Using Interactive Whiteboards, Projectors and Tablet Computers in the Classroom: Facilitating Active learning and Promoting Student Review outside the Classroom

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Abstract

In fall 2014 our institution was awarded with the University Reform Acceleration Program (AP) grant from the Japanese Ministry of Education (MEXT), and starting in 2015 an electronic portfolio (e-Portfolio) system was put in place where theoretically speaking, students would be able to demonstrate their critical thinking skills and showcase their best academic works. In addition, to facilitate students' access to the e-Portfolio system, all first year students were assigned tablet computers. This paper describes how recorded class explanations were provided to students through the e-portfolio system as well as some of the advantages of this process.

Introduction

At our institution, our instructors are faced with the challenge of teaching content in a foreign language while fostering critical thinking and active learning. This challenge became even more difficult with the institution being awarded the University Reform Acceleration Program (AP) grant. Now we have access to cutting-edge technology that, in theory, would improve our lessons and make it easier for students to demonstrate their skills. The e-Portfolio system is composed of two distinct but linked

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systems: Moodle and Mahara. Moodle is where assignments are submitted by students and later graded by instructors; and Mahara is where evidence of a student's learning is showcased. From the instructor's perspective, by ensuring that all students have tablet computers, it is possible for students to access the system at anytime from inside and outside class, allowing them to submit assignments easily.

Our institution has praised itself for using active learning in the classroom since its inception, but having tablet computers in the classroom is no guarantee of active learning. While some researchers are investigating if familiarity with a technology affects a student's learning process [1], one thing that seems clear (at least in our institution) is the fact that most instructors lack knowledge on how to effectively use this new technology in ways to improve a student's experience inside and outside classroom.

In an attempt to engage students outside class, a small-scale study was conducted with a class of 7 students. To do this, we recorded class explanations and then made them available to the students on the e-Portfolio system. The students could then use their tablet computers to review the content of previous classes and therefore less time asking questions about previous classes, freeing up time for critical thinking and active learning activities during class time.

Being a new resource to instructors it was very likely that problems with implementation would be encountered. For this reason, this class was chosen. In the case of problems, having a small number of students would make it easier to address and circumvent unforeseen problems.

Interactive Whiteboards

Interactive whiteboards have been available since the late 1990's [2], driving researchers to question the impact on class pedagogy and what positive experiences they can provide to students and teachers [3] [4]. Nowadays, researchers are analyzing their applicability and advantages in all types of education, from primary to tertiary [5] [6] [7]. Contrary from the widely-held belief that they may be

used to engage students, the main purpose of interactive whiteboards in this study was to record in-class explanations.

Figure 1 - One of many Ricoh PJX3340N projectors available in our classrooms

During a search for solutions on the market, one important point that had to be considered was that our institution's classrooms are already equipped with projectors. Considering financial and functional aspects, the eBeam package from Luidia Inc. [8] made perfect sense since it can be used to record class explanations in a range of different file formats and also makes use of the currently available projectors.

The eBeam package was used to record whiteboard annotations and share it with students through the new portfolio system. The capture pack (purchased for use in this study) allows instructors to capture audio and writing in different colors directly to a connected computer. First, the application suite captures it in a proprietary format which can later be exported in several formats. In our case, we chose to provide video annotations together with PDF files containing screenshots of the whiteboard. At this time, due the convenience provided for video format conversion, videos were stored in Google Drive. Also, at this point, there is no expectation to keep explanations from year-to-year and storing the files in Google Drive seemed like an easy choice.
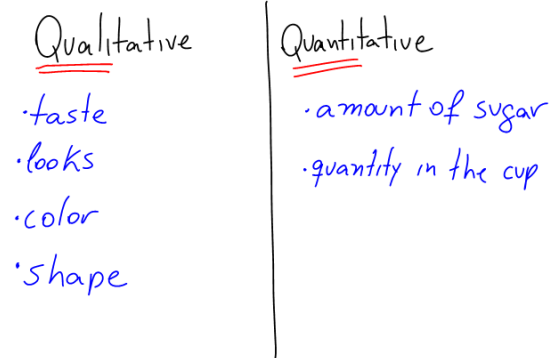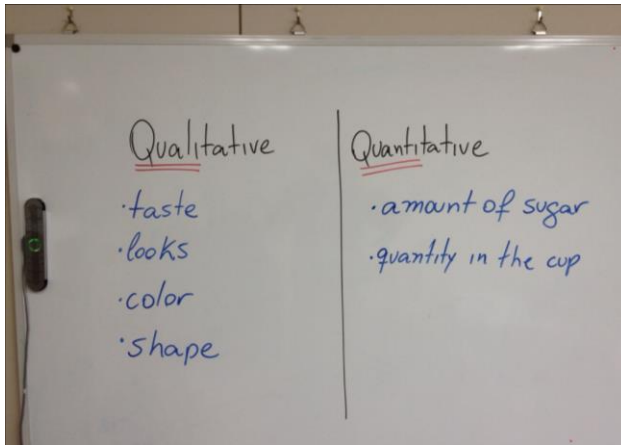
Figure 2 - Picture from the whiteboard (left) and the captured file from eBeam (right)

Connecting it to our e-Portfolio system

Unfortunately, there is no software solution that directly transfers the contents recorded by the eBeam package directly into to the e-Portfolio system. In order to provide the video files along with the whiteboard explanations to students, a page had to be created in the Mahara part of the e-Portfolio system.

Figure 3 - Material available on an e-Portfolio page

Student review

To make it easier for the students to access the materials, we created a resource in the introductory part of our Moodle course with a link to the Mahara page where the resources are available. As recorded class explanations are going to be used only by this class cohort, it made sense to create a Mahara page in which the material was made available to the students.
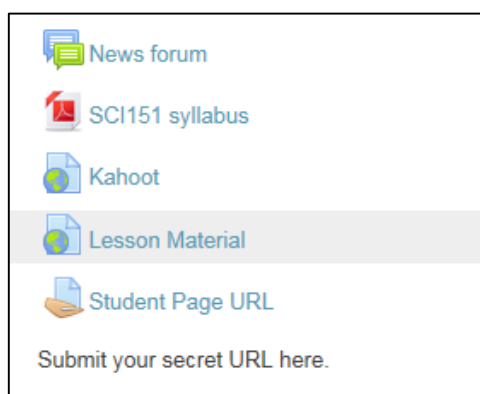

Figure 4 - Top section of our Moodle course with the link for the Mahara page with the interactive whiteboard recordings

The recorded explanations were useful mainly to students who missed classes. Usually, students who miss a class visit the instructor's office in order to get homework handouts and an explanation about what happened in class. By watching the class explanations available in the e-Portfolio system, students were able to understand what had to be accomplished and visited instructor's office with clarification and follow-up questions instead of requesting a full explanation of what happened. This was one of the greatest benefits of making the class explanations available in the e-Portfolio system because it saved instructor time and also provided absent students with real classroom explanations, thus ensuring that all students get the same level and amount of instruction.

Interactiveness

A full analysis of our e-Portfolio system's log in order to check how often students accessed recorded explanations has not yet been conducted. Of particular interest, information about how students

reviewed the videos would be particularly useful. Being able to know if a student watched a video without pausing, rewinding or fast forwarding can serve as a tool to identify which areas need to be addressed with individual students.

Final Considerations

One of the initial expectations was that the use of the material created with the eBeam package would allow more time for class content explanation as well as critical thinking and active learning activities during class time. Although inconclusive, recording whiteboard explanations gave a very good reason for students to use tablets outside classroom, as they were able not only to review explanations from past classes but also to prepare for classes using newly developed materials. In this regard, the contents from previous classes were rarely explained a second time.

Regarding the eBeam package, although the mobile version was in this study, the fixed wall-mounted version has practical advantages which makes it more suitable for institutional-wide wide implementations. One main advantage with fixed version is that instructors do not have to set up the sensors for each class. Also, because the number of classrooms with the system installed is likely to be fewer than the number of faculty who will be using interactive whiteboards, costs are reduced significantly.

Additionally, although not the main objective of this study, class explanations can be used in conjunction with video authoring tools. Videos produced in this way could provide different classroom points of view opposed to the whiteboard only focused video feed provided by the eBeam package. Such videos could be made available year-after-year for student use before and after class and even be part of a completely flipped classroom course.

Acknowledgement

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