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PowerPoint Games in a Secondary Laptop Environment

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Abstract: There is no denying the success and popularity of WebQuests among teachers. For those interested in technology integration, this is a significant step in the right direction. Yet, WebQuests are instructivist examples of technology integration – they are web-enhanced forms of direct instruction. We consider constructing homemade PowerPoint games as a constructionist alternative to WebQuests. PowerPoint is nearly ubiquitous software and teachers already use existing games in their classrooms. The authors contend that a better use of class time for learning is to turn over the act of game design to the children themselves. In this project, students in social studies course delivered by a mid-western high school designed PowerPoint Games as a means to review for portions of two examinations.

One of the most fundamental issues in public education is how to make learning relevant, challenging, and meaningful to students. One solution to this problem is to situate learning in activities and contexts which the students themselves find the most relevant. Not surprisingly, this often counters the experience and intuitions of even experienced, master teachers. One such context that we have used with much success is game design, that is, having students design their own educational games as a teaching and learning strategy in schools. Our research so far has focused on the degree to which students found the activity motivating and relevant in combination with how students were able to effectively integrate the subject matter into their games. Recently, we have used Microsoft PowerPoint as a game design tool. By using a popular and commonly available classroom tool, it has become easier for teachers and students to use game design as a strategy in their classrooms. However, there is a legitimate question about whether such an approach leads to increased learning on traditional testing instruments, such as posttests of the content. The purpose of this research is to use high stakes testing instruments as the basis for judging the effectiveness of using game design as a learning strategy. Also, our past research has focused on elementary and middle school children. This study, in contrast, uses an older audience of high school students enrolled in United States Studies classes. The gaming literature suggests that gaming remains a strong motivator for children and young adults up through at least their early twenties.

In this paper, we present one case example of how homemade PowerPoint games can used successfully in the teaching and learning of history. The aim of this is a student who learns about history as would a storyteller who values historical accuracy – to find in the ocean of facts the drama, suspense, and human interest that leads another to want to hear the story, or better yet, to participate in the story as a game. This view of learning is consistent with the National Council for Social Studies' (NCSS) Vision of Powerful Social Studies, which states that "teachers should not only expose their students to curriculum content but should also provide them with opportunities to think and communicate in ways that will help students construct a working knowledge of such content" (1994, p. 160).

This concept of students learning from the process of designing and refining a game is a good example of what the NCSS considers actively engaging students. Learning activities, such as designing a game based upon historical content, is a "minds-on activity that engages students" (NCSS, 1994, p. 161). Further, "students are encouraged to process what they learn on several levels" as they determine what will be an accurate historical narrative, yet still be engaging to their peers (p. 163).

Social Studies and Historical Understandings

Our conception of historical understanding is based on the levels of historical understanding as defined by Sam Wineburg (2001). Level I is characterized by "just because" explanations given by students and is heavily based on factual representations. Level II understanding is also very superficial and is characterized by very rational, logical thinking processes — students seeing historical facts as being like pieces of a puzzle that have to fit together. Level III understanding begins to show a more sophisticated awareness of the role of historical interpretation and how different interpretations based on the same evidence can occur. Level IV understanding is a mature level of understanding where students are able to analyze and interpret historical events using the original context. The goal of this project is to have students acquire deeper levels of historical understanding and have more students attain Level IV understanding.

This project has also been heavily influenced by the report produced by the National Council for the Social Studies (NCSS), Vision of Powerful Teaching and Learning in the Social Studies, which eventually was published as Expectations of Excellent. This report shows that the NCSS views classrooms as places where teachers "help students develop social understandings and civic efficacy" (NCSS, 1994, p. 157). Barr, Barth and Shermis (1978) state that one of the criticisms of the reflective inquiry tradition "is that its highly abstract nature renders it much less clear and understandable than the other two [i.e., the other two traditions]" (p. 132). Through their Vision of Powerful Teaching and Learning in the Social Studies, the NCSS has provided a concrete guide to teaching and learning in the reflective inquiry tradition.

The NCSS vision begins with a statement that "the primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world" (NCSS, 1994, p. 157). Students need to make decisions within a particular democratic framework or structure. This decision-making must be viewed as a process, and not a pre-conceived position where students should eventually arrive.

Methodology

In this study, approximately fifty students in two United States Studies courses that were delivered electronically by a high school in the mid-west completed two online multiple-choice exams (one at the mid-term and one at the end of the semester). As a means of reviewing for the multiple-choice portion of their mid-term exam, students created a PowerPoint game on one of seven to nine topics and, once the games were completed, they played the games created by other students. After creating and playing the PowerPoint games, students took their online mid-term examination which included seventy multiple-choice questions. This process was repeated for the students' final exam.

For the mid-term exam, the students worked in groups of two to three to create a PowerPoint Game to review one of seven units that they had covered during the first semester. The topics were assigned to students on a first come, first serve basis to ensure that there were games created for all seven units. Each game had to include ten questions per group member (i.e., 20 for groups of 2 and 30 for groups of 3). In addition to the creation of the games, students also had one to two class periods to play each other's games as review for their mid-term exam.

For the final exam, students worked in groups of three to create a PowerPoint Game to review one of nine units that they had covered during the second semester. The topics were assigned to the students based upon their request, ensuring that each of the nine groups covered each of the nine different topics. As with the first semester, each game had a total of 30 multiple-choice questions that were written by the students. Once they were completed the students had two classes in which to play others' games.

Each exam was broken down into the sections that corresponded to the topics on which the students completed their PowerPoint Games. The students score for each section was recorded to allow for comparisons between how the students did on the topic that their own game was based and the remaining other topics.

Preliminary results

The mid-term examination was given as a part of a four (class) day which included multiple-choice questions, essay questions, an oral examination, among other things. For the purposes of our project, the multiple-choice question portion was utilized. This portion of the exam had a total of 70 questions, ten from each of the seven units that had been covered. Approximately 65%-70% of the exam was taken from an exam used in previous years, with additional questions being added to ensure that all seven units were equally covered. The table below provides information on both classes separately and combined, their average scores for each of the seven units, and their average score for the unit which they completed their game, and their average score on the other six units.

	Class 1	Class 2	Total
Exam Score in Game Area	5.76	4.72	5.35
Average Exam Score in Non-Game Areas	5.10	4.71	5.01
Pre-Columbia Era Questions	5.40	4.00	4.73
Colonial Era Questions	4.68	4.44	4.57
Revolutionary War Questions	6.21	6.00	6.06
Constitutional Period Questions	5.67	5.67	5.67
Manifest Destiny Questions	5.08	5.75	5.42
Civil War Questions	4.38	3.57	3.98
Reconstruction Questions	5.21	4.33	4.98

Table 1: Student Average Scores By Class By Topic On Mid-Term Exam

The table clearly delineates that there was a slight increase in the average student scores on the unit that they completed their game compared to their average scores on the other six units (see the "Total" column). However, when these data were run through SPSS in a simple one-way analysis of variance it only yielded an F-value of 1.324 which was not statistically significant (.253). It should also be noted that generally speaking students did best on the Revolutionary War questions and worst on the Civil War questions, with an average of over 6.1 compared to an average of 3.9. The natural differences in the average scores from the seven units, along with the fact that students did not perform as well on this exam as was expected by the teacher and problems with Blackboard while the students were taking the test, suggest that the test itself may not have been a valid instrument.

The final exam did not experience the same issues for two reasons. The first issue that was resolved was the technical issues with the delivery of the exam in Blackboard that were experienced during the mid-term were not present during the final exam. The second issue that was resolved was that the final exam was one that had been field tested in previous years and the teacher was confident that it was a more reliable measurement. However, the results from the second multiple-choice exam are still in the process of being analyzed.

Discussion

The notion that children can handle the task of designing games to enhance their own learning has been examined before as a part of Project KID DESIGNER (see Rieber, Luke, & Smith, 1998; Rieber, Davis, Matzko, & Grant, 2001). The preliminary findings from this case study indicate that while the task of designing a game using PowerPoint may not have enhanced the students learning, it certainly did not hinder that learning. The no significant differences result in the analysis of variance indicated that the task of game design allowed students to learn at approximately the same level as other methods of reviewing for this mid-term exam.

In a similar study with the equivalent findings at the same school, but with a different population of students from an English language arts class, Clesson, Adams and Barbour (under review) speculated that the small sample size may be been one of the main factors leading to the no significant difference result. In this example, the difference in performance between the control group and the experimental group was 1.5% with a sample size of 35.

The authors indicated that a sample size of 700 or twenty times the number of participants with the same performance difference would also produce a statistically significant performance difference using an analysis of variance.

In our case study, there was a .34 difference in performance with a sample of 49 students. If the same speculation was applied to this study, and the sample size was increased to 784 student (and increase of only eight times) and the difference in performance was kept at a level of .34, the resulting analysis of variance would provide an F value of 10.784 which would be statistically significant at a level of 0.001. So while such extrapolation is not scientifically sound in a study of this nature, a .34 difference in improvement in favor of the treatment (i.e., the use of homemade PowerPoint games) is a promising result and something that could be built upon in future studies.

Conclusions

As this project is still in progress, firm conclusions are difficult to draw at this stage. Based on the results of the mid-term examinations, there were no statistically significant differences in the students' scores on portions of the exam where they did create PowerPoint Games and portions of the exam where they did not create games. There were also problems both with the course management system that delivered the exam to the students and with the exam itself which did not exist for the final exam (and as mentioned above the data from this second measurement has not yet been analyzed).

While there may not have been a difference in the students' performance, the initial reactions from the students were positive. They indicated to both the teacher and the researchers that they enjoyed this activity as a means to review for the multiple-choice portion of their mid-term examination. In addition to the students, the teacher was also quite pleased with this as a classroom activity in this online delivered course. These positive qualitative indications will be better represented at the conclusion of the project once students have completed the online survey and some of them have participated in the interviews or focus groups. In fact the from the teacher's viewpoint the biggest problem with the PowerPoint Games is that instead of getting on mySpace or Facebook when they are supposed to be doing other work, the students are now going to the PowerPoint Games.

Overall, we are convinced that PowerPoint Games can be used as an effective learning tool in the social studies classroom. Based on the preliminary results designing their own PowerPoint Game was as effective as the other methods students used to review for their mid-term exam. We believe that it allows students' a greater degree of freedom than other forms of technology integration, such as Webquests, and that it promotes a deeper understanding that may be more evident in other forms of assessment – which may form the basis of future, larger scale research endeavours.

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