

Tablet technology and influences on student notetaking

Hannah Hoersting

Harvey Mudd College

Claremont, CA

hhoersting@gmail.com

ABSTRACT

As tablet technology becomes more common, we would like to have ways to use this technology to improve the ability of students to take notes. Paper notes have flaws; many of these flaws can be addressed through digital notetaking. Searching one's notes, for example, is extremely difficult with notebook paper, but much easier when one's notes are online. This summer, I explored some ways that the student note taking associated with the Ubiquitous Presenter project could be further improved.

1. INTRODUCTION

Ubiquitous Presenter (UP) is a web-based program that allows instructors to ink on prepared lecture notes, then make that ink available online for later viewing by students. It also supports student submissions and some student notetaking.

Instructors may invite student submissions at any point during their lecture. Students may then annotate slides with either writing or typed text (if they have no tablet), or vote in polls. Submissions of the instructors' choice are displayed anonymously for further class discussion. [1]

The student notetaking is implemented primarily via a program called NoteBlogger. This application, built for tablet PCs, allows students to ink on the slides that their instructor is using for class. This ink is published online in the form of a slide overlay, viewable to any student in the class.

Ubiquitous Presenter has focused on a fairly specific audience: professors with tablets, and their students who have tablets. This leaves out many students, including those who have computers that are not tablets, or whose professors do not use UP. We set out to explore some alternate options for notetaking that a student with a laptop and internet connection could utilize, but that would not require a tablet.

Over this summer, we have developed a prototype for notetaking via the web interface that we plan to deploy during the 2007-2008 academic year.

2. BACKGROUND

Ubiquitous Presenter (UP) is based on the University of Washington's Classroom Presenter, which is a program that allows instructors to annotate prepared slides, broadcast these slides via multicast to their classroom, and receive student submissions. Instead of multicast, UP uses the internet for viewing lectures. All ink strokes and submissions are archived online for later viewing. [1]

In addition, prior work developed a student note taking application called NoteBlogger (NB), which enables students with tablets to view lectures on their own computers, and take their own notes on the same set of slides. These notes are made

available to the class on the UP website. Instructors have generally used between one and three "bloggers," sometimes including a TA "master blogger" who can give comments and advice about concepts from a perspective different from that of a student in the class.

The web interface itself provides little opportunity for students to take their own notes if they are not bloggers, and little flexibility in options available for examining existing lecture materials. A zip file for each lecture, containing images of the final instructor slides and student blogger ink overlays, is available for download and later perusal; this is the only method that students who are not bloggers have of obtaining their own copies of slides for note taking purposes, unless an instructor provides copies of their lecture. Students viewing a lecture can view instructor ink strokes in the order that they appeared in class, and skim through a lecture using a film strip of thumbnails. However, there is no easy way to find material within a classroom unless the student already has a good idea of where it is. In general, UP makes it easy to view slides, but much more difficult to interact with the lecture.

Thus we see that for many students, especially those without tablets, paper notes still have advantages over the UP system. A computer system has the advantage of better indexing and search capabilities; however, these are not utilized in UP. There is no method of overlaying personal notes over the instructor slides online unless a student is a blogger, but there are only a few bloggers in each class, and without a tablet it is very difficult for students to utilize NB to its fullest extent. The downloadable image files make it possible to print out slides, but is not convenient for printing out multiple slides at once. Student blogger ink overlays are in different files than the base slide, so it can be difficult for bloggers to review their own notes offline. Even students who are bloggers are writing for others as well as themselves, which influences the kind of notes they take. Beyond the limitations of UP, however, there is also a simple practical constraint, which is that the use of UP is not universal to all faculty. Students cannot use NB and the associated capabilities for sharing notes online unless there is a lecture available on which to take notes. If an instructor does not use UP, there is no way for their students to use it without a great deal of initiative and willingness to find workarounds.

3. RESULTS

This project has given a great deal of focus to the needs of instructors, which is essential for ensuring that the program is used and can be tested in real classes. However, not as much focus has been given to the needs of students who are using the system, and (as mentioned above) there are not nearly as many features that are designed for student use. My interest this summer has been in examining student note taking in the UP system, with an eye towards enabling NoteBlogger to run as a

semi-independent application, NoteTaker. This interest has led to the development of several new features.

3.1 Tagging

One issue with UP's web interface is that the natural strengths of computers in indexing and searching are massively underutilized. Thus I have worked with another student to implement slide tagging and searching. UP users can enter keywords for a slide that are displayed as tags on a slide, giving some idea as to the content of the slide on a quick look. Instructor tags are displayed in bold, on the logic that students should be aware of what their instructors feel is important. Students can "vote" on tags entered by others, giving the tags additional weight if people in the class other than their creators feel that they are important and relevant.

Tags from every lecture in a classroom are stored in an XML file within the classroom directory structure. The project uses XML throughout for storage, as it is lightweight and does not require an additional database to be set up and maintained. Storing all tags from a classroom in the same file has the additional benefit of making it easy to search an entire classroom at once for a certain tag, rather than having to search through each individual lecture files.

Tagging without a search has been implemented and is being tested in several summer classes. One week into the course, a survey was given to one class about their prior experiences with tagging on web sites in general, and what they had done with UP's tagging to that point.

3.2 Survey Results

This initial survey was made available for response for a period of three days. Nine students responded. A majority of them had previously been in a class that used UP, and all had made UP logins for this particular class. Three were familiar with the concept of tagging from prior experience; five were not; and one responded that they still did not know what tagging was. Those who were familiar with tags used them for a variety of purposes, mentioning del.icio.us, Gmail, Google Reader, and blogs.

More students had tagged slides outside class (four) than during class (two). Reasons for tagging outside but not during included it being easier to tag while not trying to pay attention to the professor and not having a laptop during class. Students who did not tag slides at all cited reasons like not having time or not seeing the purpose of tagging. Seven of the nine respondents did not vote on other students' tags. Lack of agreement between students on what tags to use was mentioned several times, as was continued confusion about tagging in general.

Tags mentioned as being useful were "quiz" and "qf" (meaning "quiz fodder"); tags mentioned as not being useful were "redundant ones," like "quiz" and "qf" both being used instead of choosing a single standard.

3.3 Discussion of Results

We expected students to be more aware of tagging, as it is a commonly used method on many Web 2.0 sites like Flickr and del.icio.us to organize content. It might be necessary to provide students with some further introduction to tagging within the UP system at the beginning of the class, so that the purpose and function of tagging is more obvious.

A major concern is that many of the students surveyed did not see a purpose to tagging slides. Part of this was that the idea that tags were not useful. Enabling search will hopefully alleviate some of this perception, because it will become easier for students to find tagged material.

Having no useful tags to search on is a more serious issue. Although we want tags to be student-generated, this method of tagging does not necessarily provide consistency. There are many options for remedying this; some that have been considered are "seeding" tags, done either by the instructor or by a TA, providing more strict guidelines for tagging slides, providing some mechanism for "clumping" similar tags together, or providing a list of suggested tags. Future study could examine what would be useful for students.

Another concern is divided student attention. As previously stated, several students cited wanting to pay attention to the lecture and not be distracted from the professor as a reason for not utilizing the tags in class. This is another potential focus for further study.

3.4 Commenting

An issue with the UP interface is that it is difficult for students without tablets to leave notes on slides, since NoteBlogger is inherently pen-based. This leaves students with laptops at a great disadvantage; many desks simply do not have space for both a laptop and a notebook, so any student wishing to follow the lecture on their laptop would not easily be able to take notes at the same time. Students with desktop computers are at an ever greater disadvantage, as their computers are not even portable. The solution we have begun to implement is private commenting. This system is heavily based on the tagging system; much of the code is similar and the storage method is the same. Private commenting enables students to enter comments associated with a particular slide in the sidebar of the slide viewer for later perusal. These comments are only visible to their writer.

Unfortunately, we have been unable to perform user studies relating to commenting, as this system is not yet ready for release. When it is ready, we intend to perform user studies similar to those done in testing comments. We also intend to examine the kinds of notes that students take with the online system, possibly in comparison with the kinds of notes that they take in other, similar classes, and in comparison with the kinds of notes that other students in the same class take with more traditional methods.

3.5 Interface Issues

The implementation of tagging led to another issue: it is difficult to skim slides quickly to find information if a student does not already know exactly where it is. As mentioned above, there is a film strip on the slide viewer that students can use to skim slides in a lecture. However, by necessity, these thumbnails are often too small for their actual content to be discerned, and their tags, another clue as to content, are not visible unless the slide is active. Thus we have implemented a new method of viewing slides, a 2-dimensional grid view similar to the slide sorter view in Powerpoint. This grid displays miniatures that are larger in size than the thumbnails, making it much easier to view the slides, but smaller than the full-size slide displayed in the manual slide viewer, so many slides can be viewed at once. Also, mousing

over a slide shows the tags associated with that slide in the sidebar.

Another interface issue that needs to be addressed is space. Currently, tagging and commenting share the same side bar, which has limited space. There is a need to balance the two. We lack data as to the best method of doing this, so further information on which is more useful to students and how they use the two different methods of marking slides will need to be collected.

4.FUTURE WORK

Our eventual goal is to develop NoteBlogger into a separate application that can operate independently of UP, and develop UP's features to support students using it independently of instructors. Use of UP is becoming more common, but is still not widespread, and there are many students who have tablets who do not have instructors who use UP. It would potentially valuable to allow these students to create an online classroom, making it easier to communicate with each other and share information. This would require several new features, and suggest several more. First, it would require that blogger notes be accessible from a student's local machine. Students do not currently have the option of directly saving their notes except to the UP server. As mentioned above, images of the blogger ink overlays are available for download, but not on the same image as the instructor ink. Thus if a student is not connected with the server, their notes are unavailable in an easily accessible form.

Another part of this is to make student notes more readily available to others online. Currently, only bloggers can share information. We would like students to be able to share their notes and comment on other sets of notes, creating, in effect, an online community centered around UP.

5.REFERENCES

[1] Wilkerson, M., Griswold, W. G., Simon, B. Ubiquitous Presenter: Increasing Student Access and Control in a Digital Lecturing Environment. *SIGSCE 2005*.