NOTE TO USERS

Bits and Bytes: A Diary of Teaching and Learning in the Digital Arts

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Abstract

Bits and Bytes: A Diary of Teaching and Learning in the Digital Arts

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This study is an examination of my process of thinking, learning, creating, and teaching in the digital arts. Through literature references, journal entries, and an interview with a female colleague I investigate three questions that have risen from my practice. With the first question I examine my processes of creating, learning and teaching in the digital arts relating it to ideas from the literature such as bricolage, cyberception, cyberspace, flow, and multiple intelligences. In the second question, I explore my relationship to technology through the context of gender and how this influences my practice. Finally, in the third question I explore the ideas covered in the first two questions by relating them to my teaching practice. It is a personal reflection on how the process and context of working in digital media impacts my creative and teaching practice.

Acknowledgments

I would like to acknowledge and thank my supervisor Cathy Mullen for her support and understanding throughout this endeavor along with my committee members Andrea Fairchild, and Lorrie Blair.

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This thesis is dedicated to the memory of my father, Morley Saylor. He was an incredible artist and father. His memory will be treasured forever.

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Introduction

Preface

This thesis is an examination of my process of learning, creating, interacting, and teaching in the digital arts. I use several methods to gather data to begin to answer questions that have arisen from my practice in digital art: excerpts from a journal documenting my experiences in the digital arts, interviews and observations of a female colleague, and literature references. These questions address learning techniques and creative thinking styles that seem to be inherent to the digital art medium and arising from these, issues concerning women in the digital arts.

The form of the presentation will be an extension of my thinking and creating processes with digital media. In the essay text I will discuss my understandings about thinking, learning and teaching in digital arts that have emerged from my art and teaching practice.

As I cut and paste paragraphs from different sections of my writing, I am working in different segments at one time, allowing myself to 'construct' my thoughts and words on the screen. I do not work from an established outline but rather a series of ideas in point form that exist in another document. These ideas are in constant flux; they flow and change as the words are typed and the sentences are constructed.

From my perspective, all of the different elements of my work--my digital

art practice, learning new software, teaching and researching my thesis—are interrelated. I realize that I cannot work on my thesis without 'constructing' it with images and text in the same manner that I construct my digital art lesson plans or write my essays. I need to incorporate my images, text, and hypertext links into my thesis document.

Figure 2, Light Reflect, digital collage, 2003

The format of this thesis reflects the way that I think and work in the digital arts. The thesis includes a narrative spiked with metaphors that evoke my creative process with unusual formatting, hypertext links, digital images from my art practice and didactic materials from my teaching practice. It has been produced by using the software Adobe InDesign 2.0, and exported to the widely used, accessible, and readable Adobe Acrobat 4.0. A web-site with the images and some text from the thesis has been published on the Concordia University Art Education Department web-site and will reside there for some time. A local copy of the web site, and PDF (Adobe Acrobat) copy of this thesis (which

includes the hypertext links and images have been saved on CD and included

with the hard copy of this thesis.

Figure 3, CD view, digital picture 2003
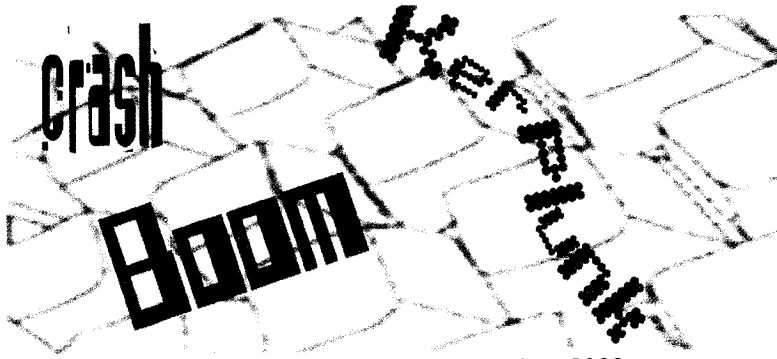
Figure 4, Crash, Boom, Kerplunk,digital drawing, 2003

Origins of the research project

Crash! Boom! Kerplunk! Over and around my thoughts churn and flow from a pool of synaptic activity in my brain to swimming pixels on the screen. Light and power blink on the monitor as I navigate between layers, windows and software. With a swift click of a shortcut key I've merged a paragraph, assembled a new image and interacted with a colleague on-line. This is how I construct my thesis: bit by bit, byte by byte I hammer my fingers on the keyboard, working my thoughts through the computer and working the computer through my thoughts. Before I type the words I can see the keys in my mind—before I even understand the logic I realize that I am moving a paragraph to a spot that seems better. Through my interaction with digital media I construct my thesis while the media helps me understand these ideas.

No, I am not a cyborg, or an android permanently fused to my computer but rather an artist and teacher who enjoys exploring the realm of digital art. Like many art teachers, I have had little formal education in digital art technologies. Most of what I know, I've learned on my own or through interacting with other digital artists. I am part of a generation that grew up around computers.

The computers that I had access to in elementary and secondary school seem like monstrous, electronic dinosaurs compared to the tiny, speedy RAM-

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and memory-packed wizards that I encounter today. In elementary school, my teachers didn't have much experience or resources using the sluggish machines (educational software did not exist to the same extent that it does today).
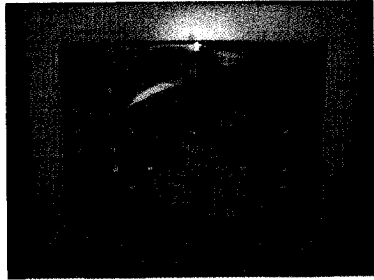
Figure 5, Access, digital photograph, 2003

Our high-school was outfitted with, what was then state-of-the-art Apple IIE computers which weren't exactly user friendly (Graphical User Interfaces were not yet available), and seemed to crash quite often. I can remember learning how to make programs that were used to calculate someone's age in different formats (seconds, minutes, and days) but nothing that seemed very useful to me. I desperately wanted to do the things some of my classmates were able to do with their home computers; but they had more powerful computers that allowed them to play and make games-- something that was not considered appropriate at our school. In addition, making and playing with the computer at home was not an option for me. Like many working class families, mine could not afford the incredible expense of a computer just to play with. For me, access to computers continued only during my weekly computer class. I did well in class, however, I was never as interested in the green computer screen as much as I was captivated by the beautiful white paper that came out of the school's dot matrix printer. At the time, the only thing the computer inspired me to do was to 'borrow' the printer paper to create long, intertwined sketchbooks that went

on for what seemed like miles of endless space for pencil drawing. My desire to learn more about making art with computers never left me. However, due to economic constraints and limited access it took a back seat to other educational endeavours. I found myself cultivating my interest in the arts by focusing on the methods and materials involved with painting, printmaking, and photography.

In the late nineties, technology seemed to explode on the market and computers became more affordable, user-friendly, and widely used at school and at work. With this new accessibility I began using the computer to make art in graduate school on a regular basis. I quickly realized that my process in academic work and traditional art making are very similar to that which is involved in working on the computer.

In school I was taught to organize my academic work logically. To research in an analytical, orderly fashion by finding information in encyclopaedias followed by journal articles, then finally reaching texts. I was told to create an outline and then write the essay following the established outline. Writing an outline that never changed was antithesis to the way that I worked. I tend to write a short rough draft followed by an outline, then change the draft and the outline going back and forth between each, moving ideas and text around changing my outline to accommodate my writing.

The creative processes espoused by my professors in my studio art were less structured; yet, they often mirrored the hierarchical approach I was introduced to in my academic endeavours. In class I was given a theme from which I developed a proposal, then displayed the final product to the class for a group critique. Then we would move on to the next project without adapting the piece to the suggestions from the critique. I've never felt comfortable planning every aspect of my work in advance. These methods may be appropriate for some students however I always needed to go back and forth between my ideas

and artwork changing things as I went along rather than knowing what I was

going to create from the beginning. Working with the computer is very conducive

to this type of academic and artistic practice where, with one click of a shortcut

key you can revert something to the way it was before, add something from one

document to the next or save different versions of a file in order to keep a record

of the changes in process. My thoughts adapt easily to the ephemeral quality of

working in the digital realm. Did I always work like this, or was I influenced by the

possibilities inherent to working on a computer? Do other people work like this?
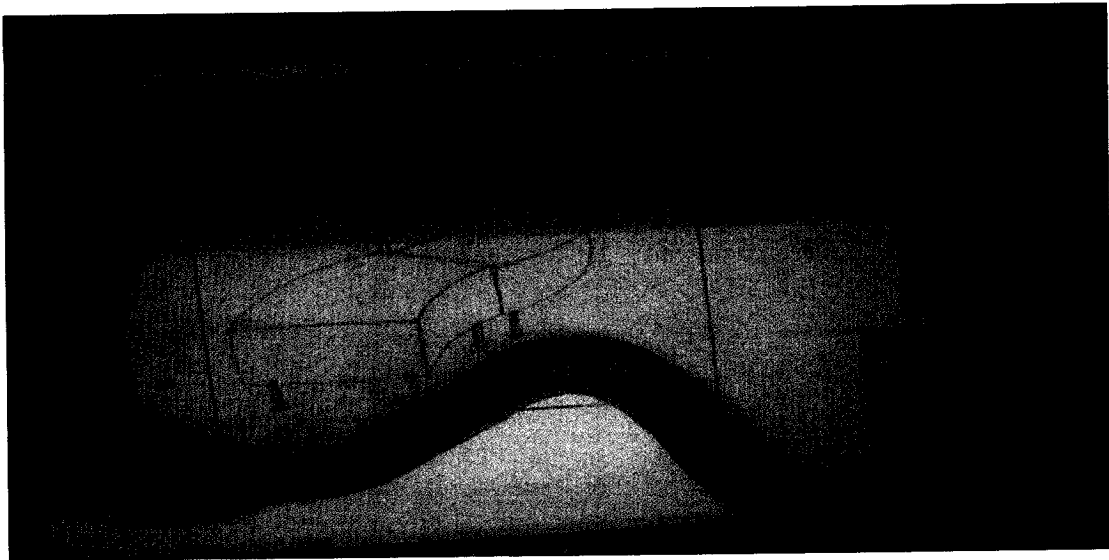
Figure 6, Focus, digital photograph, 2003

While my academic and art practices may be influenced by digital technology

so is my ability to read and understand the world around me. Growing up in a

world inundated with images processed at incredible speeds has created a type

of literacy that I've noticed in myself and my cohorts. We have become so agile at

adapting our skills to discern information that most of us can decipher, at electric

speed, instruction manuals filled with icons; yet we have trouble concentrating

on prodigious amounts of text. Along with the ability to skim through information

I have noticed that the way that I organize information is quite unlike what I have

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been taught in school. As I write this thesis or construct a lesson plan I tend to go back and forth between ideas, cutting and pasting different paragraphs and sentences attempting somewhat of an outline. I have noticed that this thinking style is very similar to the way other digital artists work. Operating in different spaces or 'windows' at the same time, changing the order of stacked layers that make up an image, moving various items to the clipboard, and creating intricate Internet searches are just a few of the things that one might be involved in at one time. It is this type of multi-tasking that I intend to investigate and try to understand.

While learning, teaching, and interacting in the digital realm I've noticed some people work like this, some try not to work like this, and yet other people cannot tolerate opening up more than one window or program at a time. As I observed people work on the computer, it seemed to me that the ones who felt comfortable with 'multi-tasking' were better prepared for navigating and learning new software. They also seemed to have had some general experience with computers throughout their life. The people who were not 'multitaskers' seemed to express a great deal of anxiety working with the computer and often a limited experience with digital media.

I had also seen the multi-tasking type of process when I watched my colleague, Elida, who seemed to personify the very nature of this way of thinking while using digital media. I watched her as she went from one program to the next as she refined her ideas and created a web tutorial. Everything, from the initial planning to the final product was created with the use of the computer. Even her brainstorming notes were created by using her PC's writing tablet and then taking the raw text written with the stylus and using it to create a diagram of her ideas. The diagram turned into a plan for the site which then became a menu bar followed by more adjustments until the raw notations went from scribbled text

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in a drawing program to a full fledged web tutorial. This was all created in several different programs while Elida kept up with communication with other colleagues in an Instant messaging program, checked her Internet account, and spoke to me about her work.

Throughout my research I've found countless examples of this type of thinking, learning, and creating but I haven't yet found a term that defines the process entirely. I find it impossible to decide on one specific definition or theme that accurately describes the processes that I have experienced and witnessed as I work with digital technology. Each idea, term, and definition that I have encountered in my readings of related literature has helped me to conceptualize some aspect of my research, some of which I will touch upon later in this thesis.

The notion of 'context' in digital technology as it pertains to gender is also significant for my research. As a woman, I cannot deny that the relationship between women and technology influences the way that I understand, work with and interact in digital technology. In order to understand my own processes and experiences as a creator and teacher of digital art I also must address the often systemic bias that exists within society as it regards women and technology. Whether at the more general level, such as in the marketing of technology or at the level of my own personal experiences I need to focus part of my research from the vantage point of a woman in the world of digital technology.

Therefore, thinking and learning in digital art and the perspective of gender in digital technology have become the two key issues that assembled themselves around my research.

While these issues were building in my mind I began constructing elaborate lesson plans and didactic materials to teach digital art to adults at a local CEGEP (college). With very little formal experience as a student or teacher of digital art (I had mostly taught myself how to use the programs) I

often wondered what would be the best teaching strategy in a digital art class. A quick survey of the current literature in art education revealed that digital art education has yet to garner much attention. There is very little information about the challenges encountered when teaching art using digital technology. How do you cope with a variety of levels of knowledge in a large class? What is the best way to organize a classroom filled with computers? What are the best ways to teach digital art—by teaching the software or by creating a project and learning the software as the piece is created? Once again, I have a plethora of questions. I want to add these teaching questions to my investigation of my own process of digital art making. From this perspective, I can also see how my teaching experiences are related to my art making process and begin to answer my teaching questions. People have been writing about different learning processes and thinking styles for a very long time. But what does the computer have to do with these processes? What do they have to do with art? And how do they influence my teaching?

Research Questions:

From the previous process of searching for my focus of inquiry, I have arrived at the following three research questions for this thesis:

1) What are the processes in my practice and how are they related to the thinking and learning styles discussed in the literature? Are my processes with digital technologies similar to what other students, artists, teachers have experienced?

2) As a female, how does my gender inform and influence my process of creating and learning digital technologies? Is this similar to the experiences of other women engaged in digital art technologies?

3) I have examined my working and thinking processes in digital art, as well as the perspective of gender. How do these aspects inform and enhance my teaching practice in the digital arts? What challenges and possibilities do I face in teaching digital arts?

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Stated in another way, I have two objectives for this Studio Inquiry and Essay. The first objective is to identify and document the thinking and making processes I use when working with digital media. My process with digital media occurs when I am making art work, and when I am constructing lesson plans and teaching materials.

The second objective is to confirm the value of those processes of my work as a female artist, and as a student and teacher of digital arts. I will use the studio and essay components of this thesis to accomplish my objectives.

For me to fully address any one—much less all—of these questions is a long-term and wide-ranging goal that is well beyond the scope of this single project. What I propose to do in this thesis is take some beginning steps in finding answers to my questions.
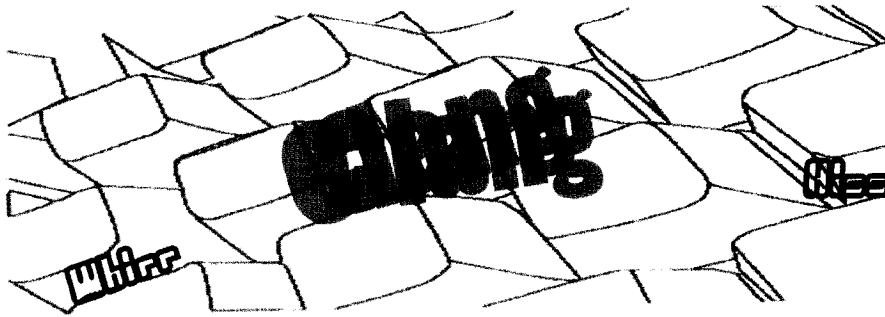
Figure 7. Whirr, Clang, Hiss, digital drawing, 2003

Chapter 1 - Research Question 1

This chapter will answer the following research question:

What are the processes in my practice and how are they related to the thinking and learning styles discussed in the literature? Are my processes with digital technologies similar to what other students, artists, teachers have experienced?

Introduction

Whirr, Clang, Hiss...These are the sounds that seem to emanate from my production; a whirlwind of clanging keys and a clicking mouse—music that only I can appreciate. It is a clamour of activity—a clutter that defies all logic and any sense of organization. No, I am not dancing to the beat of my own drum (although, it often feels that way) but rather moving through different windows of my computer, cycling through ideas, allowing myself the freedom to move between different creative activities. Whilst in this digital realm of the computer, I am writing a research report, researching information for this same report using an on-line library database, creating digital images (inspired from writing the report) while keeping a somewhat disjointed conversation via instant messaging with a colleague who is helping me troubleshoot a software problem. I am cycling through windows and through digital worlds and I enjoy it. This is just one example of the myriad of activities I engage in at one time while using the computer.

Did computers influence my working process or have I always worked like

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this? What effect does this process have on my creating, learning, and teaching in the digital arts?

With this multitude of questions I set out to explore my digital learning and creating process by documenting my activities in a journal. In this section of the thesis I begin to answer my questions using excerpts from my journal, literature review, and observation and interview of digital artist and student Elida Arrizza.

Digital Thinking and Learning Styles

My interest in the thinking and learning processes inherent to digital art began with a struggle to conform to what I believed to be the correct method of working academically and creatively. The focus on the hierarchical academic and creative practices in school seemed to be in antitheses to my seemingly chaotic working practices. I never began my work with an established outline or method; I would go back and forth changing things as I worked, allowing freedom for the natural direction of the work to emerge.

This practice of multi-tasking extended from my academic and creative processes to the way that I learned. I found it very difficult to focus on large amounts of text yet I had no problem gaining information from complex hypertext documents that contained ideas and text intertwined on different levels of a web page. Having been raised in a culture inundated with images I was accustomed to the fast-paced imagery and text that pervades popular culture. The fragmented information distributed in sound-bites between commercials, in billboards and various media have helped develop my generation's aptitudes for learning. Friends and colleagues have shared with me their comfort levels in various learning tasks; their most common concerns were being able to concentrate on large amounts of text or writing extensive research papers. I've observed Elida whip up a web site in record speed and yet she told me that in her undergraduate

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degree she would offer to do other projects such as making a web site or interface design in order to avoid writing lengthy research papers. For her, the fragmented writing required to create hypertext web documents was much easier to master than the linear flow of a research paper. I began to research this type of learning and creating process while being aware of my own personal practice and that of my cohorts.

Figure 8, Layered view, digital photograph, 2003

My research first led me to the work of artist and teacher Joseph Squier, one of the first artists and educators to put his work and ideas on the Internet in 1994 on a web site he titled "The Place"(http://theplace.walkerart.org/place.html). "The place" is a collection of hypertext links, images, and essays, somewhat of a 'soapbox' for Squier's ideas on popular culture and education. In "Electronic culture and the training of the 21st century Artist", Squier discusses the challenges and advantages of working with a generation of students impacted by the images of popular culture.

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Today's students have grown up in a world that is profoundly
electronic and increasingly digital... Today's twenty-year-olds
were weaned on *Sesame Street*, then graduated to MTV... Stated
simply, they live in a different reality. The traditional definition of
literacy simply does not apply to the current generation of student
artists. They are often hard-pressed to read and comprehend
more than a page or two of text at a time. Yet these same students
exhibit remarkable proficiency at "reading" material that is multi-
layered, complex, compressed, and fragmented. Their attention
spans are brief but intense, allowing them to process rapid bursts of
information. They are experts in the art of skimming and sampling.
(Squier, Goggin, and Chmelwski, 1994 p.3)

While my cohorts and I may struggle with large amounts of text we are

nonetheless well suited to adapt our skills to today's digital media with its layered

hypermedia texts, animated graphics, and constant software upgrades. Similar

descriptions of this type of literacy exist (Intrator, 2001; Squier, 1994 & 1995;

Turkle, 1995; Wilson, 2001; and Wolf, 2000), each recognizing the challenges,

advantages and disadvantages inherent to this type of 'digital literacy'.

Another example of this 'digital literacy' is the ability to decode ideas by

assembling and disassembling text and images located in hypertext documents.

The way that I choose to locate a document in a web site may be entirely

different from someone else, and the navigation that I choose may change from

time to time—even when locating exactly the same information. Each time you

navigate a site you obtain a different understanding of the content within that

site; this allows for the varied perspective that only the interactivity of a digital

document can provide.

Lately I've been looking at a lot of design web sites trying to get
the feel of what people will do for their portfolio sites. Most of them
have been intricately layered with multi-media web pages using
images, sound, and movement. They are almost all Flash sites with
complex menus and interface. At first it may seem like madness
trying to understand how to access other parts of the site but then
you begin to explore the site by clicking everywhere and then you
find incredible imagery and artistry. You just have to let yourself
go with the flow and explore. It also tends to be pretty entertaining

when you go back to the site and some things seem completely different and you begin to see something else. You are no longer visiting a web page but a space. It is a space that changes and it can mean different things at different times; you've clicked somewhere else and you've entered a different world that you've never seen before—even if this is not your first time looking at the site. Each time you view the site you get a new feel for the artist and their work—a new interpretation of their art practice. Each time you access one site you become more experienced with an unusual interface and you can adapt your knowledge to the next site you visit. It is a constant emergent adaptation. And I love it. (Personal journal, January 8, 2003)

Figure 9, My stairs, digital collage, 2003

According to Samuel Intrator (2001) this 'emergent literacy' used when viewing hypertext documents is often typical of my generation and helps enhance artistic creativity. Intrator believes that this literacy helps students become more comfortable combining different forms of artistic expression such as visual, kinaesthetic, musical, and verbal. Internet plug-ins and Java applets allow the creator of a web site to add animated flash images, sound, video, and hypertext

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media to create a layered, interactive art piece that includes all of Intrator's modes of artistic expressions. Creating and even viewing a web site requires some grasp of these modes of artistic expressions. Web sites are no longer static two-dimensional pages but rather a metaphoric three-dimensional space within which one can interact and inhabit. When someone experiences a multi-media web-site they navigate through many of Intrator's modes of artistic expression. My personal interpretation of a web-site is influenced by my ability to read these modes of expression.

While the interactivity and creativity of art media may be enhanced by this literacy so is the ability to encode digital, hypertext documents. Marjorie Wilson uses the term 'intertextuality' to describe the type of thinking that occurs when using hypertext documents. Intertextuality is similar to the way one chooses to 'read between the lines' of hypertext documents and code.

> Intertextuality, the condition of any text whatsoever, cannot, of course, be reduced to a problem of sources or influences; the intertext is a general field of anonymous formulae whose origin can scarcely ever be located; of unconscious or automatic quotations, given without quotation marks. (Wilson, 2001, p12.)

For me, working through hypertext documents, navigating through and creating text on a computer screen does require a different process than reading text on a physical, linear page. The following journal entry describes some of the actions that I take while navigating through web pages and search engines.

> It's like a form of elegant searching. Like a dance between myself and the search engine. I can find things that no one else can find. I've had PhD students to cocky coworkers beg me to find minuscule bits of information. I am magnificent, I often can't believe I can do this--but I can! It's all about being comfortable trouble-shooting with the software and not being afraid to try different combinations of search terms and ideas. Sometimes you find the keywords in unexpected places or you find different ways of working around the system. I found a 40 year old picture of my father in an air force training class tucked away in someone's retirement web site. And

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then yesterday I found a fantastic quote to use for my thesis but I had no idea where it came from. Without any information about the author, date of publication, or anything remotely helpful I was able to find everything I needed just by using the Internet. I'm not always that successful---wait I am pretty successful. I enjoy it. But I have a lot of experience and it is all about working in bricolage. I take advantage of what I already know to troubleshoot and solve my problem. I work from what I know and through that gain more experience and more knowledge. (Personal journal, March 4, 2003)
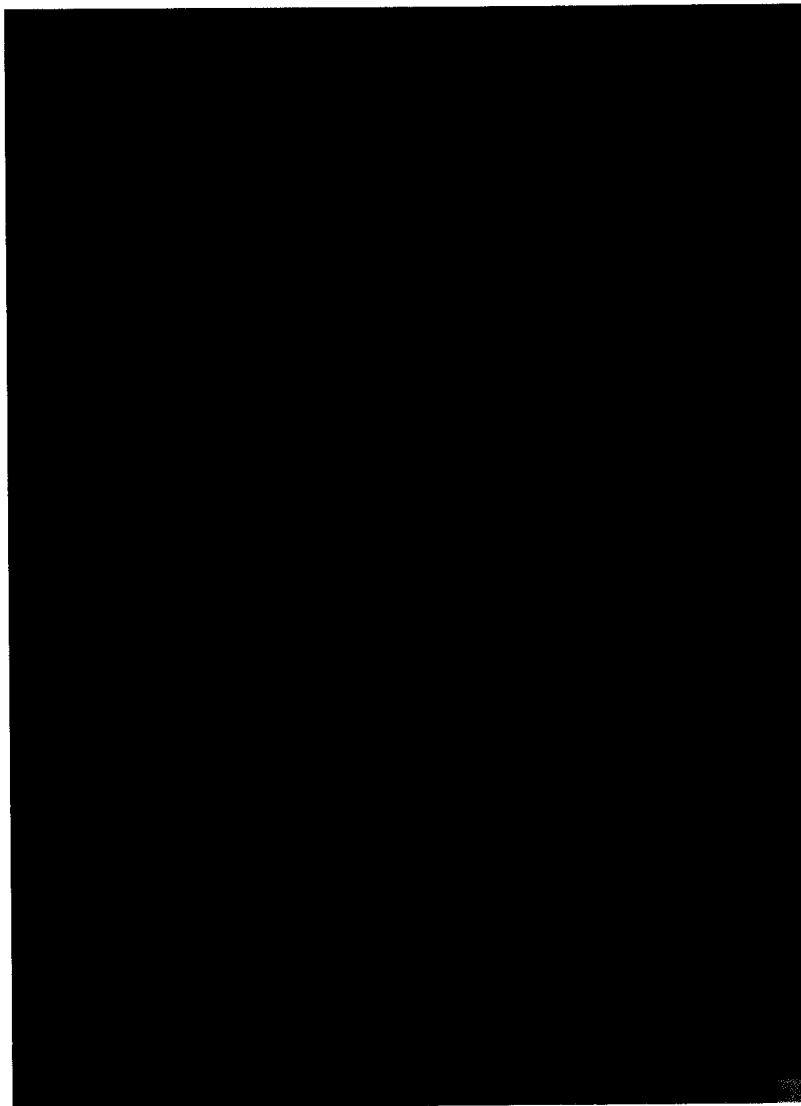
Figure10, Swim, digital collage, 2003

My comfort level in the digital, virtual world will often surpass my comfort in the real world and I will forgo writing or reading until I am near a computer so that I can use my favourite virtual tools to organize my work.

As you become accustomed to navigating within the digital world you begin applying the same principles to navigate into your own R.L. (Real Life). The shortcut keys, different perceptions and problem solving techniques transcend the computer realm and coexist within the tangible, real world. For instance, when I close my eyes I can visualize the keys of the computer keyboard as if they were right in front of me. I know them; I know where they are and what I need to do with them. When I am reading a page in a real physical (hard copy) book my hand instinctively forms the shape of the shortcut keys to find a key word 'Ctrl F' or 'Apple F' (a search function for finding specific words in a text document). It seems so much faster to find information with the aid of the computer.

Figure11, Water, digital collage, 2003

The computer is the place where I become superhuman and leap large paragraphs in a single bound to locate key words or phrases in mere seconds. The computer allows me to become lightning fast in gathering information. I could be anywhere in R.L. when an idea

takes form and once again instinct causes me to select another
shortcut key combination 'Ctrl-S' or 'Apple S', often held up in the
air absentmindedly to try to record a thought or a conversation.
'Ctrl-S' is the shortcut key that allows you to save your document
without going into the time wasting menu to do it. That means that
you can save constantly! Through habitual use, I've programmed
myself to save everything all the time. It just makes things all
the more easier. Now I seem to want to save things in the R.L.
(Personal journal, September 8, 2003)

Constructing work through the computer has made me so comfortable with

the interface that it influences other areas of life. This may have its advantages,

however, the 'advantages' associated with my generation's literacy may often

incur problems for many computer users. I've experienced this myself and

witnessed others trying to adapt this literacy to different areas of our lives. As a

result, obstacles surface when trying to adapt these digital skills to other literacy

situations. Remaining focused on a single task, reading large amounts of text,

and even spelling and grammar can become major stumbling blocks; after using

the computer on a regular basis and adapting to its nature. This frustration can

be seen in the following excerpt from my journal:

I'm struggling with concentrating. It seems that I can get so
distracted by other tasks that I go from one software application to
the next; trying out different things and never focusing on finishing
one task. I like to associate my writing process with the feeling
of constructing it from different paragraphs even within different
documents. But it is not always easy to adapt this work to the
accepted academic linear format. Sometimes I have a hard time
wrapping myself around the separations that I make. I feel that I am
battling with the 'linear' and 'non-linear'. This didn't seem to be so
much of a problem before I used a computer on a regular basis...
    And what about the deteriorating nature of language seen in
the shortcuts, abbreviations and emoticons (punctuation characters
used to create things like a smiling face or sad face during instant
messaging sessions, in chat rooms or adorning e-mails that evoke
the emotion of the writer)? I am so used to writing in this sort of e-
mail short-hand that I often write these abbreviations in R.L. (real
life), leaving out letters in a word, even going as far as abbreviating

a group of words on a sheet of paper. BTW – (By the way) I am not the only person who takes advantage of this 'instant' language. Elida has told me that she often uses it for short hand while writing notes in class. We both seem to be writing an adapted form of the English language used only by a technologically inclined portion of the population. BTA (but then again), this could just be an EBKAC (error between the keyboard and chair)☺. (Personal journal, October 22, 2003)

The humour in this journal entry does not disguise the fact that students can encounter a great deal of frustration when trying to adapt their digital literacy skills to the academic traditions in school. Turkle (1998, p.183) compares the writing used in MUDs (Multi-User Domains, similar to chat rooms) to a 'hybrid' of traditional written and oral communication that includes emoticons, sentence fragments, spelling errors and abbreviations. Users become very proficient at writing this type of shorthand and use it regularly. Yet, this type of shorthand writing is used by a minority of the population and is unacceptable in school. As access to IM (instant messaging) grows through its use on the Internet with computers, via cell phones through SMS (short message service, text messages), PDA's, and through interactive game terminals like X-Box, the problem of cryptic spelling and grammar may become more widespread. As for now, I am thankful that my word processing software will not recognize my shorthand and advise me of my errors.

Most people use the computer as a tool to write and communicate with others, yet it has also become a place to think and work out ideas. When I observed Elida (Personal journal, April 5, 2003) I saw her using her computer (and digital drawing tablet) to iron out ideas and build up her work. Rather than use paper, she chose the art board in Adobe Illustrator as a virtual scratch pad and wrote with a digital pen on her tablet to create her 'brouillion' (rough draft). From there she used three different programs to work out her ideas and create her final product—a web site tutorial demonstrating the process of object

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scanning. Her process became part of the final product as she went over the steps (for scanning objects) in her mind and on her computer.

> I use the tablet primarily as a pointer and secondarily as a drawing device. When I want to sketch or when I want to write out notes instead of typing I will open up Illustrator and put it in pen mode and right away it is better than paper. With this, I can easily save. I have access to 'undos'-- it is much more flexible than paper. I find that when I write on paper I miss, or rather I lack the tool of the 'undo' because it's not as flexible as the computer. (E. Arrizza, personal communication, September 28, 2003)

Observing Elida at work reminded me of my own creative process. Using the computer as a way to organize my ideas has been something that I experience on a regular basis. Working within various windows and documents on the computer and cycling through different digital spaces has helped me formulate my ideas and construct my own creative work. The following journal entry describes some of the thinking processes that I use to navigate through windows on a computer screen.

> I feel like I am 'constructing' my writing and artwork. Today as I created images (didactic materials) and lesson plans for my students I couldn't concentrate on one thing without working on the other. I couldn't make the lesson plan first and then the didactic images. I had to do them all at once-- at the same time. It felt like I was 'thinking' through working...I can't seem to remember when or how I began to think in levels and layers just like I do on a computer. I joke about how the two-dimensional world of paper seems to be so different from the spaces my mind seems to inhabit in the computer. Real paper is just not as dynamic as digital docs. (Personal journal, January 7, 2003)

I have always felt more comfortable working simultaneously with images and text. Whenever I needed to learn something I would memorize the way the information looked and where it was located on the page. This helped me organize my ideas, and work around my different abilities. I would jump between images and concepts, constantly rethinking relationships between ideas, their images, and the context in which I had grouped them. This allowed me to

work with my ideas and move them around to make different relationships and connections.

This type of thinking, learning, and organizational process is discussed in the literature, however I haven't found one term that I think fits or describes this process completely. From sociologist, psychologist, and technology expert Sherry Turkle's use of the term 'bricolage', digital artist Roy Ascott's 'cyberception', to psychologist and educator Howard Gardner's theory of multiple intelligences, or psychologist Mihaly Csikszentmihalyi's conception of being in the 'flow' of artistic creation, each of these different terms describe some of what I have experienced and witnessed while using digital technology.

Bricolage and digital media

Of all these descriptions the term 'bricolage' (first coined by Claude Levi Strauss in 1966) is the most prevalent in the literature. Browne (1994, p.100) writes that the term 'bricolage' has become popular with cultural studies as a way to define artistic processes. This is especially true when researching digital media practices; the term is often used in the literature specifically to describe artists as they create digital work. (Barker, 2000; Browne, 1994; Tolsen, 1996; Chesebro & Bertelsen, 1996; Lull, 1998; and Rahn, 2002) Authors describe bricolage as a process of assembling varied elements together—something that artists have been accustomed to doing. Taking disparate elements and putting them together in a collage, collecting objects to form an installation, and even mixing paint together and gathering the colours on canvas is an example of using bricolage. The digital realm allows artists to take this form of 'multi-tasking' and bring it to the level of bricolage where disparate elements from different software come together in a non-linear practice that is specific to digital media. The following journal entry is an example of the creative process that I encounter while working with digital media.

Yesterday, I made this art piece that seems to define my creative activities in digital media. It began with this funky couch near the food court at work. It always attracted my attention. I've taken a couple of digital pictures of it. I've always looked at it thinking that it would be a perfect vector drawing. After using the computer for you can begin to see parts of the world as it would look on your monitor-- wrapped up in my favourite drawing or photo-manipulation program.
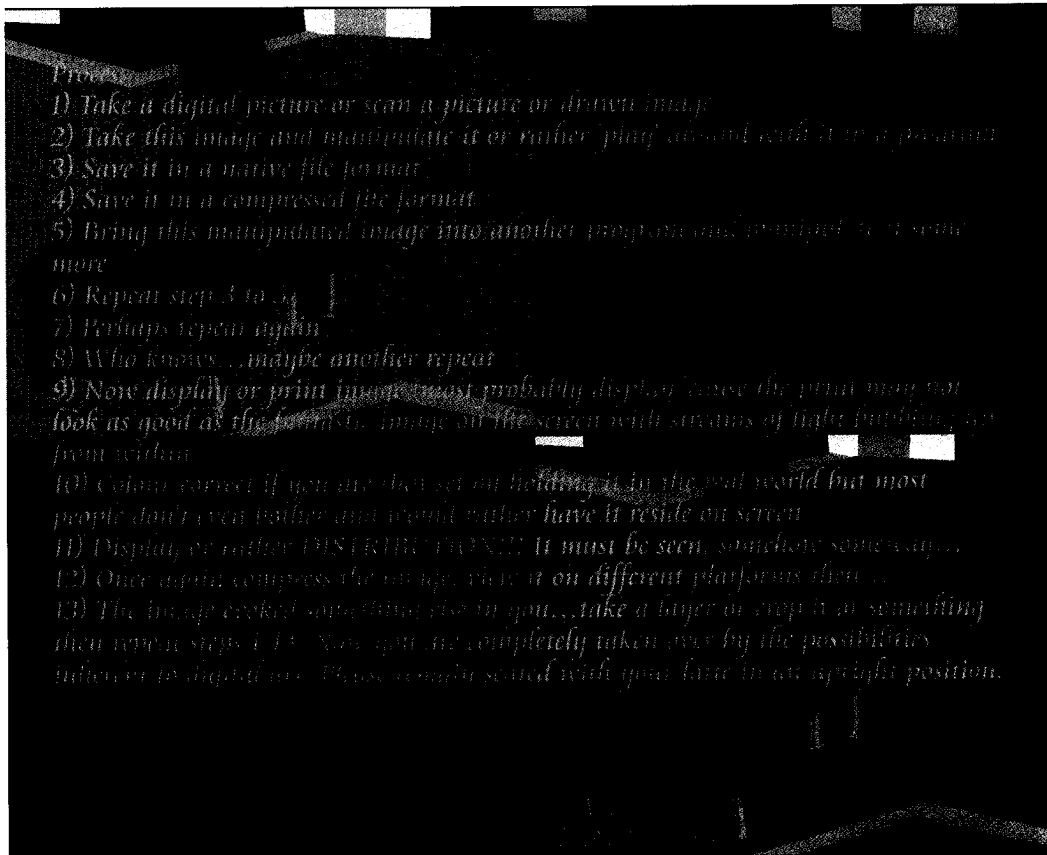
Figure12, Cushy, digital drawing, 2003

Every time I saw this couch I could literally see how it would look in Adobe Illustrator. I could see the colours, the shading, where I would put the gradient mesh. I knew exactly where to begin my Bezier curves and how I could round out each section of the piece. When I finally began to trace it in Illustrator everything fell into place. Then I began to change the colours and move sections around. I also decided to import it into another program and add some filters and then before I knew it I had a completely different piece. As I mixed elements of my piece by using different software I began to write some text which became a humorous depiction of

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my actions. In the end I added the text to the image and brought it back into Illustrator and went full circle from where I began. I was inspired by the couch, the program, another program, the ideas I've been researching for my thesis (like bricolage and cyberception), and then back to the couch. And that is what it is like to inhabit all of these different worlds. (Personal journal, March 11, 2003)

The most comprehensive description of digital media bricolage came from Sherry Turkle in her book *Life on the Screen, Identity in the Age of the Internet* (1995). In it, Turkle writes about the connection between bricolage and digital media through the form of a 'soft mastery' technique where different elements of an idea are brought together and worked on almost simultaneously rather than hierarchically.

> The tribal herbalist, for example, does not proceed by abstraction but by thinking through problems using the materials at hand. By analogy, problem-solvers who do not proceed from top-down design but by arranging and rearranging a set of well-known materials can be said to be practicing bricolage. They tend to try one thing, step back, reconsider, and try another. For planners, mistakes are steps in the wrong direction; bricoleurs navigate through midcourse corrections. Bricoleurs approach problem-solving by entering into a relationship with their work materials that has more the flavour of a conversation than a monologue. In the context of programming the bricoleur's work is marked by a desire to play with lines of code, to move them around almost as though they were material things—notes on a score, elements of a collage, and words on a page. (Turkle, 1995, p 51)

Turkle claims that this 'soft approach' is a style to which women are drawn (p. 56) because of the socialization of women in western society:

> "Soft" is a good word for a flexible, non-hierarchical style, one that allows a close connection with one's objects of study. Using the term "soft mastery" goes along with negotiation, relationship, and attachment as cognitive virtues. And this is precisely what the culture of simulation encourages us to do...it is not a style unique to either men or women. However, in our culture it is a style that women are drawn...we train girls in component skills of a soft approach—negotiation, compromise, give and take—as psychological virtues... (p. 56)

In her discussion of famous hacker Richard Greenblatt, Turkle illustrates the

similarities between the artistic process and the process of bricolage:

> Soft mastery is not a stage, it is a style. Bricolage is a way to
> organize work. It is not a stage in a progression to superior form...In
> the spirit of the painter who steps back to look at the canvas before
> proceeding to the next step, Greenblatt developed software that
> put him in a conversation, a negotiation with his materials. He used
> bricolage at a high level of artistry. (Turkle, 1995, p. 57)

While bricolage may be the way many of us organize our thoughts through a

'conversation' with the computer, Turkle ads that bricolage is not widely accepted

in the academic computer world, citing the example of hacker Greenblatt

disagreeing with a mathematician's hierarchical organization of a computer

program. Turkle also interviewed many computer students at MIT who felt a lot of

pressure and anxiety because their way of working went against the established

hierarchical route of programming promoted in that school. (p.55)

Cyberception

While the term bricolage is widely used in cultural and media studies, a

similar term, 'cyberception', is almost unknown. This term was introduced in the

early 1990's by Roy Ascott, a pioneer in new media arts and education.

> We are computer-mediated and computer-enhanced. These new
> ways of conceptualizing and perceiving reality involve more than
> simply some sort of quantitative change in how we see, think and
> act in the world. They constitute a qualitative change in our being, a
> whole new faculty, the post-biological faculty of cyberception (¶1)...
> Cyberception is the antithesis of tunnel vision or linear thought.
> It is an all-at-once perception of a multiplicity of view points, an
> extension in all dimensions of associative thought. (1994, ¶ 2)

Bricolage and the soft mastery technique is very close to the way that I

work and create on the computer, and yet Ascott's definition of cyberception

is so similar to Turkle's notion of bricolage that it can also be representative of

the way that I think and work with digital media. My ability to work with different

documents at the same time has influenced the way that I see things, as well

as how I interact on the computer and in the world outside of digital media. According to Ascott, digital or 'telematic' media allow people to perceive and conceive that extend in ways that we never could have imagined. I am often surprised at how immersed I can become in my interactions with the digital screen. Years ago, when I did not have a computer, the only way I could write an essay was by writing different sections on different papers and then literally cutting and pasting the essay together. Now, as I construct this thesis, I realize that my computer skills have developed a sophistication that often surprises me. These skills can be seen as I write, create and interact in digital media. The following is a journal excerpt which describes how I interact with a software tool.
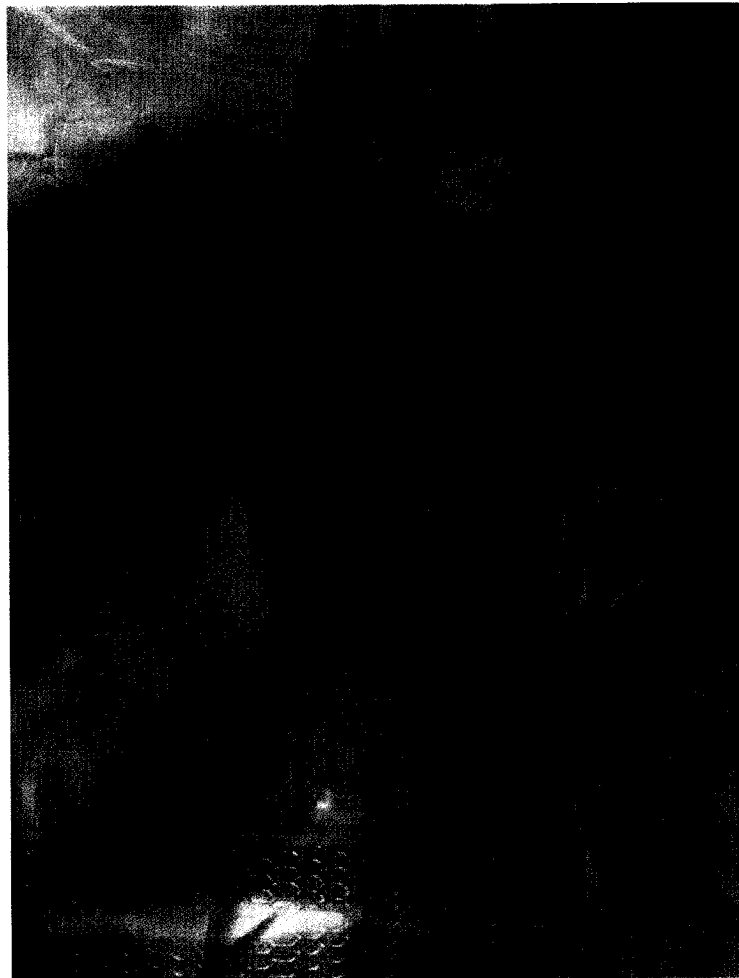
Figure13, Immersed, digital collage, 2004

Today I was using the pen tool in Illustrator (one of my favourite tools because I know it so well), I was going back and forth between the shortcut keys and I'm not sure how to describe it-- but I seemed to be forgetting exactly what each key does and yet knowing instinctively how to use it with a heightened awareness of what key to use. It is like the pen tool was a part of me and everything I did was on 'instinct' in some kind of instinctual 'flow'... I realize that there is a point when you begin working with the media when it is no longer you interacting with a machine. It is not you naming the tool and remembering what the tool is for and thinking about how it functions in your head-- it becomes a part of you. The pen tool was not a digital tool belonging to the software-- it belonged to me-- it was a part of me. Through my ease and experience with the tool it became mine. There is a point that you reach when the mouse is no longer a mouse, the keyboard is not a keyboard. It is the moment when the shortcut keys become instinctive and the use of the tool is an instinctive phenomenon much like what happens in painting and drawing. It is at that point where the whole world falls away and you feel that you are inside the machine communicating on a primitive basis where knowledge falls away and makes room for instinct... (Personal journal, September 17, 2003)

According to Ascott, the connection that I feel towards the pen tool in Adobe Illustrator is evidence of cyberception's 'transpersonal experience'. He believes that this type of instinctual flow transcends the body, allowing people to "transfer our thoughts and transcend the limitations of our body... it gives us insight into the interconnectedness of all things, the permeability and instability of boundaries..." (Ascott, 1994, ¶ 3) In considering Ascott's ideas, I choose to omit any literal interpretation of a 'post-biological body' and consider cyberception as partial description of the process of working with digital media. As more people become comfortable using software and digital tools the more they will become aware of their thinking process and perceptions whilst in the digital realm.

Existing in cyberspace

For me, being in the 'flow' of digital media is similar to the feeling of cyberspace. Navigating through different software elements or different web pages is all about being immersed in environments that often differ and even

mirror daily life. Manipulating a photographic image, playing a computer game, watching news reports from other countries on the Internet, or instant messaging with someone who lives just around the corner involves activities that have evolved from our daily lives and yet have been transformed through our interaction with digital machines. Is cyberception truly a new form of thinking or a mere extension of our world represented in the term 'cyberspace'? According to Squier (1995) you don't need a computer to experience cyberspace:

> Cyberspace has been hyped in the media as something entirely
> new and exotic. But in fact, it's been around for quite some
> time, and we have all experienced it. Most of you have probably
> experienced it at least once today, because cyberspace is that
> place you go to when you talk to someone on the telephone. It's
> the place you go to inside your head during that conversation. The
> cyberspace of the future may simply be an experience that is more
> immersive; instead of just engaging your sense of hearing, it may
> also include the sensations of sight, motion, touch, and scent. But
> my point is that we all have experience with cyberspace. And it is,
> in fact, an integral part of our everyday lives. So much so, that in
> certain respects it's a bit mundane. (¶ 7)

If cyberspace is just a collection of activities we already experience, and if bricolage is only a form of thinking that can be enhanced by using the computer (like a virtual cut-and-paste of ideas) then what makes working on the computer seem so different to me than working with traditional art materials? For me, it is the intensity of interaction that makes the experience of working with digital media unlike any other creative experience.

Being in the 'flow' with digital media

I feel that these sensations are very similar to the description of being in the 'flow' by Mihaly Csikszentmihalyi. Csikzentmihalyi (1999) describes 'flow' as an 'autotelic' experience involving complete absorption of thought in an activity. He believes that creative experiences such as writing a musical score, painting or even reading to a child as having this kind of flow. I can personally relate to

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such an experience, as the journal entry above describes how involved I became with the Adobe Illustrator pen tool. I become so engrossed in my work on the computer that peripheral thoughts are pushed out of my mind and I concentrate solely on my work. Being in the 'flow' as you work through the different windows and worlds on a computer is indicative of a feeling and perception of a process. One is only aware of this 'flow' once one is brought out of the activity. I become aware of the intensity of my experiences with the computer once I step away from the monitor and see the 'real world' again.

Digital Media and Multiple intelligences

In my search for terms and concepts, I have found that research not based on digital art is helpful and can be used to begin to understand some of the experiences I encountered while using digital media. The work of Howard Gardner and his ideas about multiple intelligences comes to mind. For years, Gardner has been actively promoting his theory of multiple intelligences, and how education should be tailored to each individual and their intelligences. Recently, Gardner wrote that the use of technology can help exercise several different intelligences. "Technologies and technologically based exhibitions in museums invite students to use several intelligences; moreover, even when one is simply typing on one's keyboard, one can "think" in spatial, musical, linguistic, or bodily intelligences. " (2000, p. 33). These different types of intelligences are evident while using digital media. I may think in spatial terms while editing an image that I took from my digital camera; yet when I physically take the image with the camera and use the keyboard and mouse to manipulate the image I use bodily intelligences.

The following journal entry is an example of how, while using digital media, I can use several of the different intelligences described by Gardner.

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How have I adapted my typing to the point of what seems like lightning speed? Is it the fact that I can visualize the keys in my mind or because my hands have become trained to the 'activity' of typing. When I use the pen tool in Illustrator am I using the tool with my mind or with my hand and mouse? How do these things work together? When I observed Elida typing and using her pen from her digital writing tablet I saw someone working without even realizing what she was doing. I was amazed at the way that she could use both the keyboard and the writing tablet at the same time. I've been thinking about these ideas as I research Howard Gardner's ideas on multiple intelligences. There must be some amount of bodily-kinaesthetic intelligences required to type on a keyboard and be able to form the required short-cut key with your hands instantaneously (You know that I love my short-cut keys). Then there is the language intelligence that is needed to understand the various descriptions of the short-cut keys. Could this account for some peoples' ease at understanding and using acronyms and abbreviations that are a standard in computer terminology? This would involve the language, and bodily intelligences working together to use computer shortcut keys. (Personal journal, October, 22, 2003)
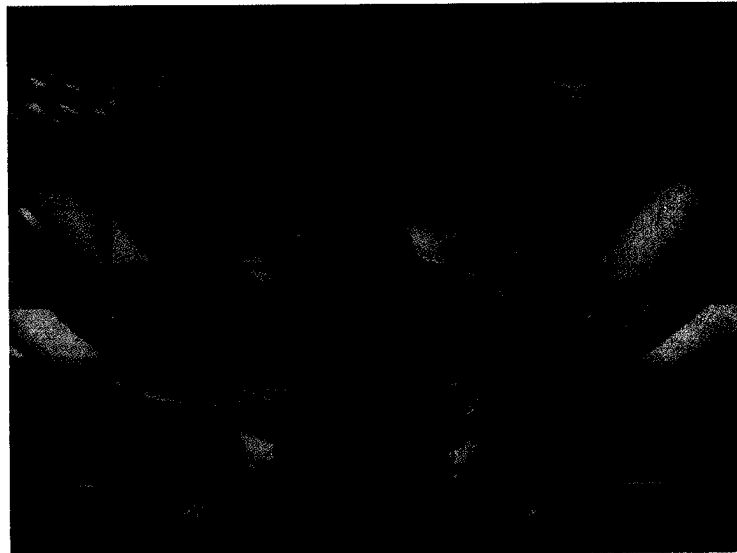
Figure14, Multiply, digital collage, 2000

Certain intelligences may emerge and become stronger with experience in digital media. For instance my typing skills (bodily intelligences) improved drastically when I began to use the computer more often while my linguistic skills improved as I gained more experience using different software menus and graphical user

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interfaces.

Formulating my language- Conclusion

The way that I think and learn in digital media has emerged from my experience using the media. For instance, I enjoy deciphering the intertextuality of hypertext documents, I have a facility with acronyms and new software languages, I use bricolage to construct my artwork and academic pieces, I often get lost in cyberception and cyberspace, I can become immersed in the flow of my work, and certain types of intelligences have emerged with my experiences in digital technology.

While this investigation is a personal one, it is still relevant. Understanding and recognizing my own experiences will help me understand a media which has yet to be fully explored. I've noticed that very few articles devoted to digital art education have been published recently. Nonetheless, the articles published in the late eighties and early nineties (Ettinger, 1988; Garvey, 1997; Johnson, 1997; Morbey, 1997; Koroscik, 1995; and Rogers, 1995) all point out that the field of digital art education is still at its inception. According to Johnson:

> Little is known about the computer art world itself. Certainly more
> studies of computer artists will be necessary if they are to serve
> as models of theoretical, practical and historical development in
> computer art--as do their colleagues in painting and sculpture.
> (1997, p 47)

More studies need to be done to determine the relationship between the thinking and learning styles that emerge through working with digital media. I've noticed that my experiences are similar to the experiences of my friends and colleagues-- I've observed Elida creating her work using bricolage and being immersed in cyberspace and cyberception. Yet, this thesis is a mostly a personal reflection which will help me begin to understand the experiences of others. It is an investigation into new ideas in new media. While the terms bricolage, 'flow', and multiple intelligences have been around for quite some time, their application

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to digital technology is new. New terms such as cyberception and cyberspace have yet to be fully explored in the research. Consequently, I have yet to find or create a term that I believe adequately represents my experiences in digital media. According to Wolf (2000), and Landow (2003), this is not unusual. They believe that it is difficult to describe the experiences of new media since we tend to view them through the experiences and vocabulary of old technology. Wolf (2000) writes that comparing new technology to old technology causes us to 'fall short' of the true experience and in such, can never truly understand our experiences with digital technologies. (p 238) In my journal I often uneasily compare my experiences with traditional painting media and digital media. The following journal entry demonstrates the struggle that I have to understand my new digital experiences.

> Perhaps because when you use traditional art materials you don't have the incredible possibilities that you have with computers. When I paint, I know that my style will be similar to the last painting. Whatever image I create in oil painting will have a similar style to what I create in watercolours or acrylic. I can recognize my brushstroke and my style in the paint. However with digital media what I create becomes an ever-growing mass of potential possibilities. Often, I wander in one direction then go off in another tangent never arriving to what I thought the image would be. With digital media the process of creation is just as exciting as the product. Sometimes my images are similar in style but with a new software program they could look entirely different. Any digital art piece can change and morph into something else completely different. And I never know where this will take me---sometimes this can be daunting but most of the time it can be extremely exciting... (Personal journal, January 21, 2003)

In this same journal entry I wrestle with my comparisons of traditional and digital media:

> I still feel uneasy trying to define my relationship with both traditional and digital media. The two things can be so different and yet similar at the same time. When I make digital art I feel I

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am absorbed in a completely different world that has a different feeling than when I paint. I get the same creative charge from the two media but I see them as very separate endeavours. I feel uncomfortable comparing them because they involve such different processes...(Personal journal, January 21, 2003)

Figure 15, Tussle, digital scan, 2001

I cannot describe my experiences with digital media through my experiences with traditional media. This makes developing a theory of my digital art process difficult, but not impossible. I have examined my experiences and I need to formulate the language which will describe these experiences. I need to find a term that is not representative of my experiences with older technology. This task will take more time and research beyond the scope of this thesis. It will become instrumental in helping design my teaching and learning strategies with digital art.

In the next section of this thesis, I explore the context of my gender in digital art education and how this context further influences my thinking, learning, creating, and teaching in the digital arts.

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Figure 16, Fizz, Flop, Blah, digital drawing, 2004

Chapter 2: Research Question 2

This chapter will answer the following research question:

> As a female, how does my gender inform and influence my process
> of creating and learning digital technologies? Is this similar to the
> experiences of other women engaged in digital art technologies?

Introduction

Fizz! Flop! Blah! I'm excited and transfixed by the flashy packaging that

envelopes the new software. I am dreaming of the potential creative possibilities

that abound in my mind. I wonder what improvements the software company

has implemented in order to justify publishing this new version. Are the changes

to the software significant or can I still get around by using the old version that

I already possess? Will this upgrade be too powerful for my machine? As I

make my way through the computer store grappling with these questions, my

daydreaming begins to fade as once again I realize that I am outnumbered and

alone in a crowded store full of men. Not only is my gender a minority among the

store's customers and staff, but women are also unrepresented in every aspect

of the products and how they are marketed. As I navigate through the store

aisles desperately trying to garner the attention of the all-male sales staff, I am

met with images of guns, cars, and scantily clad women adorning the packaging of software games lining the shelves. And I am not the only one who feels this way. According to Hermida (2004) many women are put off by the marketing of technology.

This male bias and stereotyped portrayal of women was even more apparent as I did an Internet search for software tutorials. I encountered ads for spying on women with a secret spy cam, ads about digital toys for men, and a survey from an Internet dating site which rates the attractiveness of female models.

Gender bias and stereotypes of women in digital technology

In addition to these examples of sexism in the horde of technology advertising and marketing, I am offended and angry at the stereotypical notion that women are mentally ill-equipped to cope with technology. Every day I see images of women in the media that remind me of some archaic notion of a 'damsel in distress', as she needs the help--or rather, the rescue--of a man to navigate the Internet, make an on-line purchase, or program the VCR. Just the other day I saw a TV commercial promoting electronic gifts for Christmas: the man demonstrated his command of technology 'lingo' by using acronyms like CDR's, RW, DVDR, while the woman laughed and claimed that she "couldn't understand technology and just needed something easy to use". Examples abound in popular culture, yet few of us take note of these flagrant stereotypes regarding women and technology. The worst part of this bias is how we, as a society, all seem to ignore and accept it. The association between women and technological ineptitude has seeped into our world so subtly that it has become more systemic and stereotypical than ever, affecting women and men in more ways than we can imagine. Even after making concerted efforts to make

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technology fields more accessible to girls and women, less women are enrolling in computer engineering fields than they were in the late seventies and early eighties (Spalter, 1999). Where are the contemporary female computer science innovators? The pioneering women of computer science like Ada Lovelace who helped create the differential machine, Grace Murray Hopper who created COBOL, Adele Goldstine who helped develop the world's first digital electronic digital computer and to write its manual, and countless other women who often worked without either the recognition or money afforded to men in the industry--these women had to endure discrimination that most women today would never dream. Yet, these pioneering women were not faced with the constructed and marketed bias against women and technology that has infiltrated society. Stereotypes and biases seem to have expanded and deepened as digital technology's impact on general society has increased.
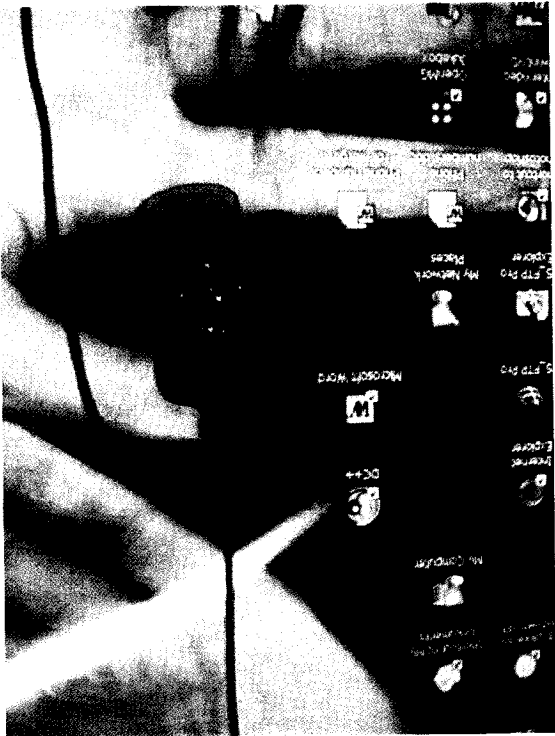

Figure 17, juggle, digital photograph, 2003

Unfortunately, role models for women in computer science are few and far between, and the situation seems to be getting worse not better... Because only a few computer scientists and programmers are women, most of the commercial tools used by computer artists are created by men. (Spalter, 1999, p. 9)

How does this bias affect women working with digital media? There has yet to be a landmark study on the bias of women specific to digital media similar to Sadker and Sadker (1995) who studied the general effect of bias towards girls in schools. They did not focus on the effects of marketed stereotypes and bias towards women and technology. This issue has yet to be addressed with the focus and scope of Sadker's study. I know only a few women involved in digital art media and at this point I would feel inadequate to talk about what would seem to be every woman's perspective. Instead, I will try to understand this bias from my own perspective. By understanding my own experiences and perspective, I can further my own learning, creating, and teaching practice. In this section of my thesis I will begin to answer my questions using journal entries, excerpts from my literature review, interactions with colleagues, and observation and interview of digital artist and student Elida Arrizza.

In my introduction I mentioned my early experiences with computers and how they were fraught with gender biases and stereotypes. I can remember experiences in high-school where I internalized gender stereotypes. For instance, during computer classes I would see the constant attention the teacher bestowed upon the male students and the subsequent rise in their computer skills and status. Stereotypes can become so pervasive that I often forget that they are just preconceived notions. I may be aware of the biases and stereotypes about women in technology yet I often catch myself accepting these generalizations. I feel frustrated when I realize that I am succumbing to the biases that I am trying to destroy.

One of the ways that I have found to help deconstruct these stereotypes

has been through my practices as an artist, teacher and student. This has led me to research the context of gender within digital art technology. In order to examine the gender issues associated with technology and art education, one must first examine gender issues within technology.

In contemporary society, understanding and proving gender bias in any field is not easy. Gender bias can be transmitted through subtle messages that are easily overlooked, de-emphasized, and minimized. As a female consumer I may feel uncomfortable and even intimidated when faced with a computer store geared towards men. Sadker and Sadker (1995) who have researched the discrimination of girls in schools have observed that even people who are aware and conscious of gender bias have a hard time noticing when bias occurs. Teachers are unaware of the hidden lessons they are giving to their female students:

> It is difficult to detect sexism unless you know precisely how to observe. And if a lifetime of socialization makes it difficult to spot gender bias even when you're looking for it, how much harder it is to avoid the traps when you are the one doing the teaching. (Sadker and Sadker, 1995, p 4)

This has led me to believe that gender bias in technology is similar to systemic racist discrimination. According to the Canadian Race Relations Foundation (n.d. ¶ 6), systemic racism:

> consists of the policies and practices of organizations, which directly or indirectly operate to sustain the advantages of peoples of certain 'social races'. This type of racism is more difficult to address because it is implicit in the policies of organizations and often unconscious.

This definition of systemic racism can be applied to systemic discrimination against women. This type of discrimination is echoed in the interviews by Roberta Furger who asked female students about their experiences with computers. The following excerpt from a female computer-engineering student sums up the

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effects of systemic discrimination:

> It's like death by a thousand cuts...It's a lot of little things that all
> add up to something large. The little comments and the attitudes
> you encounter may not seem like large things, but the fact is that
> women and minorities deal with these experiences on a daily basis.
> It all just accumulates." (Furger, p. 176)

Both Furger (1998) and Sadker and Sadker (1995), have been able to illustrate various examples of gender bias regarding the way technology is taught and marketed in our society. Girls are often told implicitly, and sometimes overtly, by their parents and teachers that computers are not for them. According to Furger (1998), parents and teachers advise girls not to take advanced math or science- - permanently excluding them from continuing their education in computer related fields.

Journalist Ilana Debare began writing about the discrimination women faced in digital technology when she noticed women were absent from the events in Silicon Valley that she came to report about. This led her to research and interview women working in schools and universities.

> 'Usually starting around the middle school years and puberty, girls
> start to get a message that computing is for boys,' said Jo Sanders,
> director of the Computer Equity Project, a New York based group
> that received federal funding to train computer teachers in how to
> reach girls...But experts such as Sanders say the dearth of girls in
> computer classes has much more to do with stereotypes of what
> are acceptable "male" and "female" activities—and the broader
> problem of girls shying away from math and science in general.
> (DeBare, 1996,¶ 2)

Despite these findings most women I know feel that gender bias is not an issue affecting their lives. Until they began to examine the idea further, my colleagues were quick to say that they saw no bias as they worked in the field of digital media. In my experience my friends and colleagues are often afraid to

point out bias because they believe someone might tell them that they are wrong.
It is often an uncomfortable situation to discuss. The following journal entry
illustrates one of the conversations I had with a colleague about gender bias in
technology.
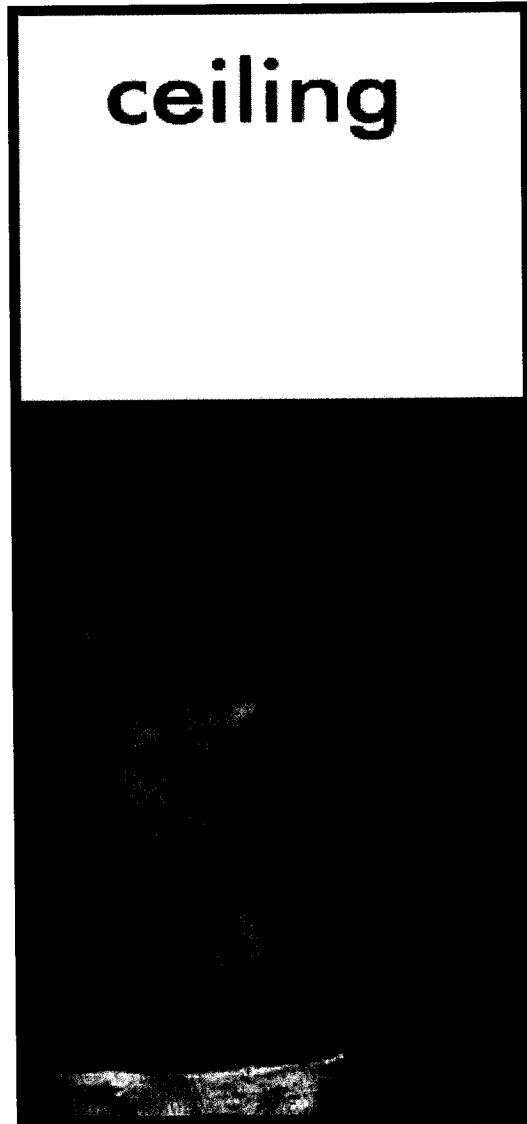
Figure 18, Glass, digital
photograph, 2000

I never understood how much we can internalize stereotypes
until I spoke with Alice (name changed for the thesis) today about
gender equality at work. We both work as technical support agents
in a technological firm. We were talking about my thesis and she
told me that she disagreed with "feminism" because she felt it was
about putting women above everyone else. I told her that my vision
of feminism was one of inclusion and equality for all people. She
replied that the word has a 'history' in our society which does not

reflect its true definition. She said that she was embarrassed to use the word 'feminism'.

I found this interesting since she is the first to admit that she has to work harder than any of our male colleagues in order to be recognized for her achievements. Recently she refused a promotion at work due to the fact that she would have to prove herself constantly. The group she would have worked for is comprised entirely of males. Alice said that she did not want to be the first woman to have to prove herself to that group. She claimed that she would rather pass that torch to someone else. I wonder, if she doesn't open the door and increase opportunities for other women, who will? I can't see myself working there either-- but my excuse is that this is just a part time job until I get more teaching contracts. How many more excuses can I make? How many more excuses can we all make? As the years pass our department is hiring less and less women. At this rate our daughters won't even have a chance of reaching our own job level, let alone the one that Alice refused. (Personal journal, December 18, 2003)

Upon reflection, many of my colleagues and friends could find situations which demonstrate bias. In my interview with Elida she claimed to have seen very little bias in her experiences using a computer, until she mentioned the experiences of her younger sister studying computer engineering at university.

I wouldn't say that I have not noticed a bias but I have noticed an in-equilibrium of gender. I've worked in a computer lab for the Fine Arts faculty and I was practically the only female technical support. I was really glad to be part of that presence and that I did represent a female position. I don't feel that it is quite balanced and I don't know how that can be resolved...In creative digital arts I don't think there really is a bias but say in engineering or computer science and stuff like that. My sister had a class with something like 78 people and only 2 students in the class were female one of which was her. (E. Arrizza, personal communication, September 28, 2003)

Figure 19, Demo-lition, digital photograph, 2001

I find it difficult to point out the pervasive gender stereotypes and biases in society. Whenever I begin to feel that things are beginning to change, whenever I become comfortable and somewhat complacent, I remember a recent interaction via e-mail with a former colleague. John (his name has been changed for this thesis) expressed some interest in my work with digital art and teaching. Via e-mail, I sent him the URL of a draft of my web site for this thesis. I was shocked and disappointed by his e-mail in which he claimed that the lack of women enrolled in science programs in higher education was due to mental differences---a topic he had researched for a paper during his undergraduate engineering degree. While I was happy to see that he requested to have more information about gender bias, I couldn't believe that someone from my generation could have such antiquated views. The e-mail and my response is included below:

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E-mail from John:

"I checked out your site. Interesting. You know, in my final year I had to write a dissertation on gender and technology, about whether the fact that women are not equally represented in the "hard sciences" such as Physics and Engineering was due to these disciplines being male-dominated in character (in most universities, these are the only disciplines still comprising a majority of males). I argued that such claims were unfounded, and in light of further evidence (for instance, the fact women are "over-represented" in other disciplines, but so much more evidence) suggested that it was much more likely that it was due to gender differences in thought and understanding, due to fundamental gender anatomical and mental differences, and not just the consequence of men and women socialising (sic) differently. I would like to learn more about what your personal research has concluded on the issue of gender and technology."

This was my response:

I must admit that I was shocked and disappointed that someone from my generation could actually think that society has little to do with a woman's interest in academic disciplines and resulting university enrolment. To me, your analogy that women have anatomical and mental differences that make them less suited to scientific disciplines is just as dangerous and unfounded as the ideology that racist groups have been trying to peddle for years: that people of different racial backgrounds have anatomical and mental differences which subjugate them to the ruling class. Such racist and inherently incorrect analogies should have disappeared a long time ago. Unfortunately, society persists in constructing and perpetuating stereotypes that effectively cause women to experience similar (albeit not as deadly) systemic discrimination that visible minorities have had to contend with for decades.

How could you explain a mental deficiency when the history of computers is littered with achievements by such pioneering computing geniuses as Ada Lovelace who is often called the first programmer, Grace Hopper who created COBOL, Adele Goldstine and Alice Burkes who were instrumental in creating ENIAC, and countless others? Oh, but that's right, you probably haven't heard about these women since history is but a construct written about the dominant gender and races.

While I must give you credit for your observation that women are underrepresented in the sciences in universities, countless studies have been done which show that this is in part due to the

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media and socialization of girls in schools. Studies have also shown that the enrolment of women in computer science has steadily declined over recent years due in part to an increase in systemic bias in the subject area and a lack of role models.

Despite this, I hope that you will not be offended by my stern words (something not usually associated with the 'gentler sex') and continue to try to open your mind by seeking out information as you did in your e-mail by requesting research from me. It took a lot of courage for you to admit your beliefs. Once I have completed my thesis I will send you my research and I hope that one day you may be able to look at these issues by focusing on a wider research perspective. I do hope that one day women and men will work together to create a better understanding in a world free of stereotypes and generalizations.
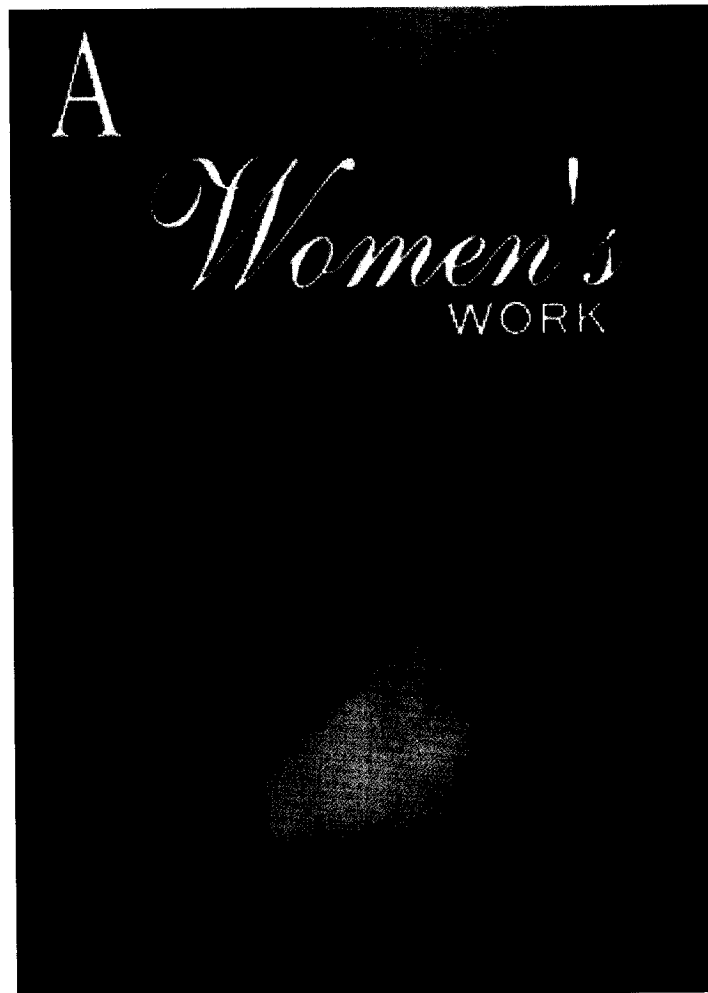

Figure 20, "Work", digital photograph, 2000

My response to John's e-mail has become somewhat of a performance piece for me. It has inspired me in so many different ways. I sent the original e-mail and the response (hiding John's identity, of course) to some colleagues and received mixed reviews. Most people told me that my response showed class, intelligence, and grace while one man stated that I was 'radical and bleak'. I can't imagine what could be more 'bleak' than thinking that women don't have the mental capacities to function effectively in scientific domains. John's e-mail has served to remind me that gender bias can be seen from people with whom we least expect it.

Digital thinking and gender

Despite John's antiquated notion that women have biological differences making them less apt to work with computers, some researchers have noticed that there is a difference in the way some women and men create with a computer. Yet these differences are due to socialization not biological differences. MIT researcher, Sherry Turkle believes that some women and men tend to think and organize their thoughts in a way that is atypical to the norms in the field of computer science. As I discussed earlier in the chapter on thinking processes, Sherry Turkle believes that a lot of women and men are uncomfortable creating programs in the traditional 'top-down' hierarchical approach—a style of programming predominant in universities and in industry. She writes that many women and men prefer to create and structure their computer program as they go along-- moving lines of code back and forth as you would paragraphs while writing an essay. Turkle has interviewed a large number of male and female computer engineering students. Many of the women expressed concern trying to 'fit' their way of reasoning into the courses they took at university.

> Lisa and Robin came to the programming course with anxieties
> about not belonging because they did not see themselves as
> "computer people." Although both could master the class material

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intellectually, the course exacerbated their anxieties about not belonging because it insisted on a style of work so different from their own. Both received top grades, but each had to deny who she was in order to succeed. Lisa said that she turned herself "into a different person," and Robin described what she had to do as "faking it." (Turkle, 1998, p. 54)

The 'soft mastery' approach coined by Turkle and discussed in the process section of this thesis is indicative of the style in which many women choose to work, because it closely resembles the so-called feminine characteristics in which we have been socialized, such as the 'process of negotiation, compromise, and of give and take', something that women have been trained to do socially. (Turkle, 1988, p. 56)

Influence of gender in my experiences with digital media - conclusion

I have mentioned that my style of creating art work on the computer reflects Turkle's ideas about bricolage and soft mastery. My style is a product of my adaptation to digital media. The context of gender is important to the way that I create, teach, and interact in the digital arts. My style of thinking, learning, and art making has emerged from my experiences as a woman in western society adapting my abilities to digital technology.

My art practice has been influenced by the way that I have been socialized, while the themes and imagery of my artwork has been influenced by my experiences as a woman in society. This is reflected throughout my work ---my artwork becomes a form of self-education and awareness; it is a way to understand my experiences and reflect on them.

In the next section of my thesis I will relate the issues of gender bias to my teaching. The context in which I create, and learn has an impact on my teaching. It is important for me to use my own experiences to try to be aware of my students' creative practices and their own context of working within the world of digital arts.

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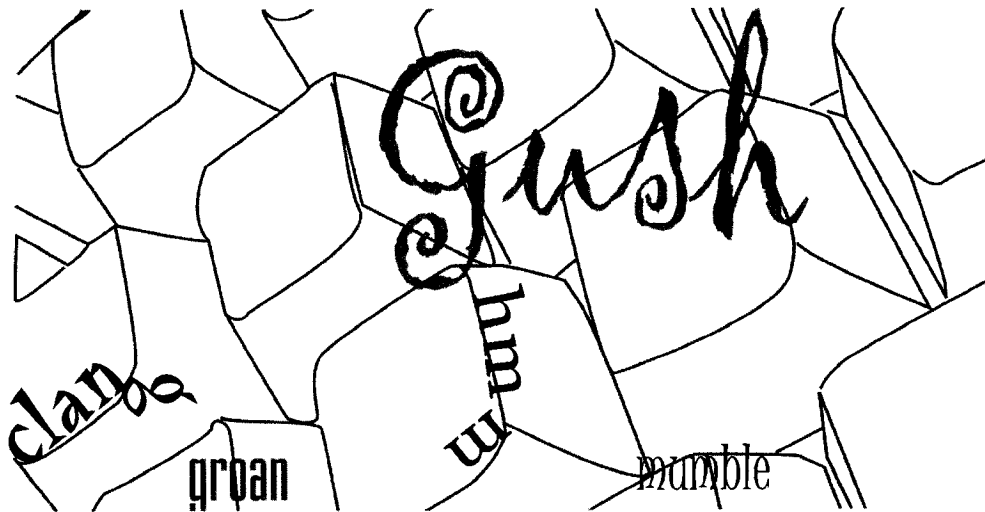
Figure 21, Hmm, digital drawing, 2004

Chapter 3 - Research Question 3

This chapter will answer the following research question:

> I have examined my working and thinking processes in digital art, as well as the perspective of gender. How do these aspects inform and enhance my teaching practice in the digital arts? What challenges and possibilities do I face in teaching digital arts?

Introduction

Hmm..., Gush, mumble, clang and groan. As I stand in front of my class about to teach a lesson in digital art I am filled with a mixture of emotions. My thoughts span extraneous items--- Is my voice loud enough? Do my socks match? Should I move to the side so that my students can see the application on the digital screen? How can I avoid tripping on the wires connecting the digital projector? Ah yes, another evening of working in the dark; literally, teaching with the lights out (how else can you see the screen?) while my eyes, ears, and mouth are wide open. I feel like I have no idea what I am doing. I've had few examples to follow (I've taken very few classes in digital media) and I haven't had much luck finding literature that would help me with the practical aspects of teaching digital art. Scratch that---I feel like I don't know what I am doing but I get a pretty good picture. I do the best job that I can, and my students enjoy my class, and they tell

me that they are learning a lot of new things. The best part is when they tell me that they finally understand something that they have never been able to grasp before. For me, class is an exhausting three hours of incredible fun with a little anxiety and a great deal of empathy.

I have a mixed group of continuing education students. Their ages range from 16 to what I think is 70 (maybe more; I'm not very good with determining age). Hmmm, one student did say that I reminded her of her granddaughter. The first day of classes I overheard two students gasp that I looked so young. As a teacher, looking young can often be a disadvantage; yet when teaching digital media it can be a plus-- society often associates expertise in digital media with the young.

Within this heterogeneous group of individuals there was a wide range of basic computer knowledge. Some people seemed so afraid to make mistakes it was almost as if they thought that if they touched the wrong button on the computer it would unleash a bomb. Other students had some idea of what they were doing and were comfortable tinkering away on the machine. Then there was the one student who believed that he knew so much about computers that he should be teaching the course instead of me. Overall, I thought that their talents were extraordinary, and I was impressed and honoured to be teaching such a fabulous bunch of people. And yet, I still fret.

It is not easy to cater to such a wide variety of knowledge and computer skills. I have to remember to take my time with students who have less experience while continuing to make it interesting for the more advanced students. I want to be able to teach them the software and the principles of design so that they are aware of what they can do with the software and do it well. I do all of this while praying that nothing will 'crash' and the world won't blow up in a giant nuclear blast. I love my students and I love what I am doing,

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but I am conscious that this is a relatively new field and that I have very little experience as a teacher or student of digital art. Most of what I have learned I have learned on my own. In the few digital art classes that I have taken, I've seen several different approaches to teaching. Some of these approaches worked for me, and some didn't.

In this section of the thesis I will explore my teaching process in the digital arts through a review of the literature, combined with my investigation into the process of working in digital art with the perspective of gender using excerpts from my journal, literature review, and observation and interview of digital artist and student Elida Arizza.

Searching for teaching strategies

I began trying to formulate my teaching strategies by researching digital art education. One would imagine that such a diverse and dynamic field like art education would be rich with information describing the experiences of people involved in the digital arts. Unfortunately this is not the case. There is still a great deal of research to be done. For instance, in the spring of 2003 while accessing Concordia's on-line database I quickly verified that the journal, "Studies in Art Education" had published only one article related to art education and computers since the summer of 2000. That's almost three years with very little research into the digital arts! Such lack of research seems surprising for a field that is constantly evolving. Even earlier, Koroscik (1995), observed that this is not uncommon:

> The impact of the information age on teaching and learning in the
> arts has been largely ignored by researchers in art education...Few
> art educators are prepared to cope with the challenges brought on
> by the information age because we have not fully considered the
> cognitive consequences of our curricula and teaching practices. (p.
> 4)

Most of the existing research in digital art education was published in the late

nineteen-eighties and early nineties. That seems like eons ago when dealing with rapidly changing and evolving digital technology. We know realitvely little about the world of digital art and the people who create it. The following journal entry shows my own struggle to understand my creative practice within the digital art world:

> It's hard for me to understand if my artwork could be considered digital art or not. I've looked around and there is very little information published about the contemporary digital art world. By contemporary digital art world I mean something past the early eighties and nineties. They tell me nothing: all the art history texts, all the 'leading' art magazines and journals. They just contain obscure facts and insignificant information that is useless to me. There is no 'Clement Greenberg' to dictate digital art taste—maybe that's a good thing. But I am still left with lots of questions about my art. I have never taken any studio art classes that featured digital art so I feel like I have no idea how to critique my work. How do we define digital art? What does it look like? What does it consist of? How do I know if it is 'good' if I'm not sure what is good? Who makes it and how should we display it? Who are the movers and shakers of digital art? Maybe there will never be any 'stars'—that could be good as well. But it would be nice to know something. Perhaps it is still too early to tell. Maybe all digital artists are in the same boat: shielded by large computer screens, alone, listening to the hub of the virtual stream. (Personal journal, January 7, 2003)

A quick query on any search engine will reveal that the search term 'digital art' pulls up an overabundance of web pages yet none of these pages (mostly amateur digital photography and fantasy imagery) gives a definitive answer to the questions that I ask in my journal entry. According to digital artist Richard Wright (1995), this is a characteristic of new media:

> Electronic media are too new to have a ready defined place in the cultural hierarchy that they can immediately fall into, and therefore they typically show the traces of many genres in their productions, partaking of aspects of both high art and popular culture. (¶ 1)

Not having its place in the 'cultural hierarchy' has made relevant information about the makers and users of digital art hard to find. I haven't yet found any

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established cannons of digital art or any general vocabulary that is used to describe digital art. It is difficult to formulate a digital art teaching strategy and art practice when digital media has yet to be completely understood and defined by critics and historians.

Coping with the challenge of students' different levels of knowledge and access to digital technology

The path of digital arts technology is not easy. Learning to use digital media is a challenge for most teachers who have never been taught digital media. According to Greh (1997) "All teachers tend to teach as they have been taught, and clearly few, if any, have been taught to use technologies as either art media or teaching tools." (p. 14).

To add to this feeling of 'novice' is the idea of a 'generation gap' that is often expressed by teachers and students. I've noted in my diary that many colleagues and my own adult education students often compare their feelings of inadequacy when faced with digital technology by comparing themselves to the relative facility seen in younger generations.

> There was one of my students, Genie (name changed for thesis)
> could not grasp the nuances of the program yet her artistic skills
> were very highly developed. She seemed to have this psychological
> defence...she put up her defences saying that because she was
> older (not much older than me-- about 7 years or so...) she wouldn't
> be able to grasp the information as well as someone like myself
> who was younger. I tried to tell her I had not been doing this for long
> and that my ease with the program came with a lot of practice but
> I still think she was looking for some quick fix or an easy answer.
> (Personal journal, January 21, 2003)

How can a teacher cope with the different levels of access and knowledge in a classroom? This question is difficult to answer and has yet to be addressed in the literature. The following is a journal entry describing my own experience trying to cope with the needs of students who had limited access and various levels of

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knowledge about the computer.

> I've been getting to class early to prepare and I've noticed that
> I always see the same students working on the computers.
> They are always the last ones to leave. They're not the best or
> worst students. They just don't have access to the software or a
> computer at home and so they have a lot less experience with
> the interface or any computer interface. For instance they have
> trouble understanding concepts that are related to other computer
> software, like the "Save as" option. Even though I had given them
> a handout asking them about their prior computer usage I am still
> a bit surprised at their lack of experience and everyday access to a
> computer. I can never be sure what they will know and it is difficult
> to prepare a lesson under this type of uncertainty.
> What can I do to help these students? What can I do so
> that they can further their knowledge rather then lose it all the first
> couple of months after class is over? I've given them handouts with
> copies of the icons and interface but I have no idea what else I can
> do. I want their participation in this class to be useful but I know that
> most of what they will learn will be forgotten. The information will be
> lost when the class is over. How can I adapt my lesson plan in order
> to better accommodate these students? Should I give them more
> class time to work on projects? How can I make sure that they will
> be able to retain what they learn when they can no longer practice
> their new skills? (Personal journal, November 22, 2002)

The links between access and knowledge are crucial to teaching and learning. Having access to the latest technology and tutorials can be an obvious boost to understanding digital media, providing a student with the confidence necessary to build upon old knowledge and make new connections with the material. The following journal entry shows how my previous knowledge of one software tool allowed me to gain more experience with software I was beginning to learn.

> As I look back on my 'apprenticeship' with the computer I can
> see that each experience has been built upon the other. Once I
> understood the 'layers' in Adobe Photoshop, I understood them in
> Adobe Illustrator. Yes, the programs are very similar and it wasn't
> much of a stretch for me to understand it, yet this gave me so

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much confidence. This helped me play with the software...Now
I can't seem to remember when or how I began to think in levels
and layers just like I do on a computer. I joke about how the two-
dimensional world of paper seems to be so different from the
spaces my mind seems to inhabit in the computer. (Personal
journal, January 7, 2003)
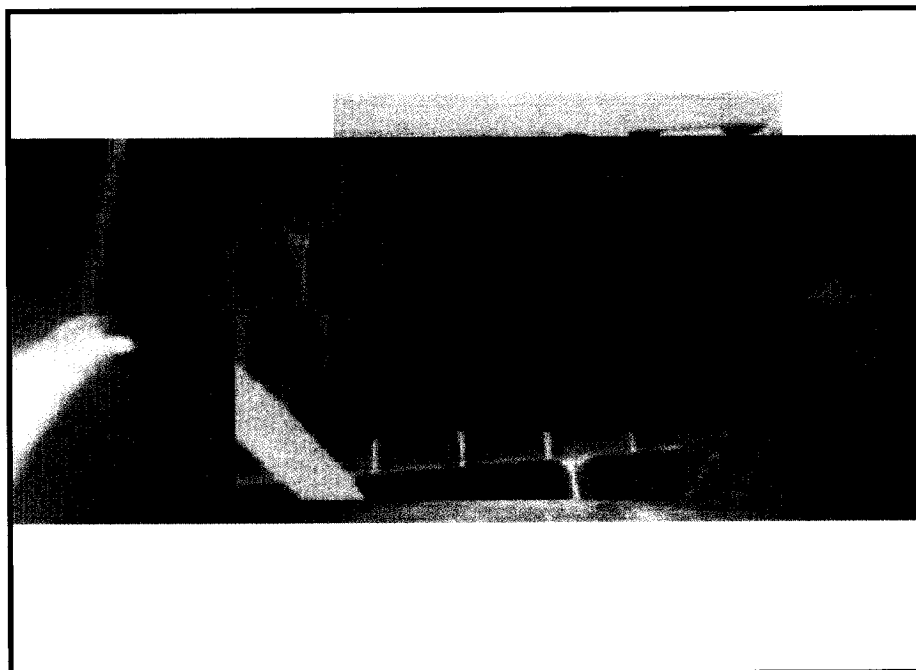
Figure 22, Spaces, digital collage, 2003

Access and prior software experience may help students and teachers further
their expertise.

Overcoming the challenge of students' anxiety with digital technology

Another challenge involves the anxiety felt while using a complex and
constantly evolving technology that is shared by everyone: experts and novices
alike.

...even the most expert of computer users are engaged in an
ongoing battle with techno-anxiety. This is the anxiety engendered
by the relationship between the human mind--in both its
conscious and unconscious modes --and the computer's dynamic
consciousness. (Lunenfeld, 2000, p. XXII)

The following journal entry describes my own difficulties as I contemplate how I

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can help students conquer their own anxieties as they try to learn how to use the software.

> I'm wondering how to get my students past the anxiety of learning
> in computers. That first year of falling over and over again
> and trying things out--I mean that always exists in the world
> of computers! It is an ever changing media where people will
> constantly need to learn through trial and error. Always working
> with trouble-shooting; going back and forth and querying what you
> already know. You will always be learning, always be an apprentice
> with these tools. (Personal journal, January 21, 2003)

As a teacher, I need to alleviate this anxiety and remember that everyone is faced with new technology that they do not understand. We are all anxious and uncertain at times. For example, one of my colleagues, who is the main person I go to with my technical questions, tells me that there is no secret to his knowledge; he says that he just reads the user guides and manuals. The way that he overcomes his anxiety is through preparation and taking the time to learn the material. Likewise, Elida believes that the key to overcoming anxiety is to 'play around and explore the software'. (E. Arrizza, personal communication, September 28, 2003)

Bricolage in digital art education

The manner that I learn about the digital art medium influences the way I teach about it. When I began teaching digital art I quickly adapted my teaching to the media. I would create demonstrations that included both images and text, adapting each lesson to the students' growing abilities and knowledge about computers.

This was different from the way that I usually taught art. I no longer followed a lesson plan that involved showing the students historical references, different construction processes and material considerations relevant to their work. With digital art, I no longer had a wealth of historical references or different construction processes. I was often teaching myself some of the obscure tools in

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the software and I needed a way that was easy for me to remember my lesson plan. I also wanted to adapt my lesson to the learning abilities of my students and be able to follow-through even when I stopped the lecture to help a student. In demonstrating the software's creative potential I would prepare an on-screen presentation of each new tool to be learned. The approach I developed to make lesson plans was reflected in the method that I used to educate myself with the software. After my first digital teaching experience, I realized that going back and forth between images and ideas has become the standard way for me to work as a teacher; I have now adopted this approach for developing lessons for traditional art media. The following journal entry describes some of these back-and-forth thought processes.
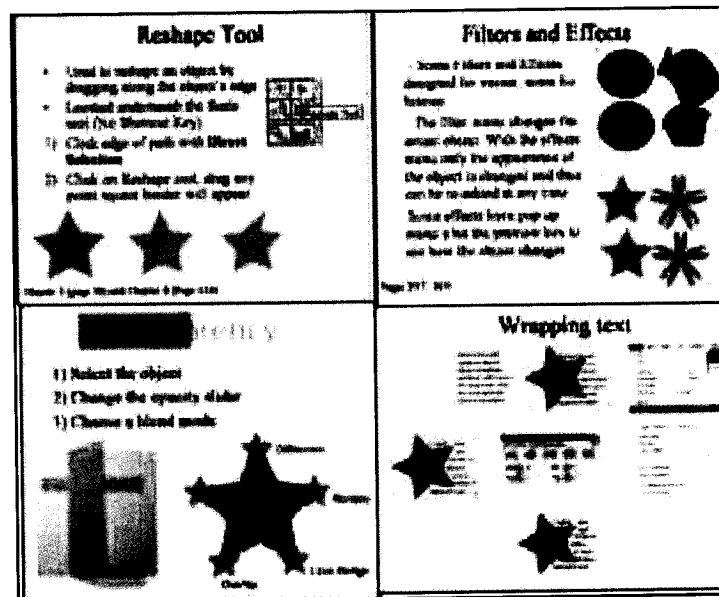
Figure 23, Teaching materials, excerpt from a digital presentation, 2001

This is incredible. I can't believe how my processes have adapted to my work and vice versa. I've been asked to teach a lesson using traditional art media at a high-school and I am panicked because they don't have a computer with a digital projector. Don't get me wrong, I'm very happy to teach this lesson but I have no idea how I am going to proceed. I have less than a day to prepare so I don't have the time to make gigantic didactic materials to replace the

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digital screen that I love to use. I can't even write my lesson plan
without including icons. It's like I need the icons to keep me focused
and help guide me-- like I do with my digital presentations. Working
like this keeps me organized. I like this. If only my students could
see it on a big screen! (Personal journal, November 7, 2002)

The action of going back and forth between different documents, programs, and

ideas is very much in the style of bricolage, and cyberception.

My lesson plans are created as a form of bricolage; bringing together disparate

elements into one cohesive presentation for my students.

Figure 24, Back and Forth, digital collage, 2000

Using bricolage as a way to learn digital technology

For Elida, exploration is very important since it serves as a way to learn

and become more comfortable with the medium and constant upgrades as well

as acquire new ideas for further projects.

When new software comes out you want to discover every in and
out that's been added-- it is almost impossible. It is infinite and you
forget what your original intent was. Because it is overwhelming,
the way that I've tried to resolve that is when something first comes
out or you are interested in it you set up "play time" just for goofing
around...These experiences often inspire me for new art pieces.
Of course there are times when you are in a panic and you can't
figure things out and everyone deals with that. (E. Arrizza, personal
communication, September 28, 2003)

According to Elida being comfortable finding a solution to a particular problem

requires confidence and the ability to 'conquer the process and the software

to get the results'. (E. Arrizza, personal communication, September 28, 2003)

Using the memories of past explorations to help troubleshoot a problem is

working through bricolage by taking disparate elements and using them to solve

a problem. In this way Elida is working in a non-hierarchical fashion to solve a

problem. Using bricolage as a problem solving tool is something that I have been

trying to encourage with my students.

> Last night a colleague said something great about working with computers: "Sometimes, it is not about what you know, but how you troubleshoot the problem that is the most important." He said that he often doesn't realize how much he does know about computers. I told him that this was exactly what I was studying: using bricolage as a way to work and solve problems on the computer. But, I need to find a way to make my students feel comfortable learning these types of skills so that they too can use their experiences to help them become comfortable troubleshooting a problem. In that way they would use bricolage to help them overcome their anxiety and become confident. (Personal journal, September 17, 2003)

How can teachers and students overcome the factors of access, prior

experience, anxiety, and feel comfortable learning by playing?

Learning the language of digital technology through analogies

It is not easy to overcome fears and anxieties to be comfortable with the

medium. This is true for experts and novices alike who all experience anxiety at

one time or other. Using analogies to compare the tools on a computer to similar

traditional media has been one way to associate the digital experience with

something familiar to the computer user. (Rogers, 1995; Wolf, 2000)

> Simplification, especially of highly complex technologies like the computer, often begins to border on metaphor (for example, the icon-driven graphic user interface), and is also usually more focused on *what* something does instead of *how* it does it... Likewise, computer icons like the paintbrush, trash can, pencil, eraser, scissors, and so on indicate computer processes that are functional metaphors of physical ones. (Wolf, 2000, p. 216)

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By using these symbolic icons, computer users get a sense of the capabilities inherent to such a tool. How can teachers use these metaphors to their advantage? When I asked Elida how she would approach teaching digital art she spoke about using metaphor and analogies to make the student more comfortable with the medium. Elida has had experience teaching traditional art materials and has also been a lab monitor at the university's digital art lab.

> For people who are not really familiar or who do not have a background in digital art. I would use a lot of analogies and compare it to traditional media...At the same time or on the same token, many of our, and I have a problem with this word...many of our "extras" have to be incorporated as well. For instance, there are no parallel examples with traditional medium like DPI and pixels. When you look at or perceive paper-- the quality is the quality-- it doesn't matter how many dots are behind that. So it is probably a bit more abstract and complicated to convey to students and it is more a matter of practice and a matter of showing them examples of the difference between 'what if' and 'what if not'. (E. Arrizza, personal communication, September 28, 2003)

Elida's approach is very useful: have the students become more comfortable with metaphor so that they can achieve the confidence needed in order to learn from a growing experience. I've noticed that this can be quite useful in the digital art classroom. However, as Elida states it is important to remember that not every computer application or tool can be referred to with an analogy to traditional media and the physical world. As I noted in the process section of this thesis, Wolf (2000) and Landow (2003) believe that there are problems viewing new technology through the experiences of older technology. They claim that if we view digital technology through the experiences of older technology we will never truly understand these new experiences for what they truly are.

It is important to understand that analogies to older technology can be used in some situations and yet it should be used in moderation. I want my students to be able to understand these analogies without confusing the properties of the digital tool with its traditional equivalent. Using analogies to other technologies

(in moderation) is one way to make students more comfortable with the medium.

Context of gender and teaching digital media

In the gender section of this thesis I spoke about the biases that I had encountered in my own personal experiences and how important it is for me to be aware of gender biases as a teacher and a student of the digital arts. Personal experiences and literature have made me realize that the discrimination women face whenever they use digital technology is pervasive and systemic. The following journal entry describes some of the experiences that I encountered while teaching an adult education class.

> Today in class some of my male students were surprised when Jessica (name changed for thesis) answered a question that they could not. My students are clearly separated amongst gender and computer knowledge. The men sit together and talk about the latest computer gadgets and the women sit apart (I'm never privy to their conversations). It still surprises me that these divisions continue to exist. For instance, I see that Jessica will know the answer but she just won't say it loud enough and the men 'take over' and answer the question. I would have expected something like this in a high-school class but Jessica is an adult who recently had a powerful government position. And it's not like Jessica is shy or scared—when I see her work at her desk she has a lot to say. It's just that most of the women seem to keep to themselves and they hardly ever speak up in class. I've tried different methods to get them to communicate more. Let's face it, I'm not going to change their seating arrangements (they are adults), but I have done other things. I think that it is important to be aware that these divisions do exist and try to encourage equality. (Personal journal, April 4, 2002)

It is not easy to encourage women to be confident using digital technology especially when they have heard society's message that technology is exclusively the domain of men. Researchers have recognized that early access to digital technology encourages students to continue using computers. (DeBarre, 1996; Freedman, 1997; Gailbraith, 1997; Kirkup, 1992; & Morbey, 1997) They often recognize that early access to things such as video games "can be a gateway to computer literacy". (Debarre, 1996, p 4) This is something

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that I have noticed in my own experience and is detailed in the following journal

entry:

> My colleague and I were talking about the confidence that someone
> needs in order to go through and troubleshoot a software or
> hardware problem. He equates this type of confidence to playing
> video games as a child. He thinks that because a lot of boys
> played video games when they were young it makes them better
> able to conquer programs. Whereas someone like myself, who
> was never interested in video games or never had access to them
> would have a harder time. He told me that being able to play
> video, games gave him the experience and confidence that comes
> with troubleshooting software and components. (Personal journal,
> September 17, 2003)

Video games are almost exclusively marketed towards males; women and

girls rarely take part in their often-violent, highly sexualized, fictional scenarios.

Researchers believe that the industry should develop video games that are

geared toward the interests of girls (Cassell &Jenkins, 1998; DeBarre, 1996; &

Furger, 1998) in order to increase their interest in digital technology.

Having women become more empowered through their interaction with

video games may be one way to increase their interest in digital technology. But

how can I transmit that empowerment to my students? Most of the women I know

don't even like playing video games. Elida says she hates them and I have no

interest in them at all. So how can I prepare women to be more comfortable using

the media?

I began incorporating small changes to my lesson plans in order to make

the women in my class become more comfortable. I added more information

about female digital artists to show that women like them are in this field. When

I asked my students questions I called out their names for answers, rather

than posing the question to the whole group. In this way, I try to encourage

more women to speak up and actively participate in the discussion. I tried to

spend more time with my female students. Near the end of the semester I felt

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that there was an increase in the participation of my female students during class discussions. They also seemed more confident in their work and were troubleshooting technical problems with more ease.

To conquer it all - Conclusion

As a teacher, I feel that it is extremely important to feel empathy towards my students' learning abilities and in turn, self evaluate my teaching skills. This can easily be done since the constantly evolving nature of digital media demands that I inhabit both the roles of teacher and student. There is always new software or hardware to explore, learn and understand. As a student and teacher of the digital arts I must not only learn how to use the software but also learn how to teach and adapt these new technologies to my lesson plans. Access, prior experience, and anxiety with a new upgrade or technology can be experienced by students and teachers alike. These challenges are something that I need to consider each time I step into the classroom.

Likewise, understanding the process that I use as I create lesson plans and didactic materials on the computer helps me feel comfortable adapting my skills to my teaching. As I understand the way that I teach using bricolage, cyberception, cyberspace, flow, and multiple intelligences I become aware of my teaching strategies and can adapt these skills to teach my students.

The way that I use and teach digital technology is always influenced by the context of gender. While teaching and creating lesson plans it is important for me to be conscious of the way that women are stereotyped in society, to empathize with the bias some students may face, to be conscious of the different learning styles my students may use, and to encourage women to be comfortable using digital technology.
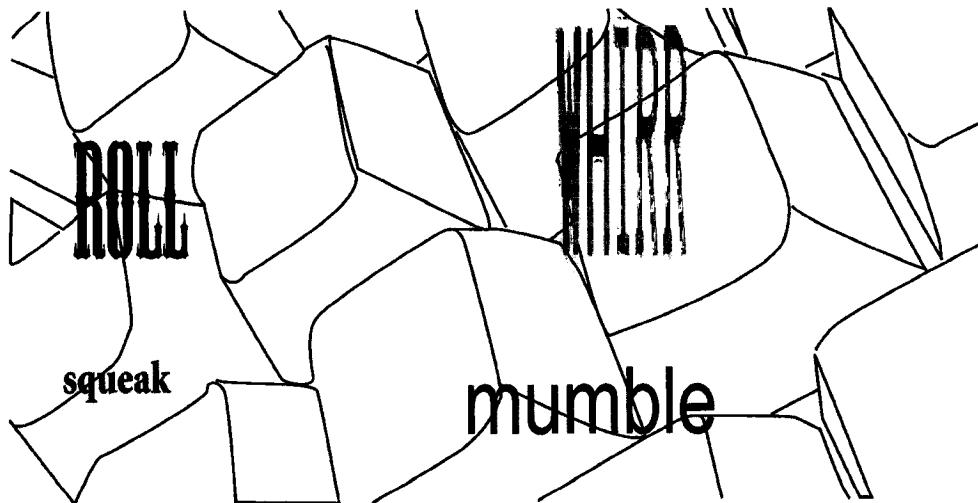
Figure 25, Whirr, digital drawing, 2004

Conclusion

Whirr. Roll. Squeak. Mumble. I am immersed in the cyberspace on my computer manipulating images and words that will be part of my thesis. The glaring sun from the nearby window causes me to see my reflection on the screen and I am brought back to the physical world with the sensations of touch, smell, sight (in the form of reflections on my monitor), and sound. I look through my digital photographs and collages; I can see reflections, remember the feel of objects and even conjure up some of the sounds and smells. As I dance between these two worlds I am using my own words, my own language, and my way of thinking. I am reminded of my experiences within this digital world in many of my 'real world' experiences; as I point to a digital projection while teaching, troubleshoot a problem in the style that I do in the digital world, or absentmindedly gesture my hands to press the shortcut key to try and 'save' an idea when I'm talking with someone.

My creative, learning, and teaching experiences in the digital arts are filled with the same amount of potential as the shiny new software packages that line the shelves of computer stores. Much like the software packages that require refinement through quirky patches and upgrades; I am constantly re-learning and

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re-configuring my processes.

Likewise, digital technology's transformative nature causes me to conjure a plethora of questions about this digital space that I inhabit. How do you teach the process of bricolage, cyberception, flow and multiple intelligences? For me, this question is one that can possibly be answered through continued research and teaching practice. With such new ideas and concepts there is very little practical information in the research. Developing lesson plans and exercises which encourage thinking through bricolage, cyberception, and flow would involve a great deal of study.

Of course, any study of these thinking processes would begin with an examination of the process of creating digital art. Using the computer as a tool to 'think' with has made the process of creating digital art all the more important. The capacity to change an image with a flick of a short cut key and the innumerable versions of one image creates a medium that is very conscious of the process. Digital art research is filled with references stressing the importance of examining the process of making art. (Ascott, 1994 & 2001; Ettinger, 1988; Freedman, 1989; Landow, 2003, Lunenfeld, 2000; Rogers, 1995; Turkle, 1995; Wolf, 2000; & Wilson, 2001).

> Definitions of art tend to focus on the art products. The computer, on the other hand, allows attention to be focused on the process— each step or decision the artist makes in the design of an art work is recorded by the computer and can be studied, analyzed, and re-directed. This potential calls into question the traditional ideas of ownership of an art work, and implies a new relationship among artist, object and viewer. (Ettinger, 1988, p. 55)

However, most art educators are unaccustomed to focusing on the 'process' of art making. School systems' need for self-promotion along with parental validation of their child's activities pressure teachers to stress the

product over process, morevoer, society's trend towards material goods has influenced our way of creating lesson plans.

My experiences in undergraduate studio art classes reflected the emphasis on product. During critiques we were often prohibited from asking the artist any questions about their creative process. I can't recall an art class which had any emphasis on process. Yet, my studio classes concentrated on traditional media. According to Ettinger, digital media calls for a new way of looking at art which we have yet to understand and construct.

> The concept of computer art today is problematic. The computer
> as a visual tool calls into question not only traditional definitions
> of art, but traditional definitions of artist and audience. Definitions
> of art tend to focus on the art product. The computer, on the
> other hand, allows attention to be focused on the process—each
> step or decision the artist makes in the design of an art work is
> by the computer and can be studied, analyzed and re-directed.
> This potential calls into question traditional ideas of ownership of
> an art work, and implies a new relationship among artist, object,
> and viewer...We don't yet know how to think about it, look at it, or
> categorize it. (Ettinger, 1988, p. 55)

How do we adapt our teaching to focus on the process as opposed to the final product? How can we change our lesson plans to adapt to this media? According to Ascott, art education will need to adapt to the changing nature of digital media.

> Clearly the traps and trappings of classical art education, with its
> historically overheated concern with composition, closure, stability,
> resolution, and permanence (in short, *nature morte*) will give way
> to the joy of what is incomplete, uncertain, unstable, fleeting,
> immaterial, on the fly, open-ended, and living. (Ascott, 2003, p. 10)

I believe that Ascott's critique of art education is perhaps extreme yet he is correct in his ideas that the direction of art education will change with the nature of digital media. For instance, I have found that adapting the way that I learn and

create digital art through my own process of bricolage is the best way for me to teach digital art classes. I tend to focus on my process with my classroom demonstrations and didactic materials. Yet I am still trying to understand how I can adapt my non-linear thinking and creating process to a linear three hour long class. Part of this can be done through more exploration of learning and teaching styles.

Consequently, I believe that there can be no conclusion with digital media; they are ever changing. There will always be better computers, better software, firmware upgrades, newer drivers, and various interfaces. It will always be changing and morphing. What I've written here has become a historical document perhaps even before my word processing software had a chance to auto-save or maybe even before I finish typing the keys. I will just have to continue tapping on the keyboard, and squeaking with the mouse. Although these sounds and tools may quickly change, the investigation and discoveries will persist.

Figure 26, Futures, digital photograph, 2003

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APPENDIX
CONSENT FORM TO PARTICIPATE IN RESEARCH

This is to state that I agree to participate in research being conducted by Chantal Saylor, Masters student from the department of Art Education of Concordia University.

PURPOSE

I have been informed that the purpose of this research is to gather information about my digital art making and teaching processes through interviews and observations. Visual and written documentation of activities and work produced during the observation sessions and interviews will be used to communicate information in scope of the masters essay. I have been informed that this documentation may be presented at academic and/or professional association conferences, used to develop papers for scholarly publications, developing new teacher-training courses, and may be posted on a website

PROCEDURES

The observations and interviews will take place at Concordia University, or wherever is most convenient at times that are most beneficial to me, the participant. There will be a minimum of two interviews and two observation sessions which will not last longer than two hours. Participation is completely voluntary. A final copy of the research will be presented to me at the end of the study.

CONDITIONS OF PARTICIPATION

- I understand that I am free to withdraw my consent and discontinue my participation at anytime without negative consequences.

- I understand that my participation in this study is: NON-CONFIDENTIAL (i.e. my identity will be revealed in study results)

- I understand that the data (including photographs of myself as well as reproductions of some of my work) from this study will be published as part of a masters thesis.

- I understand the purpose of this study and know that there is no hidden motive which I have not been informed.

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT.
I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

STUDENT NAME (please print)_____
SIGNATURE_____
WITNESS SIGNATURE _____
DATE_____

If at any time you have questions about your rights as a research participant, please contact Michelle Hoffman, Compliance Officer, Concordia University, at (514) 848-7481.

Chantal Saylor   Elida Arrizza
M.A. student in Art Education