Usability Testing Virtual Margins

by

Carl Forde

Simon Fraser University

Abstract

This study explores the feasibility and usability of a "virtual margin" feature in a knowledge building environment by comparing two possible implementations in a simulated discussion forum. The subjects were graduate students in an Education and Technology program. The paper contains a explanation 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 difficult to use and 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 environment, 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 that 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 means 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 ¼ 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. The study compared two possible implementations to learn which of the two is more usable. Usability is a relative concept indicating how easily used an object or feature is. The intent was to discover 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 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 the their thougts. 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 graduate students of a Masters of Education and Technology program used a prototypical web forum application, that has a virtual margin feature. They read forum postings and made notes using the virtual margin.

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 a Knowledge Forum database that the graduate students had created in a previous course. 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 anonymized 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 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 chose 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.
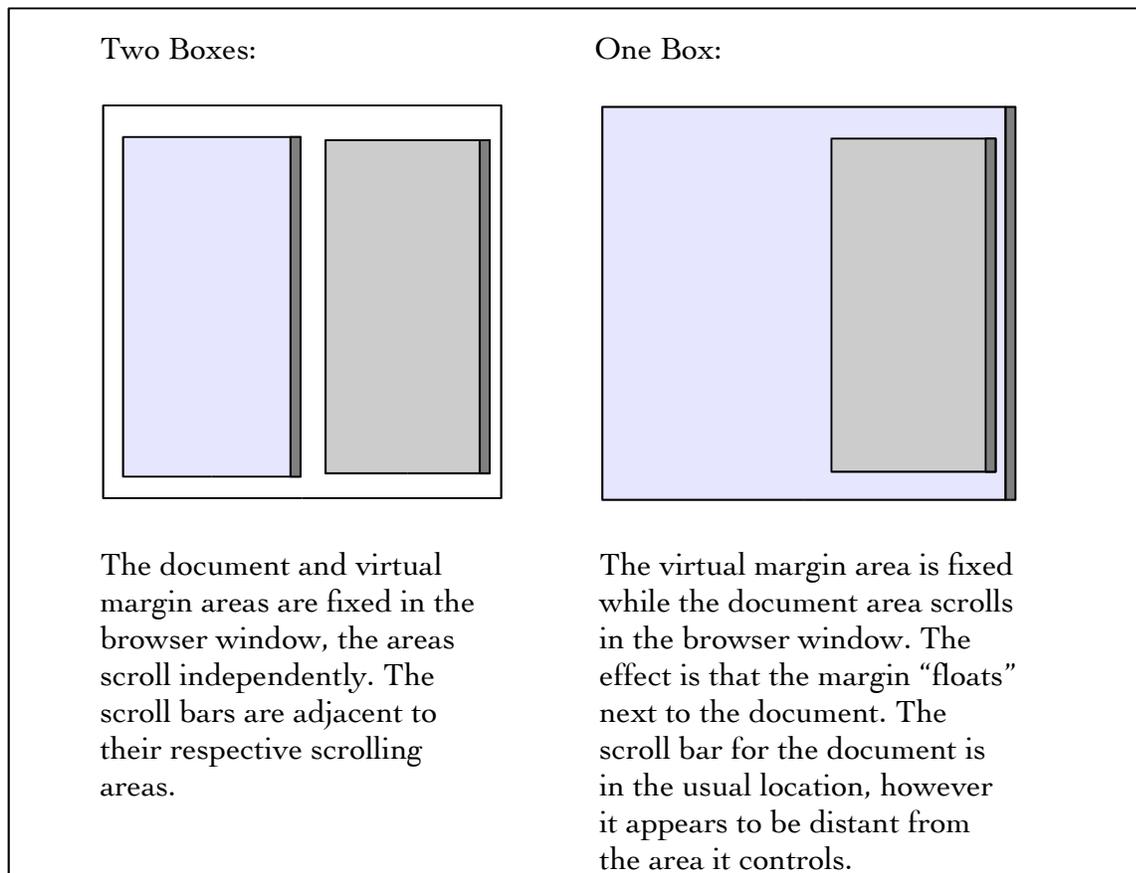
Two Boxes:

One Box:

The document and virtual margin areas are fixed in the browser window, the areas scroll independently. The scroll bars are adjacent to their respective scrolling areas.

The virtual margin area is fixed while the document area scrolls in the browser window. The effect is that the margin "floats" next to the document. The scroll bar for the document is in the usual location, however it appears to be distant from the area it controls.

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/behaviours in the expectation that these might correlate with one or more of computer experience, web comfort level or gender. Another possibility 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 a Firefox web browser. The first session was video taped. The recording captured both the audio and interactions on the computer screen. Unfortunately, the result was unusable because the video images of the computer screen were so severely 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 virtual margin interfaces was of no consequence. 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, much 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:

There were two things that were specifically asked for. That is these were not just expressed as questions, but put forward as essential functionality that should be present. The first one is 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 issue 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

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.

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

This study was fairly limited in scale and scope as the participants were merely reading and recording their thoughts. There was no expectation, or pretense, that they would revisit their virtual margin notes at a later date. An expanded study could add a virtual margin, designed with some of the feedback obtained, to a knowledge building environment to learn how this feature would be used in a real knowledge building effort with more participants.

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 Programing; 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://ikit.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

Faculty of Education
8888 University Way
Simon Fraser University
Burnaby, BC V5A 1S6

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 ofSimon 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)