - I was still an insider.

4.3 Networks of Gender

ANT can also be used to look at specific networks such as gender. In this section, I will expand ANT to discuss how gender can be seen as a network. I will discuss how gender is given power and translated as a network and I will introduce examples of actors (human and nonhuman) which interact with and are part of gender networks. Although ANT was developed to explain the interaction between people and technology, some of Latour's concepts can be applied to social phenomenons such as gender. Below I explore the application to ANT to power and gender.

As discussed earlier in this chapter, power comes from the number of other people who enter into the network - those people who are willing to enter into the translation process. For example, the Internet has become powerful because many people realize that it is a valuable tool for meeting human communication and knowledge needs. Given this way of looking at power, gender then can be seen as a very large and powerful network which has in the past fulfilled human needs. For example, I do not think there is any culture on this planet that does not categorize female/male as woman/man. Gender as a network prescribes (for good or bad) how people should behave in relation to one another. Of course the way that gender is translated, and subsequently the intersecting networks will vary and change across cultures.

Gender can also be analyzed using Latour's (1997) four methods of translation. The notion of far/close and the ability to translate by collapsing proxemics can be applied to language in relation to gender. Languages are networks which can cross distances by creating

words and definitions for objects. For example, many languages reflect a gendered understanding of the world. Previously the English language used the term 'he' as the universal pronoun to refer to people. (Language can also be seen as a non-human network which meets or translates human needs.) The translation and acceptance of this default term helped create and maintain a network in relation to gender, in which the word he was more universally important and powerful than she. Small/large can also be applied to this example which states that all networks are equal until power is translated to them. So, if we started with the blank slated networks of she and he, according to ANT they would both be equal until power was translated to them. Local/global refers to the paradox that a network can be both locally and globally networked. This is also the case for gender. Gender relations can refer to local networks of individuals who are gendered (a man or woman) and can also refer to a global network of woman and man. And finally, inside/outside refers to a network either being connected or not - we are either defined by gender or we are not. For example, there are a few people who appear to others as neither male nor female who confuse the network entirely. I will expand upon this example in relation to actors and agency.

Many individuals (or actors) who appear as neither male nor female have agency to translate the network of being genderless using other actor networks such as clothing, appearance and mannerisms. If we cannot define a person as he or she by social norms then the translation is very confusing. It is at these points of confusion that translation can become hot spots of subversion and change according to Lee and Brown (1994).

It is at these points of subversion and change where the subjective and political can become the most effective. Because networks are always changing in relation to one another, being aware of changes can become an individual network of survival and can subsequently give a person agency to translate and the choice to change. An unlabeled network can potentially become a network which needs to change. I define subversion as a political act where an actor network becomes an agent of change. For example, I see the women who have become skilled in creating web pages as subversive agents, even though they might not define themselves as such. They are subversive agents because they have entered a network which generally defines 'he' and technology as more competent than 'she' and technology. Subjective and political subversion of norms keeps our societies interesting and changing.[17]

4.4 Summary

A modified actor network theory (ANT) is a useful framework for this thesis. It affords the opportunity to discover the processes and networks by which technology evolves in response to human needs. It also allows us to examine how actor networks can be used to subvert or change existing networks. ANT allows us to see the layers of Clement and Shade's (1996) access rainbow as networks one must belong to in order to access the Internet. It confirms the existence of gender as one of these inter-related networks. It confirms the possibility that emerging grrrl networks may have played a part in subverting the existing norms

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[17] The constant change of individuals and society also means that at some point (probably as the Internet gains the same wide spread usage as the telephone) women designing web pages may no longer be the subversive agents presented in this thesis.

regarding who is allowed to use and create with technology. And, it also confirms that there are no outsiders, that we all have agency to choose (as a political act) how we want the networks of gender and the Internet to intersect.

In the next chapter on research methodology the framework for this research will be solidified. The methodology is informed by an understanding of the layers of the access rainbow and the previous literature about gender, society, technology and computers. The methodology implements the theory discussed in this chapter by formulating ways of exploring and describing the evolutionary process of women creating web pages. The methodology is also informed by the need to maintain my subjective perspective as the researcher and the political choices I made in deciding how to carry out the research.

Chapter Five: Research Methodology

5.1 Introduction

This chapter outlines the methodology used in this research. A research methodology creates a framework from which to explore how women gain access to the Internet and learn to create web pages. The first purpose of this research is exploratory. It will explore the scarcely researched process by which some women have learned to create web pages. The second purpose of this research is descriptive: "to document the phenomenon of interest" (Marshall & Rossman, 1995, p. 41). The exploratory and descriptive research questions implemented in this thesis are largely qualitative. Marshall and Rossman (1995) support the use of qualitative research to provide research findings of quality, richness and depth. In this chapter I will provide an outline of the research design for this thesis and I will describe how it had to be modified in practice. I will discuss the collection of data using the Internet as a research site and present an overview of the final data collection methods used, which consisted of an on-line survey published on my web page. I will also address ethical considerations, data analysis and related strengths and weakness inherent to the research design.

5.2 The Research Design

I began the research design with certain expectations about the way this research would be implemented. I wanted the research structure to uphold the theoretical considerations discussed in earlier chapters. In keeping with the emphasis placed on subjectivity as a rich data

collection method presented by Kirby and McKenna (1989) (as discussed in Chapter One) I wanted the research to be subjective for both the research participants and myself. I also wanted the research methods to be flexible and political (in the sense that I hoped they would contribute to social change), yet still allow me to find out if, and how, the participants had engaged the access rainbow. I naively wanted to find all the women who felt like I did and facilitate a discussion about their experiences. However, certain events lead me to change the strategies through which the research was implemented. In the end, I relied upon an on-line survey published on my web page for women designing web pages to complete. The process through which this approach evolved is described in the remainder of the chapter.

I began my research intending to learn about women's experiences designing web pages through a private e-mail group also known as an electronic list (or listserv).[18] I applied for permission to begin an electronic list for the purpose of data collection through Memorial University's Computing Services. The list was approved and I decided to call it Pandoraz.[19] I named the list Pandora to honor the curiosity of the mythical Greek woman I had researched for an undergraduate course about women in Greek mythology. I added the "z" to the end of Pandora because hacker web pages I had stumbled across on the Internet seemed to use warped

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[18] Using the Internet as a data source for social science research is ethically complicated. See Jones (1994) for discussion of ethical issues.

[19] I also submitted my thesis proposal to Memorial University's Faculty of Arts Research Ethics Committee. I received notification indicating that the committee's approval was not required for my thesis, but that it looked ethically sound anyway.

versions of words with the letters x or z. For me, Pandoraz symbolized the melding of women's curiosity with a creative technological skill. I then downloaded and printed an approximately 80 page manual which was not-so-user-friendly. Over the course of weeks, I taught myself how to run and moderate an electronic e-mail list.[20]

I created a welcome message which was automatically sent out by the University's computer to people who subscribed to Pandoraz. In the welcome message I announced the rules of the electronic list: e-mail would be reviewed (or moderated) for appropriateness to the list (I would filter out unwanted business advertising); thoughts or words in our discussions would not be censored; and people were welcome to send messages to the list anonymously (I would delete reference to the sender's name or e-mail). I also announced in the welcome message that at some point I would be conducting research using the list, but that prior to doing this I would send an announcement to allow people to unsubscribe from the list if they chose to. The list was ready on September 18, 1996.

Protocol for new LISTSERV groups suggests announcing the creation of a new list on various sites on the Internet. I followed this protocol to attract participants to the research site by announcing the list on three already existing LISTSERV-like groups (web4lib - a library and WWW e-mail list; webwomen-html, a WWW programming language e-mail group for women,

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[20] The person in charge of the electronic list is usually called the owner. The owner is typically the person(s) responsible for setting the rules for how the list is run (e.g., open to the public versus closed to the public). A moderator can be the owner of the list or someone appointed by the owner and given security access to approve or disapprove e-mail messages sent to the list. I was both owner and moderator of the list.

and webwomen-tech, a technical e-mail list for women using the WWW). The announcement welcomed both men and women to the Pandoraz list. Over the course of a week I watched excitedly as the number of participants grew to approximately 130 subscribers.

I created Pandoraz as a research site three months ahead of the anticipated data collection date (January 1997) in order to situate myself first as a participant and second as a researcher. My previous on-line experience as a participant with new LISTSERV groups indicated that a) people may not be aware of newly formed groups and b) turnover rates are high for new lists while people are deciding if the list is what they are looking for online. By creating the site ahead of time I hoped to allow people time to discover the list and get comfortable talking to one another on the list.

I sent messages to the list at the end of December 1996 announcing that starting January 1, 1997 I would begin using the list as a research site. Only two people unsubscribed from the list before research began. I intended to pose a research question on the list every Monday from January to the end of March 1997, to stimulate discussion about my research questions. I decided to post these messages on a weekly basis for two reasons. First, I wanted participants to have time each week to answer the question before distracting them with another question. And second, not everyone checks their e-mail on a daily basis. I thought a week was a reasonable estimate of the time people might spend before checking their e-mail. I also posted the messages on a Monday because those people who could only access e-mail from

a nine-to-five job would possibly get frustrated coming into a discussion after everyone else. Posting on weekends might create that situation.

I had a series of questions ready, but I was willing to let the conversation of the previous week lead the topic of discussion or questions for the next week. The questions I intended to ask were indirectly related to what Clement and Shade (1996) address in their access rainbow. They included questions about skill and experience regarding computers, the Internet, the WWW, and gender. I followed this procedure and electronically posted questions for only two weeks as a steadily decreasing number of messages to Pandoraz from participants lead me to realize that the list was not going to be an adequate site for my primary method of data collection.

The On-Line Survey

I initially planned the inclusion of a second site for data collection to compare the responses from the women on Pandoraz to similar lists. I decided to monitor the Spiderwoman, webwomen-chat, webwomen-html, webwomen-tech, women-l and womenspace-l lists. Each of these groups focused upon women and different aspects of the Internet and World Wide Web. I saved the messages from all of these groups for a period of ten weeks from January 1st, 1997 to March 15, 1997. I had originally intended to survey these lists until April 30th to coincide with the termination of my research on Pandoraz, however the amount of information (or traffic) I collected from these groups was extensive and overwhelming. I stopped systematically monitoring these lists after ten weeks as the quantity of information collected over ten weeks

would significantly exceed the scope of a Master's thesis.

After two weeks of panicking when the message volume decreased on Pandoraz, I came to the realization (through various conversations) that women would still want to participate in the research. It was the research methods that needed to be changed. I continued monitoring all the other groups I had been following and announced on the Pandoraz list that research was being discontinued and subscribers to the list were welcome to continue using it in whichever way they thought appropriate.

I then constructed a web page consisting of on-line questions that participants could fill out.[21] The questionnaire included general and specific questions, qualitative and quantitative questions, and it elicited facts and opinion. I implemented some questions to obtain demographic and specific skill-related information. I also used open-ended questions to solicit opinions about and descriptions of the experiences women had in relation to WWW page design. A notice about the questionnaire was advertised to the over 100 participants on the Pandoraz list on Monday March 3, 1997 and data was collected until March 31, 1997.

Survey Design

The questionnaire (see Appendix A) consisted of 51 questions. It included six sub sections of questions each of which is described briefly below. The first section, about the World Wide Web, included two general opinion questions about the most critical issues

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[21] While I knew how to create basic web pages, I had never created a form (questionnaire) and the process required extra time for me to learn.

associated with the WWW and the visibility of race, class and gender on the Internet. These questions were introduced at the beginning of the questionnaire to make the participants feel more comfortable and to allow them to recognize that they did have something to contribute to the survey. This section related to my first research question: who are the women creating web pages? It was intended as a way to obtain a general overview about the participants' opinions.

Questions about web page design were in the largest section of the questionnaire. They covered 21 out of the 51 questions. Questions in this section were focused on skill, learning and opinions about web page design. Quantitative questions in this section addressed topics such as the number of hours spent creating and maintaining web pages and the number of web pages that were created for differing purposes. Qualitative open-ended questions asked why women learned to create web pages and how related skills were maintained. The participants were also asked what they liked and disliked about web page design. Qualitative questions were used to elicit participants' opinions about the future of the WWW and opinions about cultural and gender influences upon web page design. This section primarily addressed the second research question concerning how women learn to create web pages. Specific questions were asked about skill and learning. However, questions in this section also touched upon the other two research questions that addressed who the women creating web pages were and what their experiences were. The opinions offered by the participants touch upon who respondents were and their likes and dislikes of web page design.

The third section of the questionnaire addressed the work environment. This section

requested specific details about where the participants created their web pages. Open-ended questions asked what time of day these women created web pages, what they liked or disliked about their workspace (including their technology) and their perceptions about the surrounding environment's influence upon their ability to work. This section addressed all three research questions.

The fourth section included quantitative and qualitative questions and addressed computer usage. These questions were designed to find out how long the participants had been using computers and why they first began using computers. This section was designed primarily to obtain information about how women learned to create web pages, and to find out if computer usage was related to their ability to learn to create web pages.

The fifth section addressed Internet issues. Questions about the Internet were focused on usage and topics of community, gender and identity on the Internet. Although this section included questions about time spent on the Internet (and addressed who respondents were), it primarily was designed to find out what the experiences of women were while creating web pages. Part of these experiences include navigating the Internet.

The sixth section was designed to collect information about demographics such as age, gender, and educational background. In this section I wanted to offer space for people to indicate if they had any limitations accessing the Internet. I also included a question for participants to indicate if they wanted to be identified in the research and if they were willing to be identified, the questionnaire asked them to create their own alias. Most of the questions were

open-ended to allow participants the chance to qualify their answers and to ensure that the participants were answering with their own words rather than using predefined research categories.

5.3 Data Collection

In light of the research questions presented I wanted to have some control over the selection of participants. I wanted to make sure that the women answering the survey were in fact on-line using the Internet and World Wide Web. Several options were possible to ensure participants had met the pre-requisites to gain access to the Internet. I decided to advertise via related e-mail groups for participants and later refer these women to the survey web page. I expected less than twenty women to respond, but over 100 women from around the world responded to my e-mail advertisement and 67 women took the time to fill out the survey. After collecting the data from the questionnaire I realized that because the data was so rich with information, I had more data than I needed. I decided to omit the data I had previously collected from electronic lists. The data from the questionnaire became my only source of data. This method of data collection has strengths and weaknesses which will be discussed in section 5.6.

5.4 Ethical Considerations

The primary ethical considerations regarding this research were anonymity and privacy. Most information which is discussed in public forums on the Internet such as news groups or LISTSERVs is automatically archived for the public in computers connected to the Internet. As

public information, the discussions can usually be accessed by anyone searching on the Internet. The list of people subscribed to lists (their e-mail addresses and subscription names) can also be uncovered.

An alternative to these public groups are non-public/private/or closed groups. The Pandoraz LISTSERV was created as a closed group which meant that archives of the participant e-mail discussions were only available to those individuals subscribed to the list. Participants were also given the opportunity to send their messages to me as the moderator and have me send them on to the list anonymously.

After circumstances necessitated a change in my data collection the primary ethical concern for the research method (the questionnaire), was consent. In the introduction of the questionnaire I announced that participant responses may be published. I allowed participants the option of not being identified, or creating their own identity (by either using their real names or aliases). As Memorial University's Faculty of Arts Research Ethics Committee did not at that time evaluate graduate research, I sought and gained ethical approval for this practice from my thesis supervisors.

5.5 Data Analysis

Both quantitative and qualitative data were analyzed. The format of the web page questionnaire allowed participant responses to be sent automatically to me by e-mail. The format of these responses listed all participants' completed and uncompleted (blank) questions. Once data collection was finished, the answers were then cut and pasted using a word

processing computer program into groupings of responses relating to question numbers. For example, a data file was created for all responses to question one and likewise for question number two. I then printed out these groupings of question responses and read through them, highlighting any common themes or categories that emerged.

5.6 Strengths and Weaknesses of the Data Collection

This approach to data collection had both strengths and weaknesses. It is important to be aware of these strengths and weaknesses in order to accurately situate the results. The major weakness of this research is a limited number of participants. Because the participants are self-selecting and not a random sample of the population, the results cannot be generalized to the rest of the population. Respondents are not representative of all of women web page designers. Rather, they represent a self-selected group from a larger group of people who were reading the listservs selected as potential data sources for the study initially. In light of an absence of information about women web page designers, the data can be seen as a contribution to an area that has, to date received little attention.

The anonymity of on-line respondents magnifies and hypersensitizes issues about the authenticity of participant responses. The prerequisites for participation in this research were for the participant to be female and a web page designer. The detailed questions pertaining to web page design internally validated the questionnaire because there was little chance that someone who had not created web pages could have answered the web design questions. The validity of the participant's gender however, was a more complex issue.

Participant responses were received by e-mail text and therefore I cannot be absolutely sure that the participants are who they say they are, or although they indicated they were female, if in fact they were. The authenticity of information is a constant issue with regards to the Internet and is the topic of various folklore. One folklore example is the spread of computer virus warnings by e-mail. Usually a person receives an e-mail warning of a computer virus (such as the good times virus) which then encourages the recipient to send it to as many people as possible. Of course there is no such virus and ironically the proliferation of these e-mail virus warnings become a type of virus through their sheer number. The issues surrounding the validity of information have also magnified the validity of gender on the Internet.

Another aspect of Internet folklore relates the propensity of men to secretly change gender on-line and portray themselves as women - usually for a sexual purpose. At a time when the Internet is becoming more frequently used as a dating service and where individuals are making meaningful romantic connections leading to marriage and/or serious commitments the manipulation of gender can have an intense impact upon individuals. The concern about the authenticity of gender also escalates research concerns - how can we be sure a person is the gender they say they are? However, questioning the gender of an on-line research participant is not within the scope of this research because it raises further issues about other off-line methods of data collection such as mail out and telephone surveys and questions how researchers know the people they are surveying are the right gender or even the right person in general. It also raises issues about transgendered individuals (people who are one sex but

behaviorally identify themselves as the other sex). These issues led me to believe participants when they said that they were female.

The final weakness was moving the research methodology from an e-mail discussion group to a web survey thereby limiting the amount of subjective interaction and feedback between the researcher and the participants.

There are also strengths associated with this research strategy. Open-ended qualitative questions allowed the participants to respond with as much (or as little) information as they wanted using their own words. These questions contribute to the exploratory purpose of this research by creating a loose structure from which themes can emerge. These strengths and weaknesses combine to create a unique research methodology.

5.7 Summary

In this chapter I have outlined the methods used to collect and analyze this research. Honoring the need for subjectivity and openness to scrutiny (Kirby and McKenna, 1989), I have described the processes involved in creating this methodology. As outlined, the methodology finally implemented for this research was an on-line web survey of women who create web pages. This survey includes sections directly related to the access rainbow (Clement and Shade, 1996) discussed in chapter two in an attempt to understand how and why these women gained access to the Internet as part of learning to create web pages. The primary weakness of this research is the inability to generalize the research results. The primary strength is that the open-ended qualitative questions provide insights into a little explored phenomenon.

and allow us to begin to describe the phenomenon of women creating web pages. Both the strengths and weaknesses combine to create a way in which to examine the three research questions. From the results of these questions research themes emerged. The next chapter about research results will address these themes.

Chapter Six: Results

6.1 Introduction

This chapter attempts to make the voices of the participants heard. It presents the quantitative and qualitative data obtained from the on-line questionnaire. The results are presented in relation to the three main research questions: a) who are the women creating WWW pages?; b) how did these women learn to create WWW pages?; and c) what are the experiences these women had in creating WWW pages? Each of these questions forms the basis of specific sections in this chapter. I begin each section by reviewing the expectations I had prior to this research, and end each section by presenting my findings.[22] The chapter ends with a summary of the results.

The majority of results in this chapter were derived from qualitative responses from the participants. The qualitative questions provided the opportunity for the respondents to reply to survey questions in their own words. The qualitative responses by the participants were grouped by questions number and analysed to determine if any themes or experiences were held in common by the participants. More specifically the responses were analysed for similar words, phrases and expressions offered by the participants, which were then recoded numerically,

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[22] It is important to remind the reader that these exploratory results come from a specific self-selected group and therefore cannot be generalised to the rest of the population.

which made it possible to determine the frequency or number of similar responses. Analysis of participant's responses included calculating the frequencies of responses into percentages. The majority of percentages in the text have thus been derived from qualitative data that has been coded numerically according to themes that arose from the data.

6.2 The Respondents: Women creating WWW Pages

I originally received 68 responses to the survey. The majority of the responses arrived in my e-mail within the first two days, with responses tapering off over a week and a half. At the end of a two week period I finished data collection. I had presumed all of the participants were women until I looked at Question 43 which asked if the respondent was male or female. Of the responses I discovered that 67 participants indicated that they were female and one participant indicated that he was male.

The male response was an unexpected result. For me, seeing this response challenged the reliability of the research. How could I tell if the participants were telling the truth? Maybe men had responded saying they were women. Why was gender so important to this research? And, should I include or exclude the male response? After much deliberation I decided to treat all responses as valid. I could not double-check all participant data. I decided to omit the male response because the process of designing this research only dealt with prior literature and research results pertaining to women, technology and computers. After dealing with these issues I moved onto a summary and analysis of the results.

Questions about age, education, computer background, time spent with the Internet,

time spent on web pages, job titles, work environments, and on-line community provide an indication of who the women web page designers are that responded to the questionnaire. I will summarize the results and my expectations for each of the research areas.

Age

Prior to implementing this research I had expected the age of participants to be in the early to mid twenties. This expectation evolved from the grrrl image I had encountered while surfing the World Wide Web. I had expected most women who created web pages to also be explicitly or implicitly a grrrl and I expected a grrrl to be a young woman. However, the average age of the participants was 38, with a range of ages from 19 to 57.

The age women first were introduced to computers varied from 6 to 50, with an average age of 25. Similar to my own computer experiences, on average there was a five year gap between first use of a computer and first use of the Internet. The average age for first Internet usage was 33 (see Table 1). This means that generally these respondents who had created web pages had some computer experience before using the Internet.

Table 1

Average Age of Participants at the Time of Survey and at First Computer and Internet Use.

	Current Age on Survey	Age first used computer	Age first used Internet
Average Age	38	25	33
Range of Ages	19-57	6- 50	10-52

Education

Question 44 asked participants about their educational background, and their highest level of education. Out of 67 participants, 54 participants said that they had attended university. Attending at an undergraduate level was listed by 29 participants followed by 19 participants at a graduate level, and 6 participants at a PhD level. This means that 54 out of the 67 women (or 80.6%) who had created web pages had attended (but had not necessarily completed) university. This finding suggests it might be the access to computers (and possibly training) at university that afforded these women the opportunity to subsequently access the Internet and create web pages.

Reason for using computers and the Internet

Question 33, an open-ended question, asked participants why they began using computers on a regular basis. Again, based on the grrrl image I expected that reasons for using computers (and the Internet) would be hobby based instead of work based. However, nearly half of the participants said that they began using computers on a regular basis for some form of work. One participant, kk@ramtechnology.com wrote that the first time she used a computer for work "I was working for the Department of the Army and they said we were going to . . .

So I did."[23] Seven of the participants (10.4%) said they began using computers for reasons I had associated with the grrrl image: fun, games, curiosity and passion about technology. The rest of the participants began using computers for school, because they were available, or they felt they should learn a new and important technology.

Question 35 similarly asked (as an open-ended question) why participants began using the Internet. Participants generally had more than one reason for beginning to use the Internet. The majority of participants indicated that they began using the Internet because they wanted to communicate using e-mail, because of work, and because of curiosity about this new phenomenon, the Internet. A participant who did not want to be identified said: "We had it at work, no one was using it, and "someone" needed to know how to use it. I was the only one at the time with the time/inclination." Other participant responses indicated that other reasons for using the Internet were: because it was there, for research, for school, for children, for friends, for fun and to access the web.

Time Spent with Web Pages and the Internet

Three questions addressed time spent using the Internet and creating web pages. Question 4 asked how many web pages participants had created for personal interest, as part of self-employment, for other people on a paid basis, and for other people on a voluntary basis. This question sought to determine how much experience these women had in web page design

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[23] The identity of the participants has been determined by participants as part of the on-line survey. Many participants, like this one, chose to use their e-mail addresses at the time as their identity.

and if they were being paid to create web pages. Most of the participants had created web pages for more than one reason with 54 out of the 67 participants (80.6%) creating web pages for personal interests, 46 of the 67 participants (68.7%) creating web pages for other people on a paid basis, 45 out of the 67 participants (67.1%) creating web pages for other people on a voluntary basis, and out of the 67 participants, 34 (50.7%) had created web pages for self-employment.

Most participants had at one time created web pages for personal interests. However, the highest number of web pages designed by respondents were created for other people on a paid basis. The number of women who created web pages as part of paid work (for others or through self-employment) was much higher than I had expected partly due to the extensive work by participants in designing web sites which can contain anywhere from one to an unlimited number of web pages.[24]

Based on my experience creating web pages, I had expected the number of hours spent creating and maintaining web pages to be quite high. Participants were asked in Question 16 in general how many hours per week were spent creating and maintaining web pages (separate categories for personal, self-employment, paid work and voluntary work were not offered in this question). The mean for women who had created web pages was 12 hours per week and the mean for maintaining web pages was 9 hours per week. The hours were much lower than I

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[24] The older average age of the web page designers combined with the fact that at least half of the participants had created web pages as part of self-employment raises further issues for research.

expected.

The time participants spent surfing the Internet was near to what I had expected. The amount of time participants indicated they spent using the Internet was addressed in Question 37. The average time spent using the Internet was 32 hours per week, and ranged from 2 to 100 hours per week. The difference in time spent using the Internet compared to the time spent creating and maintaining web pages may mean that the time spent on the Internet, outside of web page design, is a time of research and learning for women creating web pages.

General Work Environment

My expectations about the grrrl image also influenced my assumptions about the environment in which web pages were created. Results suggested my assumptions did not accurately describe the survey respondents. Open-ended questions about the general work environment included questions about the use of job titles, where work was performed, what participants liked and disliked about their work environment and whether or not they had any difficulties accessing the Internet and WWW.

A number of e-mail lists I belonged to had lively discussions about how people defined themselves when they created web pages. Many of the discussions challenged the most common title, webmaster, because it was sexist. I expected respondents to reflect my earlier observations. Question 20 asked what title participants would give a person who had created web pages, and then asked if participants used it. Out of the 67 participants, 23 (34.3%) said they would give the title web designer, 6 participants (9%) said webmaster and 5 participants

(7.5%) said webmistress. The rest gave a wide variety of answers and 8 people (11.9%) did not answer this question at all. When asked if participants used the title, Theresa Caillouette, said: "I use 'webmistress' here at the college where I work. In my private business, I use 'web designer'. Everyone at the college already knows me. They know I'm lesbian and prefer to use feminine titles. In my private business, I know I'm more apt to obtain work by not indicating my gender." Another participant, who called herself Gambit, responded negatively when asked if she would use a title: "Nope—I think everybody and their grandmother is capable of authoring HTML (and they do), so it doesn't deserve special recognition."

Question 31 addressed participant's work space and work habits. It consisted of sub-questions asking where the participants created web pages, what their work places were like, their likes and dislikes about the work space, the time of day in which most of the web work was done and how they felt their environment influenced their productivity. The only expectation I had for responses to this question were based on past contacts with a number of women who created web pages from home. As part of the young grrrl image I had assumed that most women would create web pages from home in keeping with the home hobbyist image grrrls evoked for me and because I assumed they probably did not have access to the Internet anywhere else.

Question 31(a) offered participants the choice of indicating where they created web pages from. Participants selected all applicable answers. Multiple options included: home, home office, school, office outside the home and other. The largest number of people, (16 participants

or 35.8%) said that they created web pages from a home office. 10 of the participants (14.9%) said they created web pages in an office outside the home. Of the remaining participants, 9 of them (13.4%) created web pages at home, and 9 (13.4%) created web pages in a combination of home and office outside the home. Other participants selected various combinations of home, home office, school, office outside the home, and other places where these women created web pages.

The rest of the questions about the work environment were open-ended and the qualitative, subjective nature of the responses provided more detailed information about the lives and opinions of the participants. Question 31(b) asked individuals to describe their work space including their technology. Many people offered very detailed descriptions about their work environment, especially the technology. One participant, Elizabeth Bennefeld responded:

> We've converted the two upstairs bedrooms into computer rooms (and moved our living space into the storage/recreation area in the basement). My office contains a Kaypro 2 CP/M computer and Brother daisywheel printer; 486 DX-2/66 computer (2.1 Gig hard drive, 4X4 CD-ROM player, 28.8 modem, 24 MB memory. OL 400 laser printer and Alps MD-4000 printer/scanner. Running Windows 3.1, WordPerfect 6.1, Adobe PhotoShop, and assorted other stuff under what used to be DR-DOS (I think the most recent owner/upgrade is Caldara?). In the other computer room, we have a Pentium 60, 486 DX-2/66 and 486 DX-40 (networked), running Windows NT, Windows 3.1, and Linux (all networked); 4X CD-ROM, 14.4 modems, and an Okidata dot matrix printer. Also maintain a dedicated weather computer that processes downloaded feed from the GOES 8 satellite (so we can tell when the thunderstorms are moving in), and are working on another 486 DX-40 to process the EMWIN signal from the same satellite feed.

Other participants also referred to their physical space by talking about ergonomic issues such as positioning of equipment and lighting. Personal details also offered additional insight into the

lives of the participants. For example, one woman calling herself "muskie" humourously talked about her underwear and pizza boxes lying around the floor:

> Hmmm... (looking around): An AMD 586, 20 mb ram, 1.3 gig drive, running Win3.1 and Red Hat Linux, with a Canon bubblejet perched atop the minitower, all on a cheap Ikea computer desk. A writing desk to my right covered in random papers, used coffee cups, and napkins from the last time I ordered out. A TV cart to my left, holding my Tamarack flatbed scanner (also covered with random papers), and a few computer books. Boxes of random papers, books, and disks on the floor. A trash can overflowing with take-out food containers and pop cans. A bulletin board on the wall with computer parts invoices and the menus of several pizza parlors on it. Assorted bits of computer hardware stuffed in the corners of the room. A small pile of clean underwear atop one of the boxes that never quite made it to the wardrobe the other day. A halo of stale popcorn on the floor surrounding the folding chair I'm sitting on...
> A graphic enough depiction?? :-)

Another participant referred to her collection of Xena videotapes on the bookcase. Many women included descriptions of plants, views and animals in their work environment. In some cases the detailed chaotic description of women's work environments coincided with my expectations of the image of the grrrl at home. I envisioned grrrls busily immersed in local Internet culture (hence the chaos) and I also expected these female Internet gurus to have powerful technology at their fingertips (as was described in many of the participants' descriptions of their work environment). In both cases my expectations were well met.

When asked, in Question 31c, what participants liked about their work space, responses varied from participant to participant. Some general comments emerged about the comfortableness of the space and the sophistication of the technology available to participants.

shinder@dallas.net wrote:

> Much thought and planning went into it. It is arranged for optimum convenience, is close to my husband's office (one room away) while still affording us each privacy, gives me a view that is soothing and peaceful and allows me to work while at the same time being close to my family if they're using the entertainment center or relaxing on the sofa in the living area.

Responses to Question 31(d) listed many reasons why participants disliked their work environment. Most of the responses focussed on needing more technology or a better office including ergonomic issues like supportive chairs and lighting while others said that there was nothing that they disliked about the work space and technology. Other answers included: do not like sharing work space, disliked poor lighting and/or no view, did not like isolation, office was too messy, not enough separation between home and office within the home, need for technical support, sore wrists, and the desire to constantly upgrade the technology.

Participants were also asked what time of day they usually created web pages in Question 31(e). Out of 67 participants, 25 (37.3%) said that it varied, 9 (13.4%) said during the day and evening, and 5 (7.5%) people responded each for evenings, morning, and morning and afternoons. Finally in Question 31(f) participants were asked if they thought their work environment influenced their ability to create web pages. Esther Ella Small responded "NO, creation comes from within." The rest of the open-ended contributions that indicated respondents felt their work environment influenced their ability to create web pages varied. "Yeah. I just wouldn't feel as free in an office building with other people and distractions. It is easy to feel creative when you're wearing pajamas" responded kennedyk@teleport.com.

The last question related to the workplace environment was question 46 which asked if participants had any problems accessing the Internet or WWW. Out of the 67 responses, 29 (43%) said they had no difficulty. A participant who wanted to remain anonymous said: " I don't have any difficulties with it, it works great for me. I'm not a victim and I'm well-adjusted that way. :-)" From the participants 18 (27%) did not reply to the question, and the remaining 20 participants (30%) related problems with data lines or Information Service Providers, indicated that they did not have enough time after work to create web pages, that they did not have enough money, that family needs interrupted them, that phone costs were a barrier or that language problems were a barrier. One respondent indicated that phone costs in Germany were a problem. One woman identifying herself as Tamra Heathershaw-Hart, WebDiva said "I have chronic fatigue, and during a relapse all I do is sleep." Many of the responses indicating participants had difficulty accessing the Internet, correspond to the issues raised in Clement and Shade's (1996) access rainbow.

6.3 Learning to Create Web Pages

There were a variety of questions in this section that addressed how these women had learned to create web pages. The most relevant of these questions addressed how respondents specifically learned to create web pages, the methods by which they learned, whether or not they used special computer software called HTML editors to create web pages, and whether or not they created web pages with other people.

Question 5 elicited multiple response open-ended answers in replying to why the

participants learned to create web pages. The most frequent responses to Question 5 indicated that web page design was learned by 29 participants because it was required at work (43.3%). An additional 11 participants (16.4%) said they learned because creating web pages was new, fun and exciting. Naomi Tropp writes: "Initially, I learned so that I could create my own site. Then when I found that I was really good at it, I created some sites on a voluntary basis for woman (sic) owned businesses. Now I'm continuing to develop my skills as I am starting to charge for my services." And emily@exo.com writes "Because I could. :) I love everything about the Internet and the WWW and I wanted to be a part of it. I got so much out of it that I wanted to give a little back. It's also a way to express my creativity. My work in this medium is judged by it's quality rather than by my credentials of lack thereof." And finally one respondent wrote that learning to create web pages was "therapy after the death of my unborn daughter." Each of the participants had their own reasons for learning to create web pages and they varied from woman to woman.

Question 6 asked participants to check off all the methods that were applicable to them in the process of learning to create web pages. These methods included learning from Hyper Text Markup Language (HTML) coding, from on-line help, from book(s) and/or magazine(s), from a friend, from a course and from a source other than indicated. Looking at other people's HTML was the primary method by which 62 of the women (92.5%) learned to create web pages. The second most popular method cited by 50 participants (74.6%) was from on-line help such as other web pages, newsgroups and e-mail lists. Question 6 also provided a

place for open-ended comments about which of the methods listed participants had learned the most from. Of the 67 participants 24 (35.8%) said they learned the most from the HTML code. One respondent, sallie@abs.net says "Trite, but a picture (example) is indeed worth a thousand words. It was invaluable to find an example of a feature, view the code, and adapt from there." Marion Lignana Rosenberg writes: "Courses and friends were the most helpful, because mystifying technical jargon was largely absent and we focussed on CREATING, not on congratulating ourselves on our ability to use obscure, exclusionary language." Of the 67 respondents 9(13.4%) did not respond to this question.

Question 7 was open-ended and asked if participants used an html editor (which is a software program that does not require as much time and knowledge compared to manual data entry and programming). Out of 67, 40 (59.7%) said yes, they used an editor and 27 people (40.3%) said no. When asked why participants used an editor three main answers emerged: a) to help with organization or outline of work; b) to save time; and c) a combination of pre-formatting and manual data entry. Muskie, a participant, wrote: "Yes...I use several editors, mostly to speed coding. They help ease the <TD>ium;-) ." Question 7 also asked why participants did not use an editor. Responses primarily suggested that the women did not like to use an editor because they liked to control the layout of the web page, they like to use notepad (a manual way of programming web pages) and that editors created messy HTML code. Marion Lignana Rosenberg wrote: No, "Because Notepad works just fine! Contrary to what the corporate media would have us believe, this process is SIMPLE. Why complicate it with

unnecessary tools?"

Finally participants were asked if they generally created web pages with anyone else. Multiple responses were given for this question. Out of the 67 participants, 27 participants (40.3%) said that yes, they collaborated with other people but only because it was part of their job requirement; 14 (20.9%) said that no, they do not collaborate with anyone (whether at work or not); 10 (14.9%) said that they create with a team because it produces good results (but did not specify whether or not it was in a work setting); and 8 (11.9%) said that they create with other people but they prefer not to.

6.4 Women's Experiences During Web Page Design

Questions in this survey also dealt with the experiences of participants and subsequent opinions the participants had about web pages, the WWW and the Internet. Question 2 directly addressed issues of race, class and gender on the Internet by asking participants to check off either race, class or gender, (and subsequently comment upon their responses) if they perceived that these issues were visible on the Internet and WWW. Of the 67 participants, 10 (14.9%) said they thought race was visible on the Internet, 24 (35.8 %) thought economic class was visible on the Internet and 32 participants (47.8%) said gender was visible on the Internet. Qualitative open ended comments were then offered by 56 out of the 67 participants (83.6%) regarding race, class and gender. Cindy Wambeam wrote:

> Language, whether text-based or graphics-based, has inherent social cues – because language is itself social and socialized. And, our culture makes assumptions about types of languages, descriptions, and life styles. I once was carrying on an interaction with a man via the Internet. We had never met f2f,

> but I was advising him on some tech communication things. One day, while we were speaking via a chatline, he asked why I was home in the middle of the day, and when I told him it was because I was teaching that night, he asked what I was teaching. I told him African-American music. His response was "oh" -- followed by hanging up. He never spoke with me again. Since many people assumed I must be black because I was teaching AA Studies (I ran into that both off the net and off...phone conversations, for instance), I could only assume that his reaction came from the same spot. Interestingly, I am not black, but I was pretty incensed by how he treated me.

Other participants suggest that the Internet is a neutral place. One participant, marisa@andromedia.com writes: "I think that ALL and NONE are visible within the limits of what people reveal on their pages. I think the web is great at eliminating race, class, or gender as long as people do not choose to reveal it." In response to the question about issues of gender lzemenek@creative.net writes:

> It seems to me that women who are really into the Net are willing to be "out there" as women in order to show just how important the Web is for us, and that we are every bit as capable and interested in these technologies as men. Also women communicate differently than men and therefore design and/or write differently. Maybe it is just because I am trained in several fields that helps me to discern this, but I find it fairly easy in most cases to identify the creator of most sites as male or female.

Question 3 asked participants to respond qualitatively to a question about what they enjoyed about creating web pages and many participants offered more than one explanation. The most common reason given for enjoying web pages by 37 participants (55.2%) was for the artistic and creative outlet it provided. Susie Gardner-Brown wrote: "I just like creating interesting looking pages, and thinking - wow, I did that! I only do this for work at the moment, so I can't say anything about meaningful projects or anything! But I love the way it's stretching

me to learn new and interesting skills." Additionally, 16 participants (23.9%) described the enjoyment they got from the challenge of web page design. A woman who wished to remain anonymous wrote: "It is like a puzzle--I like HTML because although it can be frustrating, after you 'fix' something, there is great satisfaction because you can immediately 'see' it. I also like using my writing and editing skills." Other answers indicated that participants liked the flexibility of publishing, inexpensiveness of publishing, the combination of different mediums and the freedom to publish any information.

Question 14 was open ended and asked participants what they disliked about creating web pages. The most frequent responses indicated that 12 respondents (18%) disliked the tedium of upkeep and maintenance of web pages. One participant, Katie, writes that she dislikes client expectations about web pages:

> I find that clients often have an idea about the web that is unrealistic. I can create a very good web site for a client and then be told that it isn't flashy enough, or it's not an instant business hit. The ISP I work for uses salesman to sell our design services to local businesses, and the salesman often make the web sound like the business opportunity of the century. When clients don't experience immediate success, they may get testy. Also a well-designed web site is often not catchy enough for clients without much web experience. I've had clients want sites filled with animated .gifs and jumping icons that would annoy even the most tolerant visitor.

An additional 11 people (16%) reported that there was nothing to dislike about creating web pages. Combinations of other multiple responses included disliking the limitations of software (n=6, 9%), the amount of time required (n=5, 8%), not being skilled enough to create what they wanted (n=4, 6%), working alone (n=2, 3%), stress injuries (n=2, 3%), poor

information service providers (n=1, 1.5%) and incompatible WWW browsers (n=1, 1.5%). My own dislike of the need to keep on top of changes in web design (including changes in computer software and hardware) did not appear in participant responses. This suggests that instead many of the participants felt comfortable with the constantly changing standards for web page design.

Question 25 asked participants if in their opinion standards should be created for web page design. Open-ended responses included the following themes: no, they liked the freedom of the Internet without standards (n=15, 22.4%); yes there should be standards for HTML but not creative design standards (n=12, 17.9%); no, there should be no standards because the web is self-regulating (n=9, 13.4%); Yes, there should be standards (n=8, 11.9%); Yes, browsers only (n=5, 7.5%); Yes, standardize HTML (n=5, 7.5%); No, there should be no standards (n=4, 6%); Yes, standardize both HTML and browsers (n=3, 4.5%); not sure (n=1, 1.5%) and no response (n=4, 6%). These responses matched my expectations regarding the grrrl image with the majority of participants rejecting restrictions upon web page design.

Question 27 asked participants to rate their own web pages in comparison to others they had seen on the WWW. Web pages were described as better than most by 17 participants (25.4%). Helen Challans writes: "hmm I candidly admit I have much to learn...like many out there...but some of my pages I believe are superior to many professionally done sites...I mean microsoft's site is legendary... (for its over engineered, 'look aren't we clever designers'

approach)...impressing only other designers is a lousy way to design." Other responses indicated that respondents felt their web pages needed work, the pages were constantly improving and that they considered the pages 'cool and up-to-date'.

Question 28 asked if the participants thought there were differences in the way men and women create web pages. No difference was offered by 18 people (26.9), 17 people (25.4%) said they did not know, 10 people (14.9%) said that yes, men used more bells and whistles than women, 5 people (7.5%) simply said yes, 4 people (6%) said yes, women were more conscientious, 3 people (4.5%) said yes, but they can't explain why, 3 people (4.5%) did not respond, 2 people (3%) said yes, but only because men seem to feel more comfortable with computer programming than women, 2 people (3%) said yes, men disclose more personal information and 1 participant each (total of 6%) said yes women do more volunteer pages, yes, men are more in your face, and women have a better sense of design. One participant who did not want to be identified wrote: "I'm not willing to fall into this. I certainly think that tech orientated people design in a very different way than creative or art orientated people do. There just seem to be more male tech-heads, though that's certainly not always true & seems to be changing all the time." These responses indicate that 52.2 % of the participants (n=35) did not believe or did not know if there was a difference between women and men in the design of web pages.

Question 29 asked participants to see if they thought there were any differences in the way men and women use the WWW. General themes emerged with 16 participants (23.9%)

who said that yes, women use the web more for communication than men who use it as play; 15 (22.3%) women said they did not know if there were differences; 11 (16.4%) women said there was no difference; 7 (10.4%) said yes, there were differences (but did not describe them); 5 (7.5%) did not respond; 3 (4.5%) said yes, men are using the WWW more for sex-related topics; 3 (4.5%) said yes, women are more hesitant to explore and try new things on the WWW; 2 (3%) said women were more practical; 2 (3%) said that yes there were differences but they were marginal; 1 (1.5%) said that women were intuitively better at using the WWW; 1 (1.5%) said No, there are not any differences but women are more likely to admit it; and 1 (1.5%) said that yes, men promote using the WWW whereas women provide helpful information. The results from this question again confirm the division between participant's opinions about the gender and the use of the WWW.

Question 30 asked if women thought that creating web pages had affected the way they interacted overall with technology. Out of the 67 participants, 35 (52.2%) said no and 12 participants (17.9%) said no, they were always competent with technology. Mary Kohmuench wrote: "No. I was doing those things long before I ever heard of the web. More likely, my tendency to tackle such tasks – traditionally considered 'male' – is responsible for my becoming involved in web authoring." An unidentified user wrote: "Well, not really. I think learning about computers in general has. I set my own VCR, I set up my vcr and cable, and set up my computer. My son brags that his mom is smart because I know about computers and the Internet. That makes me feel good!"

Question 38 asked if the participants considered themselves to be part of an Internet community. Out of the 67 participants, 55 (82.1%) said yes. One participant, shinder@dallas.net writes:

> Much of my social interaction is with members of mailing lists and other friends with whom I communicate either solely or primarily online. I met my husband on the net, and stay in touch with my daughter who lives in another part of the country via the net. I have many friends in the police community (I am a former cop and now a law enforcement writer and trainer) all over the world who I met via the net, some of whom I've met in person and some of whom I haven't.

Participation in an Internet community directly relates to issues about Internet access. An Internet community can act as an informal support network for web page designers as an on-line method for exchanging knowledge and skill.

6.5 Summary

This chapter has related the most significant research results obtained from the on-line questionnaire entitled *Creating Web Pages: Women, Technology and Skill*. The results were presented in conjunction with the three main research questions that have informed this research: who the women are who are creating web pages, how these women learned to create web pages and what their experiences have been during this process.

The average age of the participants was 38, which was much higher than I had expected. The high levels of post-secondary education of participants was also unexpected. Work was the main reason many participants first started using computers, surfing the Internet and creating web pages. Participants most enjoyed the creative and artistic aspects of web page design. The home office was the primary area in which the participants created web pages. The

qualitative descriptions of the participants' work environments were explicit and rich in their information. The primary reason participants liked their work space was because it was comfortable. And finally, when asked what the participants disliked most about their work space, the most frequent responses stated that they did not have enough technology, comfortable office furniture or enough work space. A further discussion of these results will occur in the next chapter.

Chapter Seven: Discussion

7.1 Introduction

Many of the results of this research surprised me. When I began researching I had wanted to find out what the women were like who I assumed had circumnavigated the obstacles I had encountered when I began using the Internet. I had hoped to understand what gave them their confidence and technological competence. I wanted to understand how they learned to create web pages and what their experiences were in the process. And once found, I wanted to be able to liberate all those women who were not yet empowered to go on-line. I realize now that naively I expected every participant to be a grrrl. What I found was a diversity of individual women.

The grrrl image represents for me a stereotype of women on-line. I saw grrrls as publically using the Internet to challenge women's rights on the information frontier. Instead, what I found from the research was a wonderfully diverse mix of women responding from North America (the largest number of participants), Australia, Israel, Germany, Sweden, Britain and New Zealand, many of whom I would characterize as having strong opinions and attitudes.[25] It was the strength of many of these women's views that surprised me the most. When I began the research I was seeking categorical information about the experiences of women web page

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[25] Although not part of the research I loosely tabulated the geographic location of each of the participant's e-mail address.

designers. I had not expected to receive such strong, mature, independent, witty, insightful and not-always-positive opinions. The responses from these women were more mature, insightful and well-thought out than anything I expected from a now seemingly one-dimensional grrrl. In other words, most of the qualitative data collected painted a portrait of the participants as much more multi-dimensional than I had imagined.

In this chapter I will discuss these women's responses to my questions in relation to the general themes which emerged. I will begin with a review of the characteristics and tone of participant's responses which emerged such as humour, disdain and elitism. I will also discuss themes emerging from participant's perceptions about gender and the Internet, participant's demographics, and their work environment. I will also examine participants' personal disclosure and pride in technology. Finally, I will conclude with a discussion of the implications the emerging themes suggest for future research.

7.2 The Characteristics and Tone of Participant Responses

The characteristics and tone of the responses received from the participants were diverse and ranged from disdainful to self-effacing. At first, I took personally all the negative comments and was disappointed by comments that did not fit my expectations about the technological oppression and subsequent liberation of women. Many of the responses provided me with a good laugh. Participant's comments challenged my preconceived notions, and I began to see the respondents in a new light through their comments.

Humour

Humour was the primary characteristic and tone that emerged from many of the women's responses. Many women made frequent use of emoticons or smileys to show that they were making a joke. [26] Gilbert and Kile (1996) suggest that the purpose of smileys is "to pump a little inflection into affect-deficient ASCII text-based communications and alert your readers to your state of mind. Until you have become embroiled in a flame war because someone misinterpreted or took offense at a message you meant sarcastically or as a joke, you can't fully appreciate the importance of these weird little ASCII glyphs" (p. 86). For example, one woman writes: "Uhhhm, I'm a Unix addict :)" to signify that she is smiling after her statement. Herring (1996) suggests that women and men communicated differently using the Internet where "women preferentially evoke an ethic of politeness and consideration for the wants of others, especially their desire to be liked and ratified, while men evoke an ethic of agonistic debate and freedom from rules or imposition" (p.117). In response I would suggest that from my personal experience the use of smileys speaks directly to women's desire to be liked on-line and also opens up questions about gendered communication and the Internet.

Disdain and Elitism

Very few of the responses were disdainful and elitist, but the ones I did encounter that were disdainful or elitist at first affected my own self-confidence and willingness to work with

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[26] For example, the following smiley suggests that the author is smiling :) . The smiley : (would suggest that the author was sad.

the data. I define disdainful responses as responses which challenged the validity of the research and my authority and competence as a researcher. For example, question 25c asked how web design standards (if any) should be enforced. One participant replied: "With guns, whips and chains. What a stupid, stupid question. . . we're talking about "design", not illegal drugs. Design can't be enforced - only laws can be enforced." While many other women also felt this way, the tone of their replies were more courteous with a "no they should not be enforced" or "no, standards become self-regulating."[27] Some participants also offered elitist replies. I classify elitist replies as suggesting that use of technology in general and the creation of web pages in particular, should come naturally to everyone because it is an extremely easy process. For example, question 22 asked participants if they thought learning to create web pages should be a formalized process. Examples of answers include: "no...it isn't rocket science" and "you mean, like for a credit class? You must be joking." Another participant replied in response to whether or not she used a template or HTML editor to create web pages: "Editors are for wimps! Real designers write their own code." These responses struck me as elitist because they did not recognize that everyone may not be able to access the Internet and engage in web page design with the same degree of ease. Elitist responses like these prior examples show that these women have strong opinions about, and a great deal of confidence in

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[27] The propensity for people to "flame" (to be hostile, use insults and swears, and to use intense language), is discussed by Walther and Burgoon (1992). The authors discuss how lack of "social context cues" can affect computer-mediated communication, where solutions to flaming are possible once interactions are built up over time.

their technological abilities. Such responses suggest that for these respondents, accessing the world of computers and the Internet was not a challenge. These women had not had experiences that I had assumed were common to most women on the Internet, or had not viewed their experiences as I had.

7.3 Perceptions about Gender and the Internet

A discussion of gender and the Internet involves complex and subtle interactions of social (or cultural) and technological networks. Previously I discussed actor network theory (ANT) in relation to gender. Gender can be seen as a large and powerful network because almost all cultures give power to it. Recognition and translation of gender can be accomplished by invoking categories of biology, language and social norms. Actors within the network of gender become important agents of change when they subvert stable networks. Women who create web pages and declare themselves technologically competent can also be viewed as subverting power networks.

Prior to starting this research I had declared women who created web pages as agents of change, as grrrls who were challenging myths about gender, technology and the Internet. I had assumed that most women designing web pages would have strong opinions and attitudes. I erroneously linked this propensity to have strong opinions and confidence in oneself to the geekgirl/grrrl image. Expecting all participants to be grrrls also plays into an assumption about who is 'good' with technology and ends up creating a one-dimensional image of women who

create web pages. I still classify women designing web pages as agents of change simply because women are subverting a network of male-dominated technologies. But, two different categories of women as agents of change regarding gender and the Internet have emerged from this research.

I define the two categories of agents of change as: 1) agents of inequality and 2) agents of choice.[28] I will first explore the idea of women as agents of inequality - women who see inequality on the Internet. These women are concerned with issues of access to all areas of the Internet and some suggest that restrictions are present in relation to networks of gender, race and socio-economic class. Question 2 asked participants in separate sub-questions if they thought race, class and gender were visible on the Internet. Out of the 67 participants, 10 (14.9%) said race was visible, 24 (35.8%) said class was visible, and 32 (47.8%) said gender was visible on the Internet. Participants were also given the opportunity to comment about their answers to question 2. One participant, emily@exo.com says "All are visible to one degree or another. Gender is highly visible, as is sexual orientation. Race less so, but still there. I have seen some discussion of class issues but not nearly enough. Obviously the less privileged the class the less likely they are to have a significant presence on the web because of lack of access."

Women who are agents of choice tend to say that issues about race, class and gender

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[28] I need to state that both of these groups of women are different but equally valid. One group is not more important than the other.

can be invisible (or visible) if we choose them to be and tend to see the Internet as a method of creating equal identities. Responses from women I classify as agents of choice suggest that individuals have a choice about disclosing gender, race and class on the Internet. For example, kk@ramtechnology.com said that she did not think race, class or gender were visible "unless you are dealing directly with those particular groups of individuals who choose to segregate themselves that way. The great thing about the Internet is that it does not matter who you are, or where you come from, or anything else for that matter."

Categories of agents of inequality and agents of choice correspond to the translation of power according to ANT. Translation is the process where "the spread in time and space of anything - claims, artefacts, goods - is in the hands of the people; each of these people may act in many different ways, letting the token drop, or modifying it, or deflecting it, or betraying it, or adding to it, or appropriating it" (Latour 1986, p. 267). Both agents of inequality and choice have taken up the claim - deciding whether or not race, class and gender are visible on the Internet. Women who are agents of inequality modify the claim by saying yes, that race, class and gender are visible on the Internet whereas women who are agents of choice also modify the claim by saying no, these issues are not present unless you choose them to be. Agents of inequality contribute to an awareness of gender as a source of on-line inequality, while agents of choice contribute to the invisibility of gender as a source of inequality on-line. In the next section I will discuss the demographics of respondents, and particularly how these relate to agents of inequality and agents of choice - both whom I see as under a larger category

of agents of change.

7.4 Demographics: age and education

Although demographics have been reported in the previous results chapter, there are a few interesting points I will elaborate upon here, related to the notion of women as agents of inequality and agents of choice. Concurrent with my initial expectations about this research, I had anticipated that the ages of the participants to be in their early to mid twenties because that was the age range I had associated with the grrrl image. I was surprised when the mean age of the women turned out to be 38 and reached as high as 57 years old. The level of education obtained by the participants was also interesting. Out of 67 participants, 54 (80.6%) said that they had attended university. I would suggest that this high level of education may have contributed to the confidence of these women or even that confident women seek out education (and supposedly gain better access to resources such as the Internet).

Age also played a factor in relation to women as agents of change. Women I have called agents of inequality tended to be below the mean age of 38. Women who I have identified as agents of choice tended to be above the mean age of 38 (see table 2). These results hint at a relationship between age and ways of thinking about the Internet.

Table 2

Age of participant and attitudes regarding gender and the Internet

Participant Age	# of participants who said gender was visible on the Internet (Agents of Inequality)	# of participants who said gender was not visible on the Internet. (Agents of Choice)
19-38 years old	21	11
39-57 years old	13	22

The possible relationship between the age of participants and whether or not they thought gender was visible on the Internet (as seen in table 2) warrants further research. I can only present loose speculation about the many reasons why this possible relationship might exist and my answers speak directly to the issues raised earlier in chapter two about universal access to the Internet using Clement and Shade's (1996) access rainbow. For older women (agents of choice) access to the Internet and the visibility of gender are viewed as based upon an individual's choice. It also suggests that there are not many obstacles in place regarding universal access to the Internet. In comparison, the women in the younger group (agents of inequality) may have found access to the Internet more difficult to obtain and may see gender as a barrier to accessing the Internet. These are very cursory speculations and the relationship requires further investigation.

7.5 Personal Disclosure and Pride in Technology

Two themes - personal disclosure and pride in technology - emerged from participant

responses to questions about their work environment. When I created this question I had expected brief answers. Out of the 67 participants 38 (56.7%) did not conform to my expectations. Instead I received 38 (56.7%) richly descriptive responses about work environments. Out of the 38 responses, 18 women (26.9%) presented in-depth descriptions about their technology and about their personal involvement with the work space. For example, kennedyk@telport.com wrote:

> Roll top desk, Power Tower Pro 225, a couple of external hard drives, speaker phone/modem, scanner. Another old desk with a PowerMac, zip drive, color printer, oak file drawers, bookcases loaded with old books, magazines, and art. An overstuffed loveseat, my childhood rocker, lots of paintings (flower & beach scenes), big oriental fans, masks and hats on wall, my marionette hanging from a pair of hands, big jade plant, stuff like that.

And another woman who did not want to be identified wrote: "Pentium, monitor, 28.8 modem, Hot Dog and Hot Metal, Netscape Personal Edition, Eudora, Chameleon software. My home computer is on top of my grandmother's desk, which is nice! She would have been proud of me, I think!" Both of these examples include personal disclosure and reflect respondent's enjoyment in their technology.[29] More specifically personal disclosure refers to women describing personal objects like their grandmother's desk or their pictures and plants. Enjoyment and pride in their technology is characterised by descriptions which say more than the basic 'I have a computer, monitor and printer.' The number of in-depth responses to this question becomes even more significant when the length of the survey is taken into consideration. This was the 31st of 51

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[29] The descriptions of the technology at the time were high quality and expensive computers and associated equipment.

questions and many of the participants might have been tired of answering questions by this point, so for them to have answered the question in such detail possibly indicates enthusiasm (for at least 38 of the women) about their work environment.

7.6 Learning to Create Web Pages and The Access Rainbow

Women who have learned to create web pages have also successfully navigated (informally or formally) the layers of access presented in Clement and Shade's (1996) access rainbow. By comparing data obtained from participants in relation to the access rainbow we can explore in detail how women navigated the layers of Internet access to learn and create web pages. I would now like to explore each of the seven layers of the access rainbow (governance/policy, literacy social facilitation, service providers, content/services, software tools, devices, and carriage facilities) in relation to participant's responses.

The uppermost layer of the access rainbow is governance and policy. In chapter two I suggested that social norms and beliefs should also be included in this category (or at least be included in a category of similarly broad social scope). Many businesses (including government) have embraced the technology of the Internet and in particular, the need to perform business or electronic commerce on the WWW. As result some businesses have changed policies and procedures to favour Internet usage. Creating an Internet presence on the WWW has required businesses to hire or train employees to become web page designers. The most common answer from the 67 participants (n=29, 43.3%) in response to why they began creating web pages was for work. In order for participants to be able to create web pages as part of work, two

events affecting the Internet must occur. First governments, institutions and businesses must support the need for the Internet - they must recognize the valuable translation of work (the compressing of communication over time and distance) that the technology of the Internet can perform for people. And second, there must be a demand in the paid job market for web page designers. And, if we introduce social norms and beliefs into this formula there must also be the belief that both women and men are seen as technologically competent web page designers. Norms and beliefs also impact access to the Internet. Some participants (n= 11, 16.4%) also said that they began creating web pages because they thought it was fun, new and exciting. This reason for creating web pages is predicated upon beliefs about the Internet. If participants believed that creating web pages was too challenging or took up too much time, then they may have never decided to begin designing web pages. The process of learning to create web pages is addressed in the next layer of the access rainbow - literacy and social facilitation.

In Clement and Shade's (1996) access rainbow, literacy and social facilitation refer to the ways in which people learn (both formally and informally) to use the Internet. Of importance for this research is the way in which women learned to create web pages. I will address this learning process by looking at responses to three of the questions in the on-line survey, a) the methods by which women learned to create web pages, b) whether the participants collaborated with other designers and c) if women considered themselves to be part of an on-line community.

The primary method by which 62 (92.5%) participants learned to create web pages was by looking at other people's HTML code. Looking at other people's code on the Internet

usually requires the user to select the 'view source' command (available on most WWW browsers) while stopped at a web page. The ability to look at other people's code requires two pieces of knowledge. First, an individual must know how to look at other people's code by selecting the command view source. Second, the process of looking at other people's code is an informal process. Learning to create web pages through such an informal process suggests that, except for access to a computer and the ability to use it, there are few social or economic barriers to learning to create web pages. However, it is my experience communicating with other web page designers that informal support systems (talking to other web page designers) are also valuable in the process of creating web pages. In other words, other people and/or an Internet community can be helpful in creating web pages.

Participants were asked in an open-ended question if they collaborated or communicated with anyone in the creation of their web pages. Multiple replies were given. Of the 67 participants, the most frequent theme which emerged from the replies was (by 27 women or 40.3%) was yes, that they collaborated with other people because it was required at work. While there may be both positive and negative aspects of required collaboration in the creation of web pages the fact that other people exist in this process suggests that a formal or informal support system exists for these women on a social or technical level. A support system (as one layer of the access rainbow) can also exist in the form of an Internet community.

When participants were asked if they belonged to an Internet community (which I define as an on-line method of informally communicating on a regular basis) 55 women (82.1%) said

yes. Some examples of the kinds of community women listed were e-mail lists such as Spiderwoman and webgrrls (both electronic methods of communicating about web page design and related Internet issues for women). Out of the 67 participant's, 3 participants met their fiancee or husband on-line (furthering the idea that meaningful relationships can exist at some level on-line). I suggest that access to informal support, such as an Internet community, meets the requirements of social facilitation mentioned in Clement and Shade's (1996) access rainbow and subsequently is one of the reasons why some of the participants have succeeded in creating web pages.

Service providers are the next layer of the access rainbow. In order for participants to create web pages they have to be able to access the Internet through a service provider. When participants were asked at the end of the survey if they had any circumstances which made it difficult to access the Internet, 8 of the participants (11.9%) said that they had inadequate connections to service providers and/or that the cost of the service provider was too much. The cost and quality of the service provider can become a barrier to accessing the Internet for the purpose of creating web pages, but for 59 of the respondents (88.1%) it was not a barrier.

The usefulness or the content and services provided on the Internet is the next layer in the access rainbow. This layer relates to how women learn to create web pages. Internet sites such as the World Wide Web Consortium (www.w3.org) provide standards for HTML code. Many other web sites provide free and demonstration software downloads on their web pages - which can cut down on the cost of software. Many graphic artists also provide free (but

copyrighted) pictures to be used on web pages. Other web pages provide snippets of advanced code such as Java that can be downloaded and implemented into an author's web page. The amount of services and information on the Internet regarding the design of web pages is extensive and relates back to informal methods by which women learn to create web pages.

Software tools (as the next layer) can also affect access to the Internet. HTML editors are often used in the creation of web pages because, like word processing software, they only require a button to be selected instead of manually writing out the requirement. The use of HTML editors can subsequently make the creation of web pages easier. Participants were asked if they used any HTML editor while creating web pages, and why they did or did not use one. Out of the 67 participants, 40 women (59.7%) said that they used an HTML editor in order to organize and save time in the process of creating web pages. Having the software helped cut down on the time needed to create web pages.

Devices refer to the computer hardware involved in accessing the Internet (and creating web pages). Section 7.5 presented earlier in this chapter shows the pride participants had in relation to their computer technology. The pride in this technology suggests that many of the participants had expensive, quality computer equipment - helpful for creating web pages, particularly as new designs in web pages become more sophisticated.

The final layer of Clement and Shade's (1996) access rainbow is carriage facilities. This refers to the infrastructure required to participate in on-line activities, such as telephone wires. Only one participant from Germany, when asked if there were any barriers to creating web

pages, replied the high cost of telephone time. This means that for 66 (98.5%) of the other women creating web pages, there was adequate infrastructure in place for access to the Internet.

7.7 Summary

This chapter provided discussion of some of the more interesting research results such as the emergence of the categories of women who are agents of inequality and agents of choice. Discussion of the participant's responses addressed the three initial research questions, and additional themes (humour, pride in technology, perceptions about gender and the Internet) emerged from the replies. Humour was interjected into many of the women's qualitative responses with elitism about their ability to create web pages occasionally emerging as another characteristic of responses. One of the primary reasons women began using computers and the Internet was for work. And, while many women began creating web pages as part of work, the majority of women stated that they enjoyed the creative and artistic aspect of web page design. Work environments were categorized in different ways by the participants with the majority of women working from a home office which they described as comfortable. Perhaps the most important aspect of the women's comments was the emergence of distinctly different attitudes regarding the visibility of gender on the Internet. Women were either passionate in their belief that gender was an issue on the Internet (agents of inequality) or passionate in their insistence that the portrayal of gender on the Internet can be a choice (agents of choice). The majority of women who I categorized as agents of inequality ranged in age from 19 to 38 and stated that

gender was visible on the Internet (usually whether we wanted it to be or not). The majority of women who I categorized as agents of choice ranged in age from 39 to 57 years old and stated that gender was invisible on the Internet if people chose it to be invisible. The themes that have emerged from the participant's responses raise further questions for research.

Chapter Eight: Conclusion

8.1 Introduction

I began this thesis talking about my experiences with computers, the Internet and the WWW in relation to gender. Informed by my personal experiences I wanted to research the women (and grrrls) who in my opinion, were challenging myths about gender and technology by creating web pages. My three research objectives were to discover a) who the women creating web pages were, b) how they learned to create them, and c) what their experiences were in the process. In chapter two, I introduced the pre-requisites needed for Internet access using Clement and Shade's (1996) access rainbow. In chapter three, I introduced a modified actor network theory (ANT) which recognized the negotiation of power between humans and in relation to technology, and recognized the relationship of gender in relation to technology. A review of the literature regarding women, society, technology, computers and the Internet also supported a need for more information about women and the Internet. The questionnaire I published online for women to answer was designed to cover important aspects of the research questions informed by an awareness of the pre-requisites required for Internet access, ANT, prior literature and my construction of an exploratory and descriptive research methodology. Many of the 67 participants responded in-depth to the qualitative open-ended questions and as a result added further depth and dimension to the research data. Several of the results also challenged my assumptions and expectations.

Because the research consisted of self-selected participants who represented a particular

sub-set of women web page designers, and relied largely upon qualitative data (which was in many cases coded so responses could either be analysed for their emerging themes or so that the data could be captured quantitatively), the findings cannot be generalised. The characteristics of participants' views emerging from the data were diverse. Views about gender and the Internet generally occurred in relation to age. Participants who were below the mean age of 38 tended to see gender as visible on the Internet (whether people wanted to or not). I labelled these women agents of inequality. Participants who were above the mean age of 38, tended to see gender as a choice to be visible or not. I labelled these participants as agents of choice. I suggested that longer life experiences and high levels of education may contribute to the confident and well thought out responses many of the participants offered in this research. Finally, I discussed the motivations behind women using computers, the Internet and learning to create web pages in relation to Clement and Shade's (1996) access rainbow. Many women related details of personal pride and disclosure in their work environment and were enthusiastic and proud of their technology (which included computers, modems, printers, scanners, and elements of newness and speed).

This research was designed to provide a descriptive look at women creating web pages particularly since at the time the research was conceived there was very little existing research about women and the WWW. This research has opened room for further discussions about gender and the Internet, perceptions of women using the Internet and questions about work environments in general, and particularly about home offices.

8.2 The Visibility of Gender on the Internet

Spender (1995) talks about how off-line values regarding gender (for example, who drives the car when there is a choice between a man or woman driving) have been transferred online. Herring (1996) supports this conclusion by saying:

> Because of the "mediated" nature of the medium, messages posted to others are decontextualized and potentially anonymous, free from physical cues to the sender's sex, age , race, able-bodiedness, attractiveness and so forth. Never mind that users overwhelmingly choose to forgo the anonymity option by signing their messages. Never mind that similar claims could be made about letter writing, which is hardly gender-neutral. People wanted to believe in the potential of the new technology for equalizing social relations, and thus the assumption of gender neutrality initially was not questioned (p.116).

I would also suggest that gender is present on-line simply because there are so many on-line areas dedicated specifically to gender. One participant responded to the question about the visibility of gender on the Internet by saying: "But enter chat rooms, join the mailing lists, and it is gender that determines behaviour and treatment, and many other factors." The fact that people chose to respond to my on-line survey, which clearly stated the topic was women, is proof that all of these participants find the issue of gender, in some form, important in relation to the Internet. This leads us to the question of whether it is useful to view the Internet as a gendered phenomenon.

I can only speak to the question of gender on the Internet from a personal perspective. On one hand, I like the flexibility of having my e-mails listing my name as only F. MacGregor instead of Fiona MacGregor. Based upon my computer lab experiences, I realize that I do not want men to relate to me as a woman who is using technology because as Cockburn and

Ormrod (1995) and Spender (1996) suggest, women are still seen as less qualified users of technology. I would prefer to choose instead when to reveal my gender. On the other hand, I have participated in some on-line game areas called MOOs in which I have created my game character as a man. It was an enlightening experience, a different mind set for me. I also like gender on the Internet because many of the women's groups do not fight or flame each other whereas general public areas frequented by people claiming to be men are often volatile places to be. However, I would say that while women tend to be less likely than men to access the Internet, because of economics, time and negative perceptions of women using technology, a discussion of gender and the Internet needs to continue at the policy making, grassroots and individual levels. In other words, until there is universal access to the Internet, issues of gender and the Internet need to be addressed. And these issues may also need to be addressed beyond this point if inequalities in relation to gender still exist.

8.3 Age and Opinions about Gender and the Internet

The difference in perceptions between the women I labelled agents of inequality and those labelled agents of choice seem to be related to age. The women under the age of 38 were labelled as agents of inequality because generally they tended to see gender, much like Herring (1996), as inevitable on the Internet. Furthermore in many cases this inevitability of gender on the Internet was described by these women I labelled agents of inequality as a negative occurrence where negative assumptions about women's technological competence were invoked. Women who were over 38 I labelled as agents of choice. I would suggest these women agents

of choice because they perceived gender on the Internet to be a controlled rather than inevitable occurrence. Agents of choice saw individuals choosing to portray themselves as a gendered persona on the Internet. I would suggest primarily because of the lack of visual and verbal cues in most Internet communication. The difference between age and perceptions of gender constitute a whole other body of research. For example, have the younger women been influenced by the grrrl image? Are women on-line significantly different in their attitudes from their off-line sisters? Does socio-economic status influence attitudes? Are the difference in attitudes a generational influence? More information is needed about the background of women designing and using the WWW.

8.4 Working from the Home

It is my impression that generally women who work in the home designing web pages were happier (i.e., more comfortable and descriptive about their environment) than the women who were working outside the home. This is an important issue because with the advent of new technologies such as the Internet which allow people to move around in relation to their work, many people will have the opportunity to work at home. This information technology work at home has been called telework or electronic cottaging. While the comfort level for working at home may increase, the security or job benefits may in turn decrease if the work is offered as piecemeal projects. For many women these projects may mean less access to childcare than might have been provided on or near a job site, less access to benefits and job security that might have been provided as a company employee instead of a contract worker, and finally less

recognition of women in the workforce (Menzies, 1996). Working at home may instead relegate women back into the home, out of sight and out of mind. An increased emphasis on working at home also has spatial and economic implications. Increased expectations that women will provide home offices may further exclude some women from the workforce if they are unable to pay for and provide the space.

8.5 Implications for Future Research

This thesis has focussed upon describing who the women are creating web pages, how they learned and what their experiences were in the process. Additional questions have been raised for possible future research regarding gender and the Internet. Future research could include:

a) Investigations of women web page designers as workers, that looks at their work conditions, their access to formal training, and their pay to determine if women are or will be forced into a pink collar ghetto where mostly women occupy the devalued low paying non-promotional jobs;

b) How web page development is situated within larger patterns of computer usage such as use of databases, spreadsheets and e-mail, and the changes in web page development, given the number of web design tools now available;

c) How informal networks of communication and learning, such as Internet communities, support and contribute to overall Internet usage;

d) How women not using the Internet compare to the web page designers presented in this research, particularly around their perceptions of, and opportunities to, access the Internet; and

e) Whether perceptions about the Internet differ according to age, gender and other variables such as socio-economic status, education, employment, or developed vs. developing countries.

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Appendix A: On-line Survey

Creating Web Pages: Women, Technology and Skill Survey

INTRODUCTION TO THE SURVEY

This survey is an attempt to explore how women learn to use technology and develop skill in the creation of World Wide Web pages. This survey is part of my research as a candidate for a Master's Thesis at Memorial University of Newfoundland, Canada. I have been preparing for this survey for over a year and the results will play a crucial role in the outcome of my thesis. While I have some experience creating web pages, I am interested in discovering other women's stories and communicating this collection of stories to others who are interested.

HOW MUCH TIME IS INVOLVED?

I realize that many of you are busy and I have tried to make the questions clear and easy to answer. For your convience you might want to download a copy of the questions (in Word Perfect 6.1) and bookmark the web page, or if it would be easier for you, please email me fiona@morgan.ucs.mun.ca for a text version of the survey. Ideally the survey should take 20 minutes.

WHY YOU SHOULD ANSWER THIS SURVEY

To show my appreciation for you answering this survey, I will publish a guestbook, titled "tips from guests" in which I invite you to contribute comments, WWW tips, and/or advertise URLs. The location of the guestbook will be emailed to you immediately after you send in the survey. This guest page will be linked to the summary of results which will be available in the summer of 1997. There is a form included in the survey to request a copy of the results.

ANONYMITY

The results of this survey may be published. All replies will be kept anonymous unless otherwise requested. This option is available at the end of the survey.

CREATING WEB PAGES: WOMEN, TECHNOLOGY AND SKILL SURVEY

SECTION A: THE WORLDWIDE WEB

1. What do you think are the most critical issues associated with the World Wide Web? Please check all that apply.

- ☐ a. DESIGN STANDARDS FOR THE WWW
- ☐ b. THE AMOUNT OF INFORMATION AVAILABLE
- ☐ c. SEARCH TOOLS OR ENGINES
- ☐ d. USING THE WWW TO FULL POTENTIAL
- ☐ e. SECURITY OF PERSONAL OR CONFIDENTIAL INFORMATION

☐f.COPYRIGHT
☐g.WEB BROWSERS
☐h.PROGRAMMING LANGUAGES
☐i.RESPONSE RATES/CONNECTION SPEED
☐j.OTHER
Any comments on the above?

2. In your opinion, which of the following are visible on the Internet and WWW:
☐a.race
☐b.class
☐c.gender

Please explain:

SECTION B: WEB PAGE DESIGN

3. Please describe what you enjoy about creating web pages.

4. How many web pages have you created:
a. FOR PERSONAL INTERESTS:
b. FOR YOURSELF AS PART OF SELF-EMPLOYMENT:
c. FOR OTHER PEOPLE ON A PAID BASIS:
d. FOR OTHER PEOPLE ON A VOLUNTARY BASIS:

5. Why did you learn to create web pages?

6. How did you learn HTML? (Please check all that apply)
☐a.COURSE(S)
☐b.BOOK(S) AND/OR MAGAZINES
☐c.FRIEND(S)
☐d.LOOKING AT OTHER PEOPLE'S CODE
☐e.ONLINE HELP MANUAL(S)
☐f.OTHER(S)
g. WHICH OF THE ABOVE DID YOU LEARN THE MOST FROM AND WHY?

[redacted]

7. Do you use an HTML editor? (e.g. Hot Dog) Why or why not?

8. Do you use any web publishing tools? (e.g. Frontpage) Why or why not?

9. Do you use any other computer languages to create pages? (e.g. C++, Javavscript, VRML)

10. What resource(s) do you use to find help when creating web pages? Please explain.

11 a. How do you become aware of new technical developments regarding the Internet and the WWW?

b. How do you become aware of new social and/or business developments regarding the Internet and WWW?

12. Do you communicate new developments to other people? If yes, how?

13. Do you create web pages with other people? Why or why not?

14. What do you dislike about creating Web pages?

[redacted]

15. Do you advertise or promote your web pages? If yes, please explain how and why.

16. How many hours per week do you spend
a. CREATING WEB PAGES?
b MAINTAINING EXISTING WEB PAGES?

17 How do you begin the process of creating a new web page?

18. Of the web pages you have created, what percentage do you still maintain?

19. Which do you think is more important on a web page - presentation or information content? Please explain.

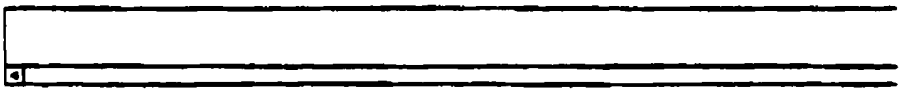
20.a. What title would you give a person creating web pages? (e.g. webmaster)

b.Do you use this title? Please explain

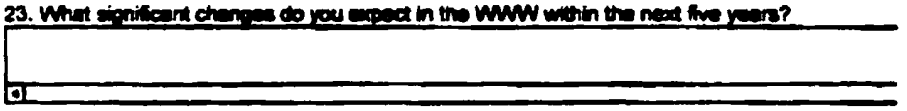
21. Have you taught other people to design web pages:
a.formally? OYES ONO
b.informally? OYES ONO
c. If you answered yes to either 21a or 21b, please explain the process including tools and/or methods:

22. Do you think learning to create web pages should be a formal process such as those taught in schools and institutions? Why or why not?

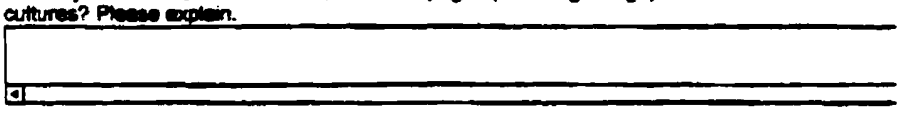
[redacted]



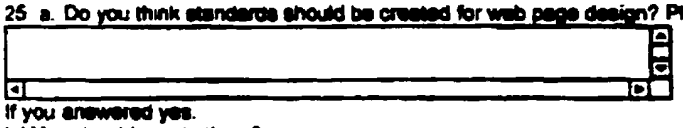
23. What significant changes do you expect in the WWW within the next five years?



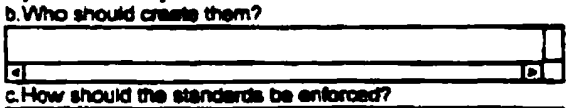
24. Do you think there are differences in web pages (including design) across countries and cultures? Please explain.



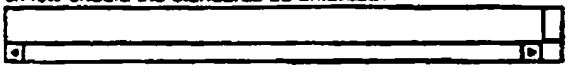
25. a. Do you think standards should be created for web page design? Please explain



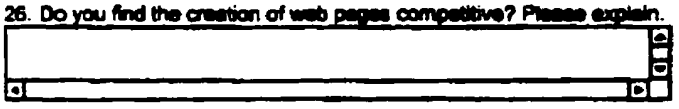
If you answered yes.
b. Who should create them?



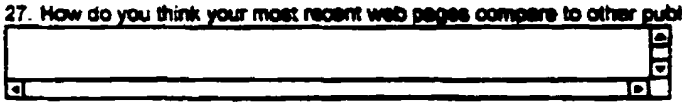
c. How should the standards be enforced?



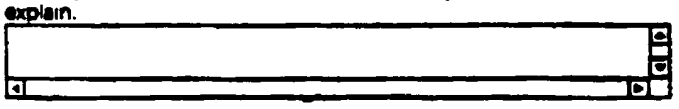
26. Do you find the creation of web pages competitive? Please explain.



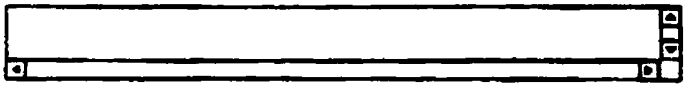
27. How do you think your most recent web pages compare to other published pages?



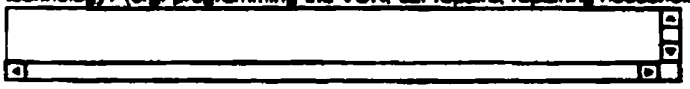
28. Do you think there are differences in the way men and women create web pages? Please explain.



29. Do you think there are differences in the way men and women are using the WWW? Please explain.



30. Do you think that creating web pages has affected the way you interact with other technology? (e.g. programming the VCR, car repairs, repairing household/office technology)

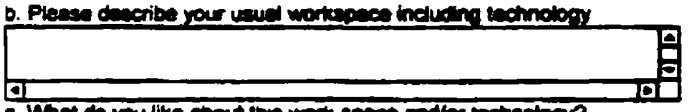


31. WORK ENVIRONMENT:

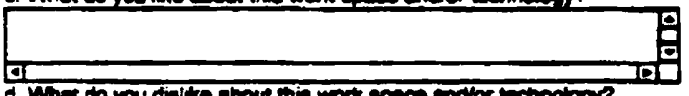
a. Where do you usually create web pages? Check all that apply.

- ☐ home
- ☐ home office
- ☐ school
- ☐ office outside the home
- ☐ other

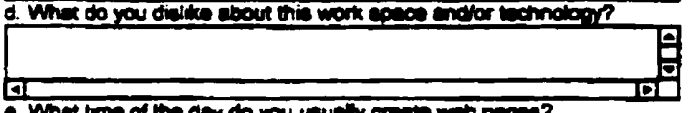
b. Please describe your usual workspace including technology



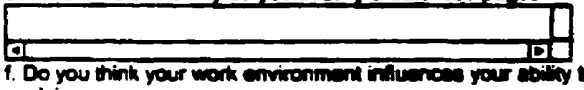
c. What do you like about this work space and/or technology?



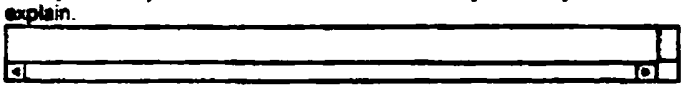
d. What do you dislike about this work space and/or technology?



e. What time of the day do you usually create web pages?

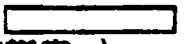


f. Do you think your work environment influences your ability to create web pages? Please explain.



SECTION III: COMPUTERS

32. Computer background:

a. At what age were you first introduced to computers? 

b. What kind of computer? (e.g. mainframes/microcomputer etc. . .)

c. At what age did you begin using a computer on a regular basis?

d. What kind of computer?

33. Why did you begin using a computer on a regular basis?

SECTION IV: INTERNET

34. At what age did you start using the Internet?

35. Why did you begin using the Internet?

36. a. How many Internet accounts do you have?

b. How many of these accounts do you share with other people?

c. How many of these accounts do you actually use?

37 How many hours per week do you spend on the Internet?

38.a. Do you consider yourself part of an Internet community?

b. Why or why not?

c. Which one(s)?

[redacted]

39. With the exception of your web pages, do you consider yourself a *lurker* on the Internet? Please explain.

40. How do you think identity is communicated on the Internet?

41. Based on your experience, please estimate the ratio of men to women on the Internet. Please comment.

SECTION V: PERSONAL INFORMATION

42. How old are you?

43. Are you: ○female ○male

44. What is your highest level of education?

- grade school
- high school
- community college/technical institute
- university
- graduate student
- Ph D
- other

45. Do you have training in computer graphic design? If yes, please describe.

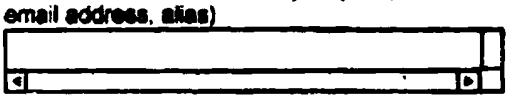
46. Please describe any circumstances which make it difficult for you to access the Internet and WWW. (For example, physical disabilities, non-English speaking, services and technology are too expensive, other responsibilities).

47. Have I missed anything? Any further comments?

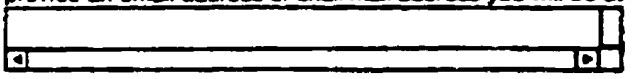
48. Can I contact you for further information? If yes, at what email address?

[redacted]

49 The results of this survey may be published, how should I identify you? (e.g. real name, email address, alias)



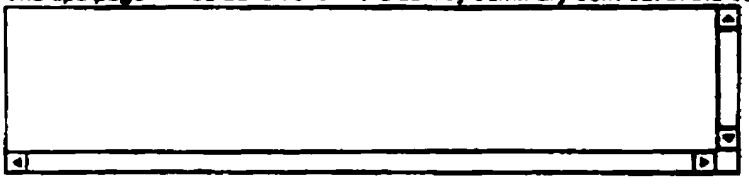
50. Would you like a copy of *summary of results* mailed to you this summer? (If yes, please provide an email address or snail mail address you will be at in June or July 1997)



51. **TIPS GUESTBOOK**
I am creating a guestbook from people who have answered this survey. Survey participants are invited to offer any of the following.

- a URL
- a web page/internet tip for other web page creators (This tip can be technical/social/business related)
- comments

YOUR EMAIL AND/OR PERSONAL INFORMATION WILL NOT BE INCLUDED IN THIS GUESTBOOK UNLESS YOU INCLUDE IT IN THE FOLLOWING SECTION.
The tips page will be advertised in the survey summary sent out in the summer 1997.



Submit Query | Reset

If you have any problems reading or replying to this form please email me at fiona@morgan.ucs.mun.ca

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Form by Fiona MacGregor March 3, 1997

[redacted]

Appendix B: Glossary

ASCII (American standard code for information interchange): Usually refers to a text only file made up of characters most computers can read. Because of the lack of graphics it is usually quicker for a computer to read.

Browser: A computer software programme which allows users to view the WWW. For example Netscape Navigator/Communicator and Microsoft Explorer.

Computer network: When two computers are linked together they are networked. In the case of the Internet, computers are usually linked using telephone lines.

Cyberspace: A term, popularized by author William Gibson in his book Neuromancer, for the shared imaginary reality of computer networks. Some people use cyberspace as a synonym for the Internet.

Electronic Mail (e-mail): Usually called e-mail, messages carried electronically from computer to computer.

Freenet(s): A community run Information Service provider (ISP) usually charging little or nothing for access to the service. For example the Ottawa, St. John's and Victoria freenets and/or community nets.

Grrrl(s): A technologically daring and competent woman or girl who challenges and transforms stereotypes about women and technology. See the Cyborgrrrl oath at the beginning of the thesis.

Hardware: The physical components of a computer system such as the monitor, computer box, keyboard and mouse.

Hypertext: Text that contains links within it to other text or documents allowing movement back and forth within a document.

Hyper Text Markup Language (HTML): This computer language is used to create web pages. It creates links within documents to other file or web pages.

Information Service Provider (ISP): Usually the business or institution who provides the dial-up access to the Internet. For example, sympatico or America On-line (AOL).

Internet: The electronic connection of a network of computers combined with the social connection of the users.

Listserv: One method computer software which can send e-mail to a large number of people.

Modems: The computer hardware which sends information from one computer to another usually over telephone lines.

Off-line: Refers to communication not using a computer, usually face-to face (f2f).

On-line: Refers to communication using computers, for example the Internet.

Physical Infrastructure: The formally structured services supporting society and technology such as power and telephone lines.

Software: A computer programme which works as a set of instructions for the computer. For example, a browser is software for the Internet and WWW.

Techie: A person who is technologically competent or highly experienced using one of many forms of technology, particularly computers.

World Wide Web (WWW, Web, W3): A combination of software (e.g., graphical web browser), hardware (connected telecommunication devices) and programming language (e.g., HTML, JAVA and Javascript). This combination allows people to view web pages using hyper text transport protocol (HTTP).