Technology Integration: Effects on Motivation, Engagement, & Interests

Final Project

LT 785 - Research Methods in Educational Technology

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I - Statement of Research Question

What is the effect of technology integration on student motivation, engagement, and interest?

II - Summary of the Literature

One challenge teachers deal with every school year is to increase student motivation, engagement in the learning process, and interest in the content. Technology integration is using technology in the classroom to effectively enhance learning. How effective is integrating technology? Does it actually increase motivation, engagement and students' interest in learning? Many studies have focused on technology integration's impact on student motivation, engagement, and interest resulting in some mixed findings.

Teachers have completed many training opportunities to try to learn how to effectively engage their students. Recently teachers are feeling the crunch to implement technology into their curriculum to aid in students' learning. Lynette Gorder (2008) conducted a survey on how teachers' perception of integrating technology can affect the motivation of students. Through Gorder’s study, it was found that teachers do not effectively integrate technology into teaching and learning as well as they do for delivering their lessons and for their own productivity. This is a key issue when trying to motivate students with integrating technology. The study showed that teachers are good operators of technology for their curriculum. It also showed teachers do well at delivering their lectures through technology, but they do not do as well with integrating technology into student learning.

Even if technology is integrated into student learning, it doesn't mean that it engages students in learning objectives. Another study showed that the way technology is integrated into instruction has mixed or no effects on students’ motivation, engagement and interest. In
Hashemzadeh & Wilson’s study (2007), they found that not all technology integration is effective. They surveyed 612 students in their upper and lower economics classes and found that “More than 62% of students indicated greater involvement with course material when the instructor utilizes C&T (chalk and talk).” The study also found that the majority of the students (71%) felt that there was more student-teacher interaction when a teacher uses a blackboard for lectures instead of a PowerPoint presentation. They also felt that their cognitive thinking was better with the chalk and talk method. Though this is a big percent of students that feel the traditional method is better, over 90% of both groups in this study think that the instructor’s lecturing technique has a huge effect on their learning outcome.

A different approach to looking at technology and motivation was taken by Erica C. Boling (2008). She conducted a study to see what teachers' views were on technology. For teachers to effectively implement technology, they themselves have to feel confident in the hardware. This could then encourage them to use technology to help engage their students. She used a designed-based research model and documented her students', which were preservice and practicing teachers, engagement in the course of Literacy and Technology. She used blogs, 3D chat rooms, and other tools to teach them about technology. Through her weekly observation journal writings, she found the students' interest overall had grown for technology. While students expressed how they thought they wouldn't use some of tools such as blogs, she found that they were engaged in creating their blogs and were excited to share their creations. Overall the teachers found excitement for the technology after being engaged in it themselves.

When teachers integrate technology effectively, the next step is to determine if these tools increase engagement of students. It can be tough to evaluate student engagement. Bangert-Drowns and Pyke conducted a study which explores teachers' abilities and difficulties in
evaluating student engagement in regards to educational software (2002). Two fifth-grade classrooms were chosen for use in this study. Rating sheets were constructed by paraphrasing essential characteristics for different modes of engagement developed by Bangert-Drowns and Pyke. The descriptions were numbered and arranged in order from disengagement through literate thinking. Teachers could indicate on a four-point scale (almost always, often, rarely, never) how frequently they had observed students interacting with software in each of seven different ways. After the rating data was collected and analyzed, a descriptive report was returned to the teachers. The researchers met with the teachers as a group to discuss their evaluation of the rating method developed. In the postrating interview, the teachers reported that the taxonomy of student engagement was very descriptive of their students' work with educational software. They observed no instance of student-computer interaction that was not describable on the rating sheet, and, conversely, they felt that they had observed instances of each of the taxonomy's levels.

There are many more studies which show student engagement with effective integration of technology. A study done by Annetta, Murray, Laird, Bohr, & Park (2008) reviewed a science class with video games. They used a virtual learning environment through ActiveWorlds(TM), which is a Multi-User Virtual Environment (MUVE) and used teachers that taught science as their students. They were trying to see if there would be a positive or negative effect of video game implementation with the learning objectives of science content. Through interviews and observations, they found that most teachers found it engaging and "addictive" as one teacher said. It also was found that engagement would depend on the design of the video game and there could be some reluctant students that don't get into video games. Annetta (2008) also stated, "There was overwhelming consensus that secondary level pupils would react to the MUVE
activities with considerable enthusiasm and motivation." Overall they found that the students (teachers) were enthusiastic and positive about technology.

In 2006, Wang and Reeves also conducted a study using a science class. This study was set up to determine if a Web-based learning environment would improve student motivation to learn science. This study was done in conjunction with a four-year design-based research project intended to enhance the use of laptops as cognitive tools in the K-12 environment. They set up fossilization WebLE and implemented it in two tenth grade science classes. Based on the information obtained, they discovered that the students were very attentive and engaged in the learning. They found that it did increase student motivation through this activity. Students indicated they enjoyed the interactivness and would like to see more of it in their other courses. While the results were positive, one must be cautious to generalize this to everyone. This study was over a three-day period. The results could have been caused by the novelty effect. A longer study would need to be conducted to see if this holds true and can be generalized to the entire population or at least the entire school.

Another study was conducted by Nguyen, Hsieh, and Allen to determine if a web-based learning environment would improve the attitudes of middle school students towards mathematics (2006). The study compared the attitudes of students who used the web-based environment with students who were taught in a traditional environment. There were seventy-four seventh graders who participated in this study. The students were randomly assigned to either the pencil and paper group or the web-based group. They received the same set of problems. The pencil and paper group received them on printed worksheets that they handed in; the teacher graded, and were handed back to them. The web-based group completed the homework using the online system in the computer lab. The online system provided them with
immediate feedback for incorrect answers and a total score when they finished each homework set. Presurveys and postsurveys were conducted as well as 10 minute face-to-face interviews. The analysis done at the beginning of the study showed there was no significant difference between the two groups in students' preattitude toward mathematics learning. After three weeks of the study, the paper and pencil group's students postattitude toward mathematics remained the same, while the overall attitudes of web-based students showed some improvement. The descriptive analysis and the interview results indicated that the web-based students were generally enthusiastic about their web-based learning experience. Many of the web-based students reported that they enjoyed working with computer assessment, and preferred to have more computer math practice.

Laptops and mobile computing devices have become valuable tools in today's K-12 setting. Many schools have gone to a 1:1 computing environment or are considering it, but does this really affect student motivation, engagement, and interest? A preliminary study conducted by Swan, van't Hooft, Kratcoski, and Unger (2005) explored the use of mobile computing devices through multiple methodologies and its effect on students' motivation to learn and engagement in the learning process. They used six classrooms for their study - four elementary and two seventh grade. Through various instruments including classroom observations, interviews, and other instruments, they concluded that the use of mobile computing devices increases student motivation and engagement in learning; however, this is only when the technology is running smoothly. Since this was only a preliminary study, the researchers agreed that further studies must be done to explore these findings.

In another study conducted in a low-income, minority school in New York City. The focus of this study was to determine how laptops were used to achieve instructional goals, how
laptops influenced students' attitudes toward computers and school, and how did the use of laptops support learning. Mouza's (2008) study found that the use of laptops supported learning in several ways: "(a) it increased student motivation and persistence in doing school work; (b) it facilitated increased interactions with peers and teachers; (c) it empowered students by fostering confidence in their academic abilities; and (d) it fostered academic gains in writing and mathematics within the laptop group."

III – Summary and Conclusions

Although there are some conflicting results, the majority of the research shows that integrating technology in the classroom can improve student motivation, engagement in the learning process, and interest in the content. It also shows that this does not automatically happen simply by integrating technology. Careful planning by the teacher along with familiarity with the technology is important when integrating the technology. If the integration is done well, many studies that show technology can have a positive impact on the student's motivation, engagement and interest in the content. The studies show this improvement across a wide variety of grade levels, ethnic groups, and income levels, which means that as a general rule if the integration of technology is done correctly, it has the potential to help improve any student's motivation, engagement, and interest in the content.

IV - Application or Effects of the Research on Typical School

Schools or educators need to provide students with the skills needed to be successful in the 21st century. These skills need to include technology. Educators should be integrating technology for this reason, but it is also a way to connect with the way today's students are
geared. Every day it becomes more and more difficult to motivate and engage students in the learning process. They have grown up in a technological world. Educators need to be using this to their advantage. The more technology is integrated into the learning, the more students will be excited about learning. Technology integration is the way to reach students on their level. It motivates them to learn. It engages them in the learning process and enhances their interest in the content. Of course, technology integration needs to be thought out and involve more than just using technology. The more interactive the lessons are the more involved the students will be.

Creating an interactive lesson can be a challenge. Teachers need to make sure that their delivery of a lesson and their enthusiasm for technology and the material are shown clearly. Educators also need to consider the tools to use in their lessons and if they will engage students. Getting students involved is the key. A Power Point presentation will not be enough to engage students. Integrating some activities where students actually use the technology can increase interaction and motivation. Teachers are the key to using technology effectively to engage their students.
V – List of References:


A14 Appendix A - Analysis of Research

Article I

Bibliographic Citation (APA Style)


Type of Research:  ___ Descriptive  ___ Correlation
                   ___ Experimental  ___ Causal-Comparative
                   ___ Historical    ___ Quasi-Experimental
                   ___ Meta-Analysis  ___ Survey

Evidence from article you used to determine Type of Research

The researchers used a web-based learning environment to determine how it would affect student motivation and engagement in learning. It was conducted on only two science classes. The report also states that “this study constitutes a design experiment.”

Purpose of the Research

The purpose of this study was to examine the effects of a Web-based learning environment about fossilization on the motivation of students in 10th grade science.

Instruments Used

- Classroom observations
- Student interviews
- Teacher interview
- Questionnaire

Validity and reliability of Instruments Used
To enhance the reliability of the research, two strategies were used: prolonged engagement and triangulation techniques. The main researcher established a long-term relationship with the teacher and the students. Classroom observations performed by two researchers were integrated to enhance consensus about data, and multiple qualitative methods were used to gather data.

**Subjects**

Through a purposive sampling method, the subjects chosen for this study consisted of a male teacher and 27 tenth-grade students (two science classes). All 27 students participated in the instruction and filled out the survey. Only 12 students, 6 from each class, were the focus of classroom observations and student interviews. This school and classroom was serving as the site of a large-scale technology integration project.

**Results and Conclusions**

Based on the questionnaire results, students indicated that using the Web-based learning environment did enhance their motivation to learn about fossilization and also expressed a desire to have more interactive lessons.

The observational finding showed that the students were very attentive and focused on the assignment, which lead to engagement in the learning process. Even through the difficult tasks, students maintained their concentration and focus.

Through the student interviews, it was found that students who were visual learners found the web-based learning environment to be a more interesting way to learn than in a traditional classroom. They also indicated that because they were in control of their learning process, their motivation to learn was enhanced. They expressed a strong desire to use this in other classes as well as it could facilitate their efforts to learn.

The interview of the teacher agreed with these findings. The teacher was impressed by the students’ attention to the tool. He concluded that the web-based learning environment was an appropriate tool for those generally uninterested in science. He agreed that student motivation to learn improved.

The concern would be the novelty effect. The web-based learning environment was new to the students. Whether or not the novelty would wear off soon would be something to research further.
Possible Influence of Extraneous Variables

The novelty effect could be an extraneous variable. This learning environment was new and exciting to the students, but whether or not it would last could affect the end result. Also their interest level in science could be an extraneous variable. If they like science, they would be more motivated to learn no matter what learning environment it is. Ability level is another variable that could factor in. Were any lower level learners?

Possible Threats to Internal and External Validity

One possible threat to the internal validity of this study would be the academic ability. One cannot generalize to the entire 10th grade class if not all academic abilities were studied. Data collector bias could also affect internal validity since the researcher/observers have developed a relationship with the teacher and students. While this may improve reliability, it could also affect validity.

A possible threat to external validity is the inability to generalize results to all contents. This study was conducted in strictly a science class and on one topic. It was also done for a short period of time. One could not necessarily say that this would work in another classroom.

Generalizability of Results to Local Issues

With schools pushing technology integration and many moving to a 1:1 computing environment, educators should consider more interactive lessons. While the results of this study may not be generalized to all content areas or even topics within science, it does provide some examples of what might happen by integrating a web-based learning environment. As teachers are always looking for ways to motivate students and engage them in the learning process, this study provided one way to do this. Based on these results, it would be worthwhile for other teachers to try a web-based learning environment.
Article II

Bibliographic Citation (APA Style)


Type of Research:  
___ Descriptive  ___ Correlation  
___ Experimental  ___ Causal-Comparative  
___ Historical  ___ Quasi-Experimental  
___ Meta-Analysis  _x_ Survey

Evidence from article you used to determine Type of Research

The author described the method of research and said it was a survey method. In the research they also conducted a survey in their classes to obtain data from the students’ preferences toward technology. The study also wanted to obtain information on how students think they learn better.

Purpose of the Research

To see if students of all types enrolled in economics courses benefit from extensive use of technology based teaching/learning tools.

Instruments Used

A survey/questionnaire was distributed that attempted to obtain the information needed for the research. The first three questions asked about SAT scores, GPA scores, and number of economics classes taken. The next four questions requested students to choose preferences to the Power Point display or to the traditional chalk and talk method. The last questions dealt with technology intensive instruction, its affect on attendance and student stimulation in class, and students’ views on teachers who use technology in their classes. The final question inquired on how students use their computer (entertainment versus educational).

Validity and reliability of Instruments Used
Some questions asked on the survey are expecting that students themselves know how they learn best as well as what teaching method engages them the most. There was a 100% returned response write on the questionnaire. Some students did not answer questions or had more than one answer to questions. The researchers said that this could slightly throw off the results. It should have been considered beforehand how to eliminate the double answer situation.

Subjects

The subjects were students that were enrolled in both lower and upper division undergraduate economics courses at Radford University. Some students were enrolled for the first time in an economics course, others were advanced economic students.

Results and Conclusions

By using a standard normal distribution, similar to a chi-square test, it was found that there was no significant difference between the chalk and talk method and the Power Point method in reference to what students preferred. This test was for questions 4 through 8 on the survey. However the next three questions did show that a preference for the chalk and talk method. At least 62% of the students felt more involvement with the material and 71% felt that there is more interaction between the teacher and student when using chalk and talk.

A chi-square test found that there was no significant difference of opinion of students in regards to SAT scores or GPA. The validity of this test is good as it is consistent with previous research. The researchers found that advanced students academically have a tendency to be more engaged and involved when traditional methods are used, instead of intensive technology instruction. The chi-square also found that students who had taken more than one economics course preferred chalk and talk method compared the Power Point presentation. The most impressive statistic is that over 90% of the students surveyed thought that the instructor’s lecturing skill is important to the students’ learning outcome.

In conclusion, the survey supports that intensive technology instruction does not necessarily increase students’ motivation and engagement in the classroom. This survey actually shows the opposite. Students prefer the traditional chalk and talk method. The results do not show that traditional methods increase student disengagement. In reference to students’ preferences of what method, it could be that teachers have not been trained well in integrating technology. The key thing to realize is that technology can be danger to the learning process. It requires great thought and strategy when implementing into classrooms. It also depends on an instructor’s capability of delivering a highly motivating lecture.
Possible Influence of Extraneous Variables

The study only dealt with economics courses, but it wasn’t taking in account that students could possibly have had other experiences with technology in other courses. These courses could affect the way students view technology with engagement, thus affect their answers on the survey. The researchers were going to administer the survey in other related courses like accounting, but instead they just stuck with the economic courses. I think if they made sure that their courses were a good sample of the whole population, this extraneous variable could have been controlled.

Possible Threats to Internal and External Validity

The sample was only taken at one university and in one content area and with one particular group. Also there is no way of knowing if the faculty at this institution is a good representation of the average. Another external validity issue is that there is no way of knowing if these classes exposed to technology represent the average class.

Selection bias also could be a threat as other student groups could differ with regard to academic achievement, ethnicity, content material, experience level (grade), family background, and socioeconomic effects.

I also would question the data collector characteristics and bias. The teachers themselves delivered the survey and this could cause some students to respond differently. These teachers also have the opportunity to give “leading questions” or more time for the survey.
Article III

Bibliographic Citation (APA Style)


Type of Research:  ___ Descriptive  ___ Correlation
                   ___ Experimental  ___ Causal-Comparative
                   ___ Historical   ___X_ Quasi-Experimental
                   ___ Meta-Analysis ___ Survey

Evidence from article you used to determine Type of Research

Under the Methodology section it states a quasi-experimental design was used.

Purpose of the Research

To study the effects of web-based assessment and practice on students' mathematics learning attitudes.

Instruments Used

- Homework and practice tasks
- Presurveys and Postsurveys
- Interviews

Validity and reliability of Instruments Used

The homework and practice sets were selected from the Connected Mathematics series (Lappan et al., 1998), and were examined by six middle school teachers and the Principle Investigator of the National Science Foundation-Middle School Mathematics Project (MSMP). Also, both groups of students were given the exact same set of homework problems.
The surveys conducted were different between the two groups. The web-based group had more extensive surveys. I think this hurts the validity of the study.

For the interviews, the 12 students were randomly selected from different gender and ethnic groups to assure the collection of diverse opinions. However, they were only selected from the web-based instruction group. I think this hurts the validity of the study because the paper and pencil group was not given the same chance to express their opinions in an interview.

The study was conducted with students from one middle school in Texas. I think the fact that only one school in one area of the United States was chosen could hurt the reliability of the study.

Subjects

The subjects were 74 seventh graders from a middle school in Southern Texas.

Results and Conclusions

After three weeks of the study, the paper and pencil group's students postattitude toward mathematics remained the same, while the overall attitudes of web-based students showed some improvement. The descriptive analysis and the interview results indicated that the web-based students were generally enthusiastic about their web-based learning experience. Many of the web-based students reported that they enjoyed working with computer assessment, and preferred to have more computer math practice.

Possible Influence of Extraneous Variables

The groups having different teachers could have influenced the results of the study. If the students enjoy their teacher they may be more motivated in the subject they teach. Another factor that could have influenced the study is the group's previous experiences with web-based instruction. If any students had a positive or negative experience with web-based instruction they may have brought that opinion into the study with them. A third influence would be the students' ability level in mathematics. Students tend to be more motivated in subjects they are better at.

Possible Threats to Internal and External Validity

Subject Characteristics - the students may differ from each other in mathematic ability
Location - the study only took students from one middle school in Texas. Students in other parts of the US or even other parts of Texas may have differing opinions. Data Collector Bias may have played a part during the interview process. The interviewers may have unconsciously been asking questions in a leading way.

Generalizability of Results to Local Issues

Teachers are always looking for ways to motivate and engage their students. Based on this study, teachers should consider using a web-based environment instead of the traditional pencil and paper approach to increase student motivation and engagement.
Appendix B - Shared Participation in Writing the Final Paper

Michelle Prasek
   • Three articles
     o Learning With Laptops: Implementation and Outcomes in an Urban, Underprivileged School
     o Uses and Effects of Mobile Computing Devices in K-8 Classrooms
     o The Effects of a Web-based Learning Environment on Student Motivation in a High School Earth Science Course
   • Summary of Literature - on my articles
   • Application in a typical school
   • List of References
   • Appendix A: Article 1 - The Effects of a Web-based Learning Environment on Student Motivation in a High School Earth Science Course

Kaci Vander Vorst
   • Four articles
     o Investigating Student Attitudes Toward a Synchronous, Online Graduate Course in a Multi-User Virtual Learning Environment
     o Learning From Teachers’ Conceptions of Technology Integration: What do Blogs, Instant Messages, and 3D Chat Rooms Have To Do With It?
     o A Study of Teacher Perceptions of Instructional Technology Integration in the Classroom.
     o Teaching With the Lights Out: What Do We Really Know About the Impact of Technology Intensive Instruction?
   • Summary of Literature - on my articles
   • Application of a typical school
   • List of References
   • Appendix A: Article II Teaching with the lights out: What do we really know about the impact of technology intensive instruction?

Amanda Schwartz
   • Two articles
     o Teacher ratings of student engagement with educational software: An exploratory study.
     o The impacts of web-based assessment and practice on students' mathematics learning attitudes
   • Summary of Literature - on my articles
   • Conclusion
   • List of References
   • Appendix A: Article III The impacts of web-based assessment and practice on students' mathematics learning attitudes