

Reflective Portfolio Essay

by

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for

EDUC 809

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Introduction

Two years ago when I wrote my letter of intent as part of my application for this program I had been writing applications and supporting users of computers in the high tech industry for over 10 years. I had also spent a couple of years teaching custom computer applications to a people with a broad range of computer literacy. My classroom had computers in it—not so the students could learn about the computers themselves, but what could be accomplished with them, to solve their business problems. I thought what I was doing was pretty advanced: using computers as a means rather than as the subject of the learning. But what I was doing was driven pretty much by necessity. After all, if you want your students to learn a new programming model or a new software application, it's a given that they will need a computer to work on.

My expectations of technology and education had been coloured by the hype surrounding the Maine Learning Initiative. Here was a group of people using computers in the classroom “correctly”. Computers were not the subject but the means to information access and collaboration. The possibilities were mind expanding. The first drafts of my intent letter were a bit preachy on what I thought of the future of education in this light. Fortunately, I came to my senses and realized that it wasn't for me to be telling the application committee about their business.

I started the program with the intent of completing an M Ed because the idea of writing a thesis intimidated me and I didn't see myself as a researcher. So it shook my world a bit when during the initial get acquainted evening in September, Cheryl told me that I'd make a good researcher. I had pointed out to her that many (most?) of the attendees were wearing sandals or open toed shoes. I thought it interesting that so many people were wearing similarly styled footwear (I wasn't one of them) and it led me to wonder in what other ways the demographics might co-relate. Did that mean I had researcher potential? Seemed a bit of a reach to me. What did it mean to be a researcher anyway?

Functions and Methods of Research on Learning

I suppose I knew this already somewhere in the clutter of my implicit knowledge, but research is “messy”. Figuring things out and learning something new is never as easy and straight forward as packaged presentations of the material make it appear. This has enormous implications for how research is done. One has to document the mess that is one's raw material and further one has to document how the mess was obtained so that others can validate the conclusions drawn from it. It's really about managing complexity in such a way that one can extract meaningful information from the work. For example, my research journal which is Artifact 2. But this raises the question: what conclusions can be drawn? That should be easy: What does the data say? Well as I've learned, what the data can say depends a great deal on how it was obtained and how it was obtained in turn depends on how the researcher views the subject matter. People from different backgrounds have different ways of managing complexity and different perspectives which enable them to see different things, and just as importantly, not see certain things.

Part of the job of a researcher is to demonstrate to his intended audience that he has done his homework. The Literature Review shows how the researcher's work builds on what others have done. Interestingly, it also provides a framework for understanding the researcher's contribution. The idea of a framework of understanding was a radical idea for me. If I had thought about it, I probably would have said that research results should be self supporting and convey their own meaning. But that's really not the way it works. Observations and interpretations are made within a context. This was brought home to me in the study of the “Global Warming Wars: Rhetorical and Discourse Analytic Approaches to Exxon Mobil's Corporate Public Discourse” (Livesey, 2002) It wasn't news to me that people have agendas they might be trying to promote. What was eye-opening was how thoroughly an agenda in a paper could be analyzed and deconstructed without it even being explicitly stated. In the same vein Activity Theory was a mind expanding method of looking at a social situation and

revealing how the facets influenced each other. It was a bit of a shock to see how such a simple diagram could describe a context to focus discussion and point to areas of weakness.

As someone who comes from a physical sciences background, the tension between quantitative vs. qualitative investigative methods wasn't much of a surprise. I have a strong bias towards numbers: If you could put a number to something; it could be measured. That was science. Yet, I have to admit that not everything can be assigned a number on a scale. It is possible to obtain meaningful information without numbers. To help me understand the differences and relative strengths of Action Research, Case Study and Ethnography I put together a table (Artifact 4) which contrasts them in 10 different ways. Valuable in itself, it is also significant for what it leaves out: the find an appropriate scale and measure it method. And yet, in some sense each of these three investigative methods has its own system of measurement.

I used to think that research was all about discovering new things; gaining a better understanding of ourselves and the world we live in. The pursuit of Truth, finding out what is real. That's a lofty goal. I now think research is about something more pragmatic: it's about gaining a better understanding of ourselves and the world we live in, yes. But it's done in the context of finding out what is useful to know. Questions whose answers that aren't in some way useful, aren't pursued. Results that benefit someone, that have a use, those are what warrant the effort. This begs the question: who decides what questions are worth the effort? The obvious answer is: those paying for the research. There is a tension here between research as a means to improve the "human condition" and research for commercial purposes. I think it would be tragic if the usefulness of research were measured solely by commercial interests because that removes the human element of its purpose. I'm still not entirely reconciled on this.

Roles of Technology in Education

The reason we pursue research, apart from an innate curiosity, is to find ways to do something

more effectively or efficiently. That is, in some sense “better”. Better is a value statement: For someone to say that one thing is better than another is to say that it is of more value to him. Or phrased another way, it is more important to him. Technology has the potential to make teachers more effective and students more efficient. Which is to say that technology has the potential to make the process of educating better. The question we need to ask is better in what way? And at what cost? Because by choosing one type of technology we are necessarily deciding against some other alternative. The reason we make these choices is because we value the resultant outcomes more than we value their lack. This is the source of much of the controversy as technology takes a greater role in education: the conflict in values between decision makers and those who must implement the decisions or are affected by them. Often the decision makers don't realize, or aren't aware of all the ramifications of their choices, and not surprisingly, they are often influenced by vendor claims and marketing. This again can lead to value conflicts. So we end up with a situation where technology is perceived as both the solution and the problem.

Two years ago, my view was fairly straightforward: students are knowledge workers; the tool of a knowledge worker is the computer. So, just give everyone a computer. As I saw it, web enabled computers provided access to more and better information than students had access to otherwise. It seemed to me the only thing standing in the way was money and the political will to do it. I saw the Maine Learning Initiative as a guiding example. Through the course of the program I've learned that the issues are far more subtle, complex and far reaching than just replacing paper with computers. Wholesale replacement is probably a mistake. Instead, integrating, or “blending” the two, is likely to lead to better results. I think I was guilty of projecting my preferences and enthusiasm, rather than listening, observing and evaluating what works for students and teachers in their situation with their subject matter and their goals.

Traditionally computers have been used in business and science as data processors. “Mindtools” as characterized by Anderson. They enabled people to view and manipulate data

with a facility and speed not otherwise possible. However, when networked together, computers are also communication enablers and amplifiers. So called computer networks are really people networks, mediated by computers, that allow people to talk and write and make pictures together in ways that are not possible otherwise. This is a fairly recent development whose implications we are still exploring and only beginning to develop language to talk about. The whole notion of “social software” is just a couple of years old. Computer mediated communication has been around for about 30 years, but it is only in the last 10 or so that it has become a widespread phenomenon. It is only in the last 5 or so years that computer mediated communications have been used in the classroom. There is much we don't know yet. The field is changing rapidly. We started with email, then came, listservs, BBSes, newsgroups, gopher, world wide web, web forums, and in the past 2 years wikis and blogs. Each of these technologies has a variety of implementations. Each with its own affordances that render it more appropriate for a given situation than a seemingly equivalent implementation.

The significant point here is that technology is not neutral. That was a major awakening for me. I had thought of tools as value neutral. They are just things which are incapable of acting on their own. It was the tool user who determined use of the tool and therefore the “goodness” of its application. What I have come to realize is that every tool has biases, aka affordances, for particular uses. These affordances are designed into the tool. They influence how the tool is used, by whom and for what purpose. From this perspective, the tool maker has influence on the purposes for which his tools are used. In the design choices and implementation details, tools reflect the values of their maker. For this reason, decision makers and instructional designers should be aware of the vendor's values because they will influence the technology users. This influence needs to be taken into account as part of the instructional design. For example: Knowledge Forum as compared to FLE/3. Both are learning environments, but their interfaces lend themselves to different interactions which biases them towards different goals.

Nature of Teaching and Learning

Superficially, the job of teaching is fairly simple: present the material to be learned in a manner so that the students can in fact learn it. The difficulty comes in doing this with students from diverse backgrounds, ability and motivation. Doing it effectively, repeatedly, in large numbers, and at an affordable cost. Each of these factors has a direct effect on the nature of teaching.

Teaching with intention, is an attitude or mindset I realized when I took the Provincial Instructor's Diploma program. Teaching as I remember it from when I was growing up consisted of teachers telling students what they were supposed to learn and the students trying to remember it. What I used to do in my classroom was not very much different. I told my students what they needed to know and then gave them the opportunity to try out what I had just taught them. After all, if they had been paying attention, they should have learned it. I think this could be characterized as “teaching with hope”. The teaching method is simply to convey the information to the students and hope they will retain it long enough to correctly answer some questions about it. If this method worked well, learning and therefore teaching could be automated. However, we know that it doesn't work well at all. People's minds are not simply buckets that can be filled or sponges that absorb information and experiences. As appealing as these analogies are, they are overly simplistic. They miss the critical connection between the learner and the material. And that is motivation. Why is the material significant to the learner? What is important enough about it to warrant remembering it?

Here is where Anchored Instruction, Goal Based Scenarios, Role Playing and related constructionist teaching strategies enter the picture: They provide the means to make the material relevant to the student. Relevance is established by connecting the new material to what the student already knows, building on that base to construct their new knowledge. Social Constructivists take this a step further by having students create new artifacts in consultation with and the support of their peers. This hands-on involvement with the subject matter personalizes it which makes it more meaningful and so more likely to be remembered

and applied in the future. The more authentic the hands-on involvement, the more readily this will happen.

Social Constructivism then, is not focused on what it is the students should know, but on who the students are and who they are to become. With those beginning and end points in mind, one can design a program that will build on what they already know to achieve the end goal. Along the way, they will necessarily learn the subject matter needed to make that happen. Interestingly, retention of the course material becomes a side-effect rather than a primary goal in this strategy. This neatly demonstrates the difference between remembering and learning. Remembering is the desired result of the “teaching with hope” strategy whereas learning is the expected result of the “teaching with intention” strategy.

With that in mind, I find it interesting to look at the design of this program: How we started with an overview of technology in education in 804, then the foundations of research work that were laid prior to the fieldwork course and this “encompassing” course in which we the students were required to design and deliver classes on the influence of technology in education. It's been kind of an ongoing reflective exercise culminating with this reflective paper. It seems the goal was to transform a group of people from a variety of education and technology backgrounds into novice researchers capable of instructional design that includes modern technology.

Design and Evaluate Curricula, Tools, Systems or Practices That Incorporate Technology

As with every part of a learning design, the key question that needs to be answered is how does this element support the students' learning process? “Support the student's learning process”. What a radical idea. That technology should actually help the learner rather than just be a means to do more. I see that as one of the underlying themes in this program, but I don't think it was ever explicitly stated. For instance, the introduction of radio and TV into classrooms solved an administrative problem: scaling the content delivery to many more

students in a consistent packaged format. But they really didn't help the students learn. The introduction of calculators however, solved a problem students had and enabled them to tackle more complex topics. Yet, calculators weren't perceived as helping by the teachers and administrators because they then had a new set of problems to confront. This highlights one of the major problems in designing curricula that incorporates technology: resolving the conflicting objectives between the students, teachers and administrators.

Another major problem where computer mediated communication is concerned, is designing the user interface. It turns out that designing interfaces that are both highly usable and highly functional is extremely difficult. It is not enough make all the features available. They have to be grouped and presented in a consistent and logical manner that makes sense to the application users. If a feature is hard to find or difficult to use, then people will tend not to use it. For some features this is desirable. There are good reasons why certain features should be less accessible. The point is, each feature's ease of use should be a conscious choice on the part of the application designer. Applications should be designed in such a way as to minimize the work the users need to do while enabling people to do things they otherwise couldn't.

Knowledge Forum and FLE/3 are two examples of computer mediated communication that we worked with in this program. Each has particular strengths in the types of communication they enable—their affordances. They also have significant usability problems that hinder people in using them effectively for their intended purpose. Knowledge Forum for instance supports knowledge building via forums in which people use “scaffolds” to make clear their thinking. Unfortunately, because of the way scaffolds were implemented, many people have trouble using them as I saw in all of my classes where Knowledge Forum was used. FLE/3 is also intended to promote knowledge building, but it takes a very different approach. It uses the colours of the “Six Thinking Hats” to indicate knowledge types. While the description of the meaning of the colours is available in the interface its location is not at all obvious nor is it available when one is composing a new posting, and that is one of the times when it is most wanted.

It was because of my frustration with these programs, Knowledge Forum in particular, that I decided to design another knowledge building application as my project for EDUC853. One of areas I think almost all computer applications fall short on is support for users remembering. That is when the users of an application want to remember something, they need to find some means outside of that application to do so. The application is not supporting the student's learning process. I attempted to address this failing with the addition of a "virtual margin" (artifact 5) to the knowledge building application I designed.

The idea with the virtual margin is that people would be able to make notes or associate information of their choosing with postings and views in the application much in the same way as they would with a book or journal. My intent was to create a new interface element that required an absolute minimum of effort to use. By having the users do as little as possible I hoped to enable a new way for people to work with their ideas. Initial results from the testing in the fieldwork class indicate that this idea has some potential. It was very gratifying to receive such positive and encouraging feedback from my peers. It was because of this encouragement that I submitted my EDUC 811 paper "Usability Testing Virtual Margins" (Artifact 6) to The Institute for Knowledge Innovation and Technology for consideration in their Summer 2005 Institute. To my surprise and delight, it was accepted.

Conclusion

The artifacts I have chosen are a demonstration of how much my attitude to the Education and Technology program has changed in the past two years. When I started the program I thought of it as a large learning exercise. It was a matter of learning the material, writing the papers and getting the degree. But as the later artifacts show, my motivation has shifted. These aren't the materials of someone who is "just getting the task done". But of someone who has actively struggled with the issues raised by the subject matter.

At the start of this program I had no intention of writing a thesis. I liked the idea of writing an exam and being done at that point. And yet, as I progressed through the courses, the M Ed option became less satisfying. When I started I didn't think I had anything to contribute—I just wanted to get as much out of the program as I could. Now, as they say, I see a gap in the literature. One that I think I can make a contribution towards. So in February I put a stake in the ground and committed myself to the MA program. I still find the idea of a thesis intimidating but it seems more manageable now that I have come this far.

Artifact 1: Letter of Intent.

While researching the graduate programs available in the greater Vancouver area, it was Simon Fraser University's Masters program in Education and Technology that captured my attention. It is the one that I kept coming back to.

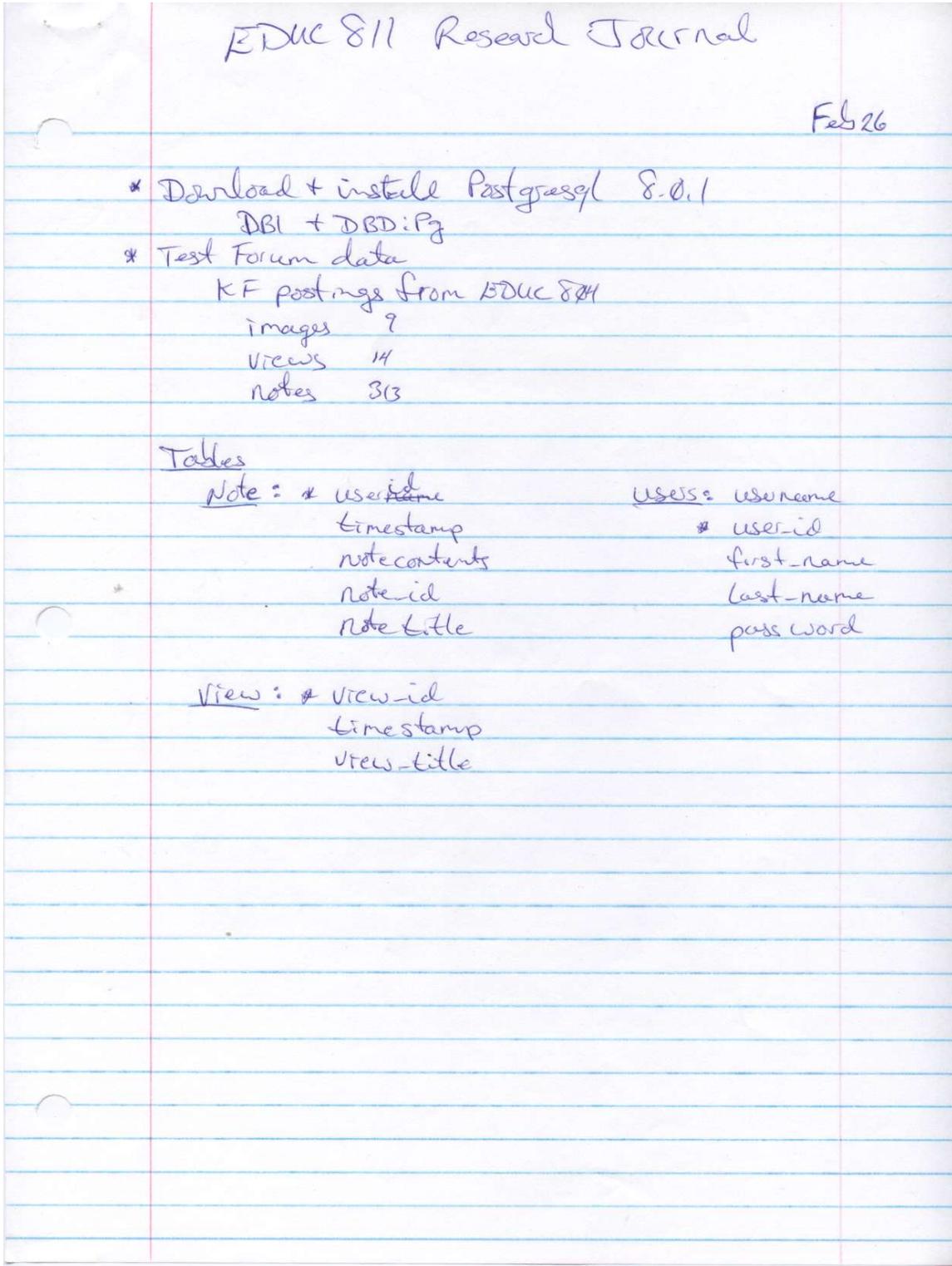
I have been excited about computers, the intellectual challenge of using them, and the technologies they enable since the summer of 1980 when I spent a couple of weeks at UBC at an introduction to programming course. I grew up playing games and solving puzzles; to me computers opened a whole new realm of puzzles to devise and solve. That was my motivation for undertaking a Computing Science degree. In December of 1986 I completed the requirements for a Bachelors degree in Computing Science and Mathematics at the University of Victoria.

My involvement with Internet technologies began in 1993. I was fascinated with client/server applications Mail, Usenet, FTP, Gopher and the World Wide Web. In 1994 I developed a text mode web browser called Charlotte for use on mainframe systems. Since 1996 when I joined an Internet start-up company my career has been spent developing and using Internet technologies with an emphasis on using the web to provide new services and enable flexible access to information. Recently, as a corporate instructor I taught others how to use Internet technologies. Teaching was a very exciting and rewarding experience. I enjoyed it so much that over the summer of 2002 I completed the coursework for The British Columbia Instructor Diploma program.

Now I want to move on in my studies to understand the usage of computers and related technologies in teaching. I think my background and experience have uniquely prepared me to undertake the Masters program in Education and Technology. I see this program as a natural progression of my career. It combines my experience in using computers to provide information with my enjoyment of teaching. While I have been introduced to e-learning and used computers in my classrooms, there is much I don't know but I'm very motivated to learn.

Through my career each position has required me to learn something new. Learning and doing new things is a challenge I enjoy; they are part of my career development. I'm looking forward to the challenges and rewards of the Masters program in Education and Technology.

Artifact 2: Research Journal



Feb 27

DBD:Pg work install cleanly

Install MySQL

DBD::mysql

create educ8ll database

Mar 6

Attempt to set up on Mac OS X 10.2

Apache 1.3.33

Perl 5.8.1

Mason 1.29

Mod-Perl

Hours of frustration

- various parts work not all at once

Mar 8

Have Apache 2, MySQL

Perl etc working on linux ...

educ8ll-homeip.net:808

Mar 9

connectivity → browser → web server → DB!

Mar 8

Data Model:

Notes:

Note_id (PK)
 User_id (FK → Users)
 Timestamp
 title
 Content

Users:

User_id (PK)
 Username
 Password
 Firstname
 lastname

Views:

View_id (PK)
 Title

Notations:

Notation_id (PK)
 User_id (FK → Users)
 Note_id (FK → Notes)
 Content

View Postings:

View_id (FK → Views) } (PK)
 Note_id (FK → Notes) }
 Response -to (null if note has no responses)

Mar 9

Tables Created

usernames from 10 most popular boys
 + girls names in 2004
 none match actual names!
 20 names in all

Mar 10

→ 4 people → 4 cameras -
 instead of ~10 people + 1 camera } Cheryl

Think a loud protocol
 say what you're thinking

Mar 12

Revised data model

- only need to be able to display views
 notes - don't need to be able to add
 or manage them ---

Views:

view-id
 Content

Users:

user-id
 name
 password

Notes:

note-id
 Content

Annotations:

id
 user-id
~~note-id~~
 Content

index.html → list of all the views

Mar 13

Scenario:

Quick scan through recent postings
 make some notes for later reference
 + add to postings own notes

Data loaded into DB

initial view + note display working

Mar 14

Found Moodle

PhD research project:

How can internet software successfully
 support social constructionist epistemologies
 of teaching and learning?

Exactly!

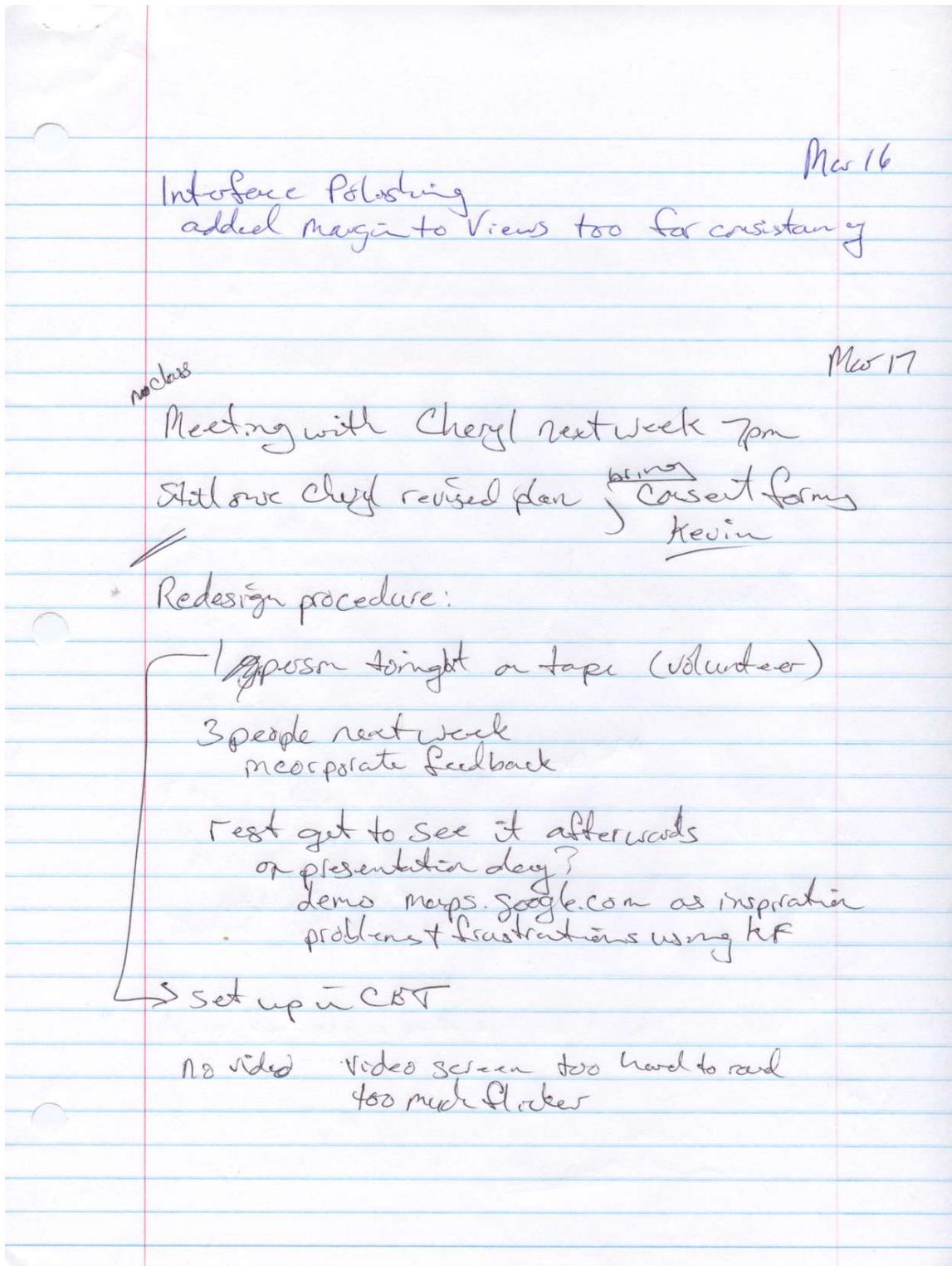
Found Geoffrey Glass ^{@SFU} who is looking to
 add annotations similar to what I'm
 thinking to Moodle!

www.geof.net/code/annotation/example.html
 Dated 2005-03-13

layouts are working At Last!

Mar 15

Margins fully functional was!
 oBlw → a mouse out → onload



Mar 21

What if I could extend the idea of a virtual margin to arbitrary web pages? notes indexed by URL
could make a "virtual margin" proxy but would be better implemented in the browser

Went looking for Firefox extensions
found Wikalong which adds a wiki sidebar to the browser window - contains
a shared, editable, by all(?) Wikalong users.

This is a wonderful idea, but having the content shared defeats the ~~pro~~ my intent

would be very useful to be able to search one's own margin notes with links back to the "source" page.

Seen on the Wikalong User Preferences page:

→ "Can you config this thing to store notes locally?"

→ "wouldn't do much for the collaborative www annotation effort..."

→ "yeah, but it'd be useful for personal annotations...
(why does everyone seem to think private wikis are sacrilegious or something? social wikis are great, but the technology also holds such great potential, mostly unexploited for organizing personal notes and information")

Mar 24

have observed them using
what they said

> questions + suggestions

how would use it & why

purpose

support users remembering

• validation for extending etc.

Apr 2

Dynamic merge width - based on browser
~~the~~ window size - dynamically update ~~width~~
style widths? via onresize.

Is that a good idea? set by "onload"

have some min?

currently 200 pixels

how 'bout 1/4 of window width

→ consistent + sane

Artifact 4: Table comparing Action Research, Case Study & Ethnography from a Knowledge Forum posting in 864

	<i>Action Research</i>	<i>Case Study</i>	<i>Ethnography</i>
Researcher	<ul style="list-style-type: none"> examines own current practice or situation collaborative effort working together with the subjects 	<ul style="list-style-type: none"> examines others practice or situation. May be historical. an outside observer 	<ul style="list-style-type: none"> observes a culture foreign to him/her an outside observer
Purpose	to understand what is happening and determine how to improve things in that context (Tomal).	to study a phenomenon that is not readily distinguishable from its context (Yin, 1993).	to understand the link between culture and behavior and/or how cultural processes develop over time (Hall)
Types	enhancement of direct practice, or to bring about social change (Smith)	<p>exploratory</p> <p>define the questions for a subsequent study or feasibility of a research procedure</p> <p>descriptive</p> <p>describe a phenomenon in its context</p> <p>explanatory</p> <p>present data bearing on cause-effect relationships: which causes produced which effects</p> <p>(Yin, 1993)</p>	<p>Macro-ethnography</p> <p>is the study of broadly-defined cultural groupings, such as "the English" or "New Yorkers."</p> <p>Micro-ethnography</p> <p>is the study of narrowly-defined cultural groupings, such as "local government GIS specialists" or "members of Congress."</p> <p>(Garson)</p>
Hypothesis	statement of the problem is used instead	findings are used to propose theory	guiding question to focus researcher's attention
Use of Theory	provide fresh insights into the topic (Rust, Meyers)	delimit a case study inquiry to its most effective design. (Yin, 1993)	It is through theory that ethnographic data gains meaning. (Hall)

	<i>Action Research</i>	<i>Case Study</i>	<i>Ethnography</i>
Design	<ol style="list-style-type: none"> 1. problem statement 2. data collection 3. analysis and feedback 4. action planning 5. taking action 6. evaluation and follow-up (Tomal)	<ol style="list-style-type: none"> 1. study's questions 2. propositions 3. units of analysis 4. logic linking the data to the propositions 5. criteria for interpreting the findings (Yin, 1994)	Participant observation: participate as much as possible in local daily life (everything from important ceremonies and rituals to ordinary things like meal preparation and consumption) while also carefully observing everything they can about it. ...seek to gain what is called an "emic" perspective, or the "native's point(s) of view" without imposing their own conceptual frameworks. The emic world view, which may be quite different from the "etic", or outsider's perspective on local life, is a unique and critical part of anthropology. (Hall)
Applicability	limited to the context in which the research is performed	a single-case might not be applicable to other cases (at least directly) whereas a multi-case replication study might have broad application.	<ul style="list-style-type: none"> • art and cultural preservation • cultural anthropology (Garson)

	<i>Action Research</i>	<i>Case Study</i>	<i>Ethnography</i>
Risks	<ul style="list-style-type: none"> • "fuzzy" question • insufficient pre-planning • subject's "buy-in" • lack of objectivity • unintended consequences • conflict of interest • subjects' privacy <p>(Tomal and Rust, Meyers)</p>	<ul style="list-style-type: none"> • improper generalization • poorly defined unit of analysis • poorly chosen cases • scope "creep" • insufficient theory or development prior to start of study • unclear time boundaries • idiosyncratic key definitions • validity violation <p>(Yin, 1993 and Yin 1994)</p> <ul style="list-style-type: none"> • replication might not be possible • researcher bias <p>(Crane)</p>	<ul style="list-style-type: none"> • Ethnographic focus could overestimate the role of cultural perceptions and underestimate the causal role of objective forces. • Can be difficult to identify the relevant community of interest. • Is the researcher capable of understanding the cultural mores of the population. • The researcher might introduce bias toward perspectives of his/her own culture. • Falsely assuming that given measures have the same meaning across cultures. <p>(Garson)</p> <ul style="list-style-type: none"> • researchers must be sure that the research does not harm or exploit those among whom the research is done. (Hall)

	<i>Action Research</i>	<i>Case Study</i>	<i>Ethnography</i>
Advantages	<ul style="list-style-type: none"> • low barrier to entry • professional development • directly relevant and applicable to one's own situation • can influence policy for the better (Tomal)	<ul style="list-style-type: none"> • can provide new insights or perspectives to others who do not have access to the subjects • can lead to better/deeper understanding of a subject • Permitting investigation of otherwise inaccessible situations (Crane)	<ul style="list-style-type: none"> • can provide new ways of understanding familiar phenomena • can preserve language or culture in danger of being lost • can remove the fear factor of a strange (unfamiliar) culture

I found this discussion <http://www.infed.org/research/b-actres.htm> by Mark K. Smith to be very helpful in understanding Action Research.

I found this discussion <http://web.isp.cz/jcrane/IB/Casestudymethod.html> by John P Crane to be helpful in understanding Case Studies.

I found this discussion <http://www.sas.upenn.edu/anthro/CPIA/methods.html> by Barbara Hall and this one <http://www2.chass.ncsu.edu/garson/pa765/ethno.htm> by G. David Garson to be helpful in understanding Ethnography.

Artifact 5: Virtual Margin Demonstration

An application I wrote to demonstrate and evaluate the usability of virtual margins.

<http://vmargin.homeip.net:808/index.html>

Artifact 6: Usability Testing Virtual Margins

Usability Testing Virtual Margins

by

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IKIT Summer 2005

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Abstract

A study exploring the feasibility and the usability of a "virtual margin" feature in a knowledge building environment by comparing two possible implementations. It contains a discussion of the motivation and key design considerations concluding with a discussion of the study results and suggestions for further exploration.

Introduction

Knowledge Building (KB) applications are intended to enable people to share and build on each other's ideas. A guiding concept is "improvable ideas". Because it takes time to improve one's ideas, it is often desirable to be able to easily associate a thought or piece of information with something one has read so one can come back to it at a later date. Ideally, the KB application interface would supply the means to do this because people's memories are far too fallible and managing pieces of paper is far too cumbersome. Unfortunately, in KB applications annotations are cumbersome which makes them hard to use and the concept of margin notes is non-existent. Also, everything one writes is immediately shared with the rest of the community. While sharing ideas is central to KB, often people have ideas that they aren't ready to share. They want some time to work with them and consider multiple perspectives. Yet, with no convenient way to record these thoughts, the ideas aren't put into words and so are easily forgotten. Lost to the people who had them originally, and their KB community.

In the physical realm of books and journals, margin notes, or annotations, provide an easy way for people to record their thoughts for later reference. When a person returns to a page, any comments made earlier are also present. The comment automatically retains its context and so supports the person's remembering what prompted it. This allows the person to collect information and privately reflect on their ideas.

By adding a "virtual margin" to a Knowledge Building forum, the members of the community will be able to save their thoughts in a convenient location without giving them the weight and visibility of publishing them for everyone else to see. This gives people the ability to better consider their thoughts and "talk to themselves" before they talk to others. This removes the anxiety of exposing their nascent ideas to the KB community before they are ready to do so. Implicit in this, is that a virtual margin is a private area for each person. No one can see the contents of anyone else's virtual margins. This allows people the freedom to say things to themselves that they wouldn't allow themselves to say to anyone else. As a result people have the ability to express things they otherwise wouldn't which enables them to come up with ideas that they otherwise wouldn't.

This study explored the feasibility of the virtual margin feature. The idea was to enable "writing in the margin" as in a real book or journal. There were three key design decisions. The first decision was that the virtual margin would allow editing web pages without opening

a new interface element to do so. By not presenting a new interface element, people would be able to focus on what they wanted to record, without having to also think about how it is being recorded. The second key design decision was that clicking in the virtual margin should not cause the presentation of the web page to move in any way. The reason for this is if the margin were to scroll partly out of the viewable area, then clicking in it could make the browser scroll the web page down so the input cursor would be visible. Additionally, allowing the virtual margin to scroll completely out of the viewable area would defeat its purpose. Either result would be distracting. In effect, this meant that the virtual margin must remain fixed within the browser window. This led to the third design decision; to make the virtual margin as tall as possible to make the best use of the viewable space. The margin had a fixed width of 200 pixels which takes up approximately $\frac{1}{4}$ of the horizontal space on an 800x600 monitor. On monitors with higher resolution, this would be proportionately less space. This seemed a reasonable compromise for the purposes of this study.

With the basics of the virtual margin decided, the issue became how to present the actual page content next to it. This study compared two possible implementations. The objective was to learn which of these implementations was more usable. "Usability" is a relative concept indicating how easily used an object or feature is. The intent here was to find out which virtual margin implementation works more in the way people expect the feature should work. Or to put it another way, which implementation is more predictable and less surprising [Raymond, 2003; Wikipedia, 2005].

Literature Review

The idea that it would be useful to be able to associate comments with an arbitrary web page has been around from the earliest days of the World Wide Web [NCSA, 1993]. Yet the web as we know it today, does not have this feature. This seems strange considering the amount of time and effort that has gone into developing web browser and web server functionality. It seems the annotations feature has almost been ignored until very recently.

The Firefox web browser provides a facility for 3rd party developers to write extensions to it which can provide additional features. One of these extensions, called Wikalong, provides a wiki environment that enables people to associate comments with web pages. A wiki is a web site that allows its visitors to edit its web pages as well as read them, typically with no editorial review before the changes are made public. [Wikipedia, 2005]. Comments written in the Wikalong extension are stored on the wikalong server that makes them available to everyone who is using the Wikalong extension and viewing the web page associated with the comments. The developers characterize it as a "wiki-margin for the internet" [wikalong, 2005]. It is very much in line with the approach described by the NCSA. All comments are public and can be edited by anyone. Both the Wikalong developers and NCSA talk about provision for private group servers.

The key design points here are that the comments are stored completely separately from the

web pages—it is the browser that brings them together, and all comments are publicly editable.

Knowledge Forum is designed to support knowledge building communities. It has a completely different style of annotation. In this application, annotations are created by opening a dialog window that contains a small text input box, entering the comment and choosing the text with which to associate the annotation. Once the input box is closed, a small yellow icon is placed next to the selected text to indicate the presence of an annotation. These annotations are publicly viewable and can be seen by clicking on the yellow icon. In this way, the comments remain hidden until the reader chooses to see them. This process of creating and viewing annotations is somewhat cumbersome and tends to be used for short comments that don't merit their own posting note.

Fle3 is another application intended to support knowledge building [Leinonen, 2002]. In this application annotations are added by clicking on an “Add annotation” link at the bottom of an article. This presents a page where annotations can be read and new annotations can be added. Again, annotations are hidden until specifically requested to be seen, and then they are all publicly viewable. While each annotation is associated with a particular article, they are not viewed in the context of their articles. This creates a separation between them that weakens the relationship between an article and its annotations.

COSE is a Virtual Learning Environment [COSE, 2003] that took another approach to adding comments to web pages. The COSE interface has a margin in which a variety of features are located. Among them is an icon which activates the Margin Notes annotation interface. It opens a dialog box in which the comments may be entered. Once a comment has been entered and the dialog box closed the icon then indicates the presence of a comment. This comment may be kept private or shared publicly [Stiles, 2003]. Entering and viewing of the annotations is again a multi-step process.

Under active development is an annotation feature for Moodle which “... is a software package for producing internet-based courses and web sites ... designed to support a social constructionist framework of education” [Moodle, 2005]. The approach the developer has taken is along the lines of a physical margin which contains the annotations. The main content of the page is on the left side of the browser window and down the right side of the page is a grey box where the annotations are placed. An annotation is created by selecting some text and clicking the “New” button. This creates a numbered entry in the margin with a small input box into which the annotation may be typed. The annotations are publicly editable and may be hidden or visible at the viewer's option by clicking an appropriately labeled button. The grey margin is always present.

All of these annotation and commenting systems require the person to perform several actions before starting to type their thoughts. The risk with this is that every step in the process is a decision point where the person can decide not to bother. In most cases once the process of

making a comment is complete, the comment is hidden until it is specifically requested to be seen. In only one case does the system support private comments. As a result these systems only tangentially support people's remembering. In contrast, the desire for the virtual margin proposed in this study is to get as close to "no interface" as possible. That is, to make the barrier of use so low that it won't be an inhibitor. People would be able to focus on what they want to express – not the mechanism for doing so. The goal is for the means to be "transparent".

Methodology

The study took place over two days in the Centre for Education Technology in the Education building at Simon Fraser University. Four members of a Masters of Education and Technology cohort used a web forum application, that has a virtual margin feature, to read forum postings and make notes.

The web forum application was written in two parts: A Linux server running an Apache web server using Perl and Mason (a suite of Perl libraries) accessing a MySQL database, and a browser interface written using HTML, CSS and JavaScript. For purposes of the study, the participants used the Firefox web browser on Mac OS X. Other browsers, and operating systems, could be used, but this was not pursued due to time constraints.

The web forum was "pre-loaded" with views and notes from the cohort's EDUC 804 Knowledge Forum database. This provided the participants with content on familiar subject matter and a familiar structure. The names in the forum (author names and names in the postings) were changed to anonymize them by using the list of the 10 most popular boys and girls names in 2004. The assignment of real names to new names was done at random.

The participants, two men and two women, were asked to review a set of postings of their choice and make notes in the virtual margin as they went. The expectation was that this would take about 5-10 minutes for each person. Instead the sessions lasted 25-35 minutes as the participants read and took notes avidly.

For each page request the server randomly choose one of two presentations as represented in the diagrams below. The blue-grey (left) is the document text area, the light-grey (right) the virtual margin (annotation) area, and the dark grey areas are the scroll bar controls. As usual, the scroll bars only appear as needed to view content outside the viewable area.

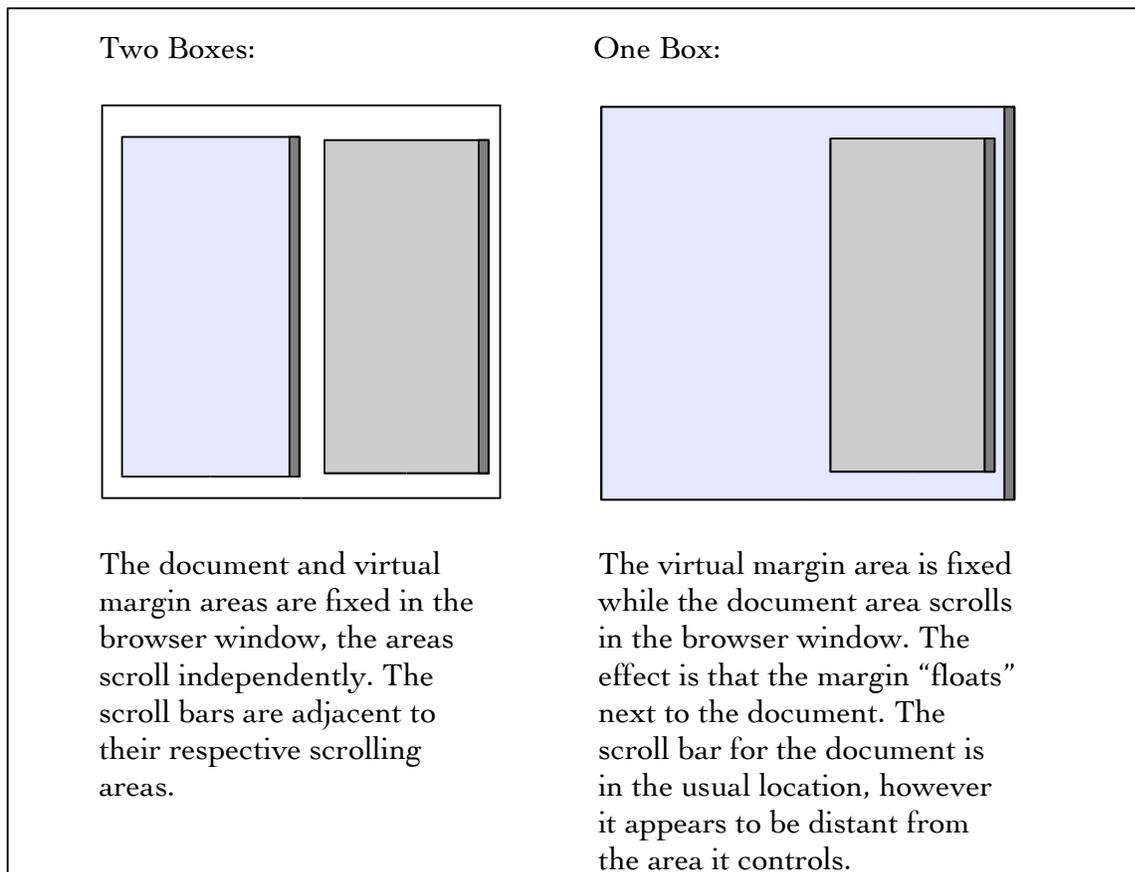


Figure 1 Comparison of the two virtual margin implementations

While the participants were using the web application the observer took notes on a survey form (Appendix One) which was designed to capture some basic demographics and record observations about the participant's interactions with the web forum application. The demographic information was intended to provide context for understanding each participant's responses/behaviour in the expectation that the participants' behaviour might correlate with one or more of computer experience, web comfort level or gender. Another possibility that was considered was that there could be a demographic split, which would suggest that in a real application it would be appropriate to provide both interfaces and allow people to choose their preference.

Each session took place in the Centre for Education Technology in the Education building at Simon Fraser University using an eMac computer with the Firefox web browser that had been installed for the purpose. The first session was video taped, recording the audio and capturing the interactions on the computer screen. Unfortunately, the result was unusable because the video images of the computer screen were so badly distorted. For the remaining sessions, a tape recorder was used instead.

Virtual margin notes are associated with a username so before the start of each session the observer loaded a “log in” page in the web browser and pre-filled the username and password fields. The observer also readied the tape recorder to record the audio of the session. At the start of a session the participant sat in front of the eMac with the log in page displayed while the observer sat on a chair where he could easily see the screen and make notes. The observer then explained that the web application would display the EDUC 804 postings with a virtual margin in which they could write whatever they wanted. He did not mention that there would be two different presentations. The observer filled out the demographic information on the survey and asked them to ask any questions and voice any confusions they had while they used the application. Next the participant signed the consent form. (Appendix two) With that done the tape recorder was started and the participant clicked on the log in button. The first page after logging in presented a list of views next to the virtual margin. Selecting a view displayed a threaded list of postings in that view. Selecting a posting displayed the content of that posting. The participants were not able to alter or edit the views and postings – only the contents of the virtual margin displayed on each page after logging in was editable.

For the data analysis, the intent was to group the observations according to what particular feature caused difficulty. This turned out not to be useful. Instead, the observations and responses were grouped into four broad categories: Comments, Questions, Requests and Difficulties. While there is some overlap between them an effort was made to classify each response according to how it was expressed by the participant.

Results

The primary result of the study is that difference between the two interfaces effectively made no difference. None of the participants noticed that there was two different presentations. Until it was pointed out to them that sometimes the page was constructed one way and sometimes another, no one noticed. After the difference was pointed out to them, two participants said that they preferred the two boxes format with one person offering that he felt more control with that presentation. One person said that both formats were easy to deal with.

In addition to this result, a good deal of feedback was received that hadn't been expected. This was grouped into the categories: Comments, Questions, Requests and Difficulties.

Comments:

The comments centred around the usefulness of the virtual margin. What it is and what it is good for. As Ryan (names are fictitious) said “this is a place to collect my thoughts,” or as Hannah put it, “It's a thinking pad. Whenever a thought comes I can get it down.” Olivia voiced the idea that she “...could use this to code my own thoughts.” Olivia and Hannah both voiced the opinion that the virtual margin would have been useful in 804, with Hannah adding that “it would probably improve my posting quality and quantity.”

Questions:

The questions fell into two categories. The first could be characterized as “trust.” Hannah was concerned about the presence of public and private information in one web page. She wanted to understand how content of the private space, the virtual margin, could be moved into the public space, the web forum. Olivia wanted to know “How long do the comments stay?”

The second category is questions about features for working with the text within the virtual margin. As Matthew asked “Why is the input position always at the top?” and “How do I move the text down?” Ryan and Olivia were more specific and asked if it was “...possible to relate a comment to a specific point in a note?”

Some feature questions had a “word processing” flavour to them. Two people asked if there was a spelling checker. Another asked if it was possible to use italics or colour to differentiate text pasted into the virtual margin. Hannah asked if graphics and tables were available.

Other feature requests related to working with virtual margin comments on their own. Hannah wanted to be able to take notes from one page to another. Taking this idea a little further, Olivia asked if she could “.. look at all the comments in one spot?” She also wanted to be able to sort her comments.

On the interface element level, Ryan asked if he could have the margin on the left and Hannah asked if it could be resized. Matthew wanted to know if it was possible to “apply this to an arbitrary web site.”

Requests:

Two features were specifically asked for. That is these items were not just expressed as questions, but put forward as essential functionality that should be present. Matthew, Ryan and Olivia asked for a “margin-note” indicator attached to the view and note titles. That is, if a note or view has a margin note associated with it, some visual indication should be added to their titles. The second request was for a “summary” view or some means for the “margin note to 'bubble-up' to the next level” as Hannah phrased it.

Difficulties:

The participants did have some difficulties. Two things gave them pause. The first concerned the ability to use cut and paste within the virtual margin. Initially the participants were hesitant to use this feature. It took a couple of usages before they gained confidence that it worked in the usual fashion.

The second thing that the participants had trouble with was that the “content” and margin

notes reflow and scroll independently. Some of this was hinted at earlier in the questions around positioning the cursor within the virtual margin. The virtual margin contents are not “fixed” to the page text as in a physical document. This break in the metaphor requires some conceptual re-adjustment.

Discussion

This study looked at the usefulness and usability of a virtual margin feature in the context of a Knowledge Building forum. Gratifyingly, all the participants thought it was very useful and were enthusiastic about the idea. One person liked it so much that he asked if it was possible to use it in conjunction with arbitrary web sites.

The usability issues that were anticipated were completely missed by the participants. They simply did not notice the variations in presentation. The fact that the content scroll bar was sometimes to the right and sometimes to the left of the virtual margin seemed to be of no consequence until it was pointed out to them. The observation recorded during Matthew's session was that the vertical scroll bar was a “strong attractor”. That is, whenever he wanted a vertical scroll bar; he found one and used it. This was consistent with the behaviour of the other participants. This strategy was successful because there was only the one scroll bar — there wasn't enough text within the virtual margin to cause a scroll bar to be displayed there. It could be then, that the presence of a vertical scroll bar on the virtual margin might cause the kind of usability problems that were anticipated at the beginning of this study.

The subtext heard from Olivia's question about how long the virtual margin notes last and the separation between public and private content is “can I trust this thing?” This is a valid concern with any new interface. It is likely that the question of trust is also behind the participants' apprehension over using cut and paste. The virtual margin is an unknown quantity. It will take people some acclimatization time before they become comfortable with it. This means that the issue of trust is of central importance. Before people will use it to record their unvarnished private thoughts, they must trust that those margin notes will not show up in some unexpected place. People also need to develop the confidence that what they put in the virtual margin will come back. Any failure in either of these areas is liable to jeopardize its acceptance and thus its usefulness.

An unexpected benefit of this study is an awareness of the ways people envision using a virtual margin. This has broadened the scope of its applicability. It is capable of much more than just supporting people's remembering. It provides a new way for people to work with their own ideas. The implications of this are worth exploring further. How would people really use this feature, and what would they actually use it for?

Another unexpected benefit is the list of features that the participants desired in a virtual margin. Some of these would be easy to add, such as aggregating margin notes for postings to their view level. Others such as word processing features are more difficult, but are still

possible in some browsers. The challenge here is how to provide this kind of functionality in a confined space without introducing a degree of clutter that compromises the basic functionality and interface transparency. Some lessons from the development of wiki markup languages could be useful here.

Conclusion

The presence of a virtual margin next to typical forum content (notes and views) did not cause the participants any difficulties. In addition, the differences between two virtual margin implementations went completely unnoticed. The response of the participants enthusiastically supported the virtual margin idea and offered many suggestions for improving its usefulness.

A Knowledge Building Environment is defined as “[a]ny environment (virtual or otherwise) that enhances collaborative efforts to create and continually improve ideas” [Scardamalia & Bereiter, 2003]. Adding a virtual margin to a web forum application opens up new ways for people to interact with their own ideas as well as the ideas of other community members. By supporting individual people's remembering, the expectation is that virtual margins have the potential to improve a community's Knowledge Building. Further research is needed to validate this proposition.

References

What is Wikalong? (2005) Cappiello, John
Retrieved April 6, 2005 from
<http://wikalong.org/>

Web Annotation extension for Moodle (2005) Glass, Geoffrey
Retrieved April 6, 2005 from
<http://www.geof.net/code/annotation/>

Moodle Documentation: General information about Moodle (2005)
Retrieved July 9, 2005 from
<http://moodle.org/mod/resource/view.php?id=3846>

Group Annotations in NCSA Mosaic. (1993) NCSA
Retrieved April 6, 2005 from
<http://www.socs.uts.edu.au/MosaicDocs-old/group-annotations.html>

The Art of Unix Programming; Chapter 11: Interfaces: Applying the Rule of Least Surprise
(2003) Raymond, Eric Steven.
Pearson Education Inc.
<http://www.faqs.org/docs/artu/ch11s01.html>

Knowledge Building Environments: Extending the Limits of the Possible in Education and
Knowledge Work (2003), page 2, Scardamalia, Marlene & Bereiter, Carl
Encyclopedia of distributed learning. Thousand Oaks, Ca
Retrieved April 6, 2005 from
http://iokit.org/fulltext/2003_KBE.pdf

COSE Project: Annotating COSE Content with Margin Notes (2003)
Stiles, Mark, J.
Staffordshire University Enterprises Ltd
Retrieved April 6, 2005 from
<http://www.staffs.ac.uk/COSE/cosenew/marginnotes20.html>

COSE Project: COSE is a Virtual Learning Environment (VLE) (2003)
Stiles, Mark, J.
Staffordshire University Enterprises Ltd
Retrieved July 9, 2005 from
<http://www.staffs.ac.uk/COSE/>

Collaborative Discovering of Key Ideas in Knowledge Building (2002)

Teemu Leinonen, Otso virtanen, Kai Kakkarainen, Gidre Kligyte

University of Art and Design Helisinki

Retrived July 9, 2005 from

http://www2.uiah.fi/~tleinone/codi/codi_cscl.pdf

Principle of Least Astonishment (2005, March) Wikipedia: The Free Encyclopedia.

Retrieved April 2, 2005 from

http://en.wikipedia.org/wiki/Principle_of_least_astonishment

Wiki (2005, July) Wikipedia: The Free Encyclopedia.

Retrieved July 9, 2005 from

<http://en.wikipedia.org/wiki/Wiki>

Appendix One: Survey Form

Task:

Use the web application to review a collection of web forum postings and use the virtual margin to make notes.

Questions:

1Sex: M / F

2Computer experience: 1-5 5-10 10-15 15-20 years

3Web comfort level: low 1 – 2 – 3 – 4 – 5 high

4Initial reaction to the format of the postings?

5Any trouble understanding the interface components?

6Able to add/alter margin notes?

7What “issues” arose?

8Participant questions?

Appendix Two: Consent Form:

Simon Fraser University

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Informed Consent By Participants In A Research Study

Title: Virtual Margin Annotation Interface Comparison
Investigator: Carl Forde, cjf@sfu.ca
Department: Faculty of Education

Purpose:

To investigate the relative usability and affordances of two methods of adding a virtual margin to the interface of a web forum.

Procedures:

Each participant will use a web browser on a computer to access a discussion forum. Participants will be able to view the postings and record annotations directly on the screen. (Each participant's annotations will not be viewable by any other participant.) The researcher will take notes on the participant's interaction with the web page components. The computer screen during the sessions may be video taped and audio recorded, subject to the participant's approval.

Risks to the participant:

There is minimal risk to participants. The activities are non-threatening and non-invasive. Any participant who feels uncomfortable may choose to stop participating at any time and have the record of their session destroyed.

Benefits of the study to the development of knowledge:

The information obtained will help to improve the researcher's understanding of the affordances of virtual margins for annotations in Knowledge Building.

A copy of the results of this study, upon its completion, may be obtained by contacting Carl Forde at cjf@sfu.ca

The University and those conducting this research study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This research is being conducted under permission of Cheryl Amundsen, Associate Professor of Simon Fraser University's Faculty of Education. The chief concern is for the health, safety and psychological well-being of research participants.

Should you wish to obtain information about your rights as a participant in research, or about the responsibilities of researchers, or if you have any questions, concerns or complaints about the manner in which you were treated in this study, please contact Cheryl Amundsen by email at cheryl_amundsen@sfu.ca or phone at 604-291-4853.

Any information that is obtained during this study will be kept confidential to the full extent permitted by professional ethics. Knowledge of your identity is not required. You will not be required to write your name or provide any other identifying information on research materials. Materials will be maintained in a secure location.

Having been asked to participate in the research study named above, I certify that I have read the procedures specified in the Study Information Document describing the study. I understand the procedures to be used in this study and the personal risks to me in taking part in the study.

I understand that I may withdraw my participation at any time. I also understand that I may register any complaint with Cheryl Amundsen or Carl Forde.

Participant Last Name

Participant First Name

Participant Contact Information

Participant Signature

Date: (mm/dd/yyyy)

References:

Livesey, Sharon M., Global Warming Wars: Rhetorical and Discourse Analytic Approaches to ExxonMobil's Corporate Public Discourse; *The Journal of Business Communication*, Volume 39, Number 1, January 2002, pp. 117-148