Technology in Education

Elizabeth Broadbent

Western Oregon University

Ed 633
Introduction

In today’s fast paced world children are bombarded with technology as part of their everyday lives: from instant messaging, video games, cell phones, Facebook, digital music players, and email. Students in this generation are known as “digital natives”. It seems obvious that technology would be integrated into classrooms to support the curriculum and the core standards, and that by doing so teachers would increase student motivation and prepare students for the real world.

Although educators are aware that technology is a vital part of our society, it is still not being used in schools to a large extent. In fact, school policies often prohibit them (students) from bringing their technology tools with them to school (Spires, 2006). There are several reasons for this lack of technology integration. First and foremost are budget constraints. Many districts cannot afford to purchase the hardware, software, professional development and technology support needed to successfully implement technology. Secondly, many veteran teachers are not comfortable, or knowledgeable, about how to incorporate technology in their classrooms with their existing curriculum. Lastly, lack of time for trainings, peer coaching, and collaboration hinder the use of technology.

The focus of this literature review is to: look at how technology integration can enhance student motivation by allowing them choices, address the specific ways technology can enable teachers to differentiate instruction through technology, discuss the effective ways to incorporate technology into the curriculum.

Student Motivation

Years ago, a teacher was considered effective if they were the authority figure in the classroom disseminating information to their students by encouraging rote memorization. Today however, a more “instructivist” approach is being taken. Instructivism engages students in inquiry learning. Rather than rote memorization of instructional material, inquiry learning emphasizes active learning and development of analytical skills. Research suggests that inquiry learning can have a positive affect on student motivation (Moos and Honkomp, 2011). According to Deci and Ryan there are three basic needs that need to be met in order to promote motivation: autonomy, competence, and relatedness (Autio, Hietanoro, Ruismaki 2011). Autonomy refers to the
amount of choice students are given about specific tasks and how to perform them. Students are encouraged to be creative, think independently are research topics of interest. This creates a feeling of ownership among students. Competence is when students feel that they understand and have mastered something. It is important for teachers to make sure the learning activities are challenging but within a student’s capabilities. Lastly, is relatedness, which has to do with feeling part of a group. This can be accomplished by setting up a classroom that feels like a community, and where students work in teams or cooperative pairs to complete tasks.

Several studies looked at how technology can improve motivation in the classroom. Moos and Honkomp (2011) conducted a study that examined how adventure learning (AL) affects motivation and learning outcomes in middle school students. Adventure learning has emerged as a promising technology forum that provides students with opportunities to explore real world issues through authentic learning experiences (Moos and Honkomp, 2011). Christian Gilbert, an eighth grade geography teacher, led this particular adventure learning. He spent three days on a service project helping orphans, two days on a safari, and seven days climbing Mt. Kilimanjaro. Gilbert emailed lessons each day that included an animal of the day, latitude, longitude, satellite pictures, video and use of a satellite phone. The study included 182 seventh and eighth grade students from a suburban middle school in Minnesota. The students took a questionnaire regarding motivation and a pre and posttest about the topic of study: Africa. The participants were also interviewed. The study found that overall motivation was significantly increased after the adventure learning. Students said they enjoyed learning more when using the Internet then through books. They remarked that they thought the books were outdated and that the Internet was more current. Furthermore students showed a sense of competence and there was evidence of intrinsic motivation throughout their answers.

Rather than focusing on adventure learning to create motivation, a study by Autio, Heitanoro, & Ruismaki (2011) looked at how using technology to create a final project combined with the environment of the classroom, influenced motivation. The study group consisted of four 15-16 year old students attending a secondary school in Finland. The students had varying exposure to technology throughout their schooling. The findings showed that giving the students freedom of choice for their final project greatly
increased their motivation. The students commented that they felt proud of their projects and enjoyed working on them. The study also showed that the physical environment of the classroom was also important for motivation. The environment included the actual space, set-up, technology tools available, and the climate of the room.

A third study focused on textbooks and lack of motivation. Nelson, Arthur, Jensen & Van Horn (2011) did a study on an Indiana school district that could not find a textbook to meet their criteria: critical thinking skills, learning styles, relevancy and rigor, adherence to standards, tech and 21st-century skills, and diversity. The district decided to create an online “curriculum loft”. The curriculum loft was a storage platform where teachers placed lessons, scoring, rubrics, videos, and other relevant information. Teachers also learned how to use the program netTrekker and linked it to the loft as well. Students (and parents) were able to view assignments on the loft. Students were given choices about which articles to read, how to record information and how they wanted to present the information to the class. They were often placed in groups to work collaboratively to disseminate the information that they learned. Teachers found that students were more engaged, were more likely to read the articles assigned, and even challenged themselves with more difficult readings. Students interviews confirmed that students enjoyed working much more online than with a textbook. They felt that textbooks were outdated, boring, and too broad. Both students and teachers though the program netTrekker added an exciting element to the curriculum.

Among the many technology tools available in schools are student response systems (SRS), or clickers, as they are widely known. Clickers are used for taking attendance, reviewing for an assessment, providing spontaneous feedback, promoting team building, and giving quizzes. Edens (2006) conducted a study to see if classroom quizzes conducted with clickers enhanced student motivation. 120 undergraduate students in two educational psychology classes participated in the study. Each class was exactly the same except that one class assigned points to the SRS quizzes (25% of the grade) while the other section said the SRS quizzes were purely to self monitor and self assess. Students in the graded SRS group were more motivated to attend and prepare for class. Ironically, though, these students were also more anxious about using the SRS since they knew their grade depended on their responses.
There is much debate among teachers, administrators, board members and policy makers regarding technology and education. However, students are often left out of these pertinent conversations regarding their education. In a study conducted by Spires, Lee, & Turner (2008) the focus was truly on that of the students. The participants included 4,000 middle school students that were randomly selected from an afterschool program. The students were pretty evenly split in terms of gender and 49% were African American, 40% white, and 11% were Hispanic or Asian. Quantitative results were taken from student surveys and qualitative results were taken from six focus groups that were created from this same set of students. The survey results showed that students ranked using the computer in general and doing research on the Internet as the school activities they liked best, and listening to teachers explain things and doing worksheets as activities they liked the least. Several themes emerged from the focus groups. One of those themes was “engage us”. Students expressed that they want to be engaged in school and that one of the ways to do that would be to allow them to use technology as a tool to complete projects. They also identified very specific ways that technology could be used in various academic settings.

Lastly, let us look at technology and how it can motivate younger students in a positive way. Mouza (2005) conducted a study that asked, “What are the benefits of technology-enhanced activities on student learning?” The study was dubbed the 100 days project and included six K-2 teachers and a technology coordinator. Teachers attended professional development and collaborated together on how to integrate technology into their 100 days of school theme that already existed. All activities were designed to address the NYS standards. There were four units within the project: School interviews of 100 staff members by students, recipes with 100 ingredients, a 100 word poem, and a quest of knowledge in the world of toys. Data was collected over a period of one year from teacher lesson plans, classroom observations, samples of student work, and field notes from workshops. One of the biggest findings of the 100 Days project was that it motivated students and increased their persistence in completing schoolwork. Teachers noted that students were more motivated to read and write when they were on the computer. Students even took responsibility for the work that needed to be completed by reminding the teacher of the unfinished tasks. Most importantly teachers noticed that
students who were usually less engaged became highly engaged in their work. All of the teachers found that their students became more reflective about their work when editing on the computer, and were willing to make changes to their projects.

**Technology to Allow Differentiation in Instruction**

In today’s classrooms where class sizes are increasing, teacher’s are without aides, and inclusion is used as much as possible; differentiation of instruction can be very challenging. Teachers realize that meeting the needs of all students is crucial for motivation, understanding, and skill mastery. Using a variety of technology in various academic areas can help to meet that need. In the study by Nelson, Arthur, Jensen, & Van Horn (2011) the use of the curriculum loft offered the perfect opportunity to differentiate instruction. Teachers presented the information using a variety of tools: PowerPoint, videos, articles, and games. In return students demonstrated their knowledge using charts, essays, Socratic Seminars, and silent debates. By presenting lessons using different tools and allowing students to report back by choosing their favorite mode students are apt to be more confident and more successful. By using the tool netTrekker teachers were able to search for resources based on age group, subject, and could even modify lessons for English Language Learners. Furthermore teachers felt that netTrekker enabled them to scaffold their lessons.

In a New Zealand study the laptop became the hub of instruction. Parr, & Ward (2011) conducted a study where the New Zealand government paid for two thirds of a laptop for teachers. The teacher or their building then pitched in to pay for the rest. The purpose of this initiative, known as TELA, was to increase teacher confidence in using digital technologies: including learning and teaching, behavior management, and administration. Thirteen schools that included primary, secondary, and intermediate schools were selected for the study. From there the study was narrowed down to three schools. The data was collected from classroom observations and teacher and student interviews. The teachers used their laptops for lesson planning, grading, to connect students to outside resources, and to store student work. Technology enabled teachers to differentiate and or personalize student learning. For example in one of the schools there were several students that were identified with oral language problems. Specifically, students did not comprehend or had not been exposed to the vocabulary necessary to
interact with the curriculum. Researchers noted “all of the examples we saw of technology use had some element of oral language, whether it was the Year 1 students practicing oral language or Year 3 students explaining mathematical concepts while being recorded” (Parr, & Ward 2011). All of the teachers and students interviewed gave examples of how they use the Internet in their classroom to provide individualized teaching and learning. For example, in one school a web-based program called Matletics was used for math practice. The teacher was able to set up the program for individual students to work at their own level. At the end of the course the students competed against people all over the world at their same level.

The 100 days project, mentioned earlier (Mouza, 2005), also discussed how technology helped differentiate for higher achieving students. One of the tools that teachers used, Kidpix, allowed children that finished early to enhance their projects using more detailed facts, graphic images, and color.

**Ways to Effectively Incorporate Technology**

Although many teachers realize the importance of technology in education many are unclear how to incorporate it successfully. They do not see technology as a tool to enhance their curriculum. Rather they view it as a separate entity. A large part of this problem is due to lack of professional development for teachers, the nonexistence of media specialists in many schools, and time to learn about the tools and confer with colleagues. Much of this is due to poor funding. In several of the studies where technology was being used successfully the teachers acknowledged that they never could have accomplished what they did without a coach, technology support, professional development, or administrative support. It is not enough to buy a teacher ipods, ipads, or laptops without teaching them how they can be incorporated into their existing curriculum.

Authors Keengwe and Grace (2009) facilitated a summer institute project in a medium sized public university for practicing early childhood education teachers to explore technology tools to integrate into their curriculum. Twelve early childhood education teachers participated in the hands on institute. First teachers were taught the technology standards for their grade level. Secondly they were shown on line resources that included already made templates, scoring rubrics, and graphic organizers. Next they
were introduced to software and programs such as PowerPoint, Garage band, Google Docs, Microsoft Word, Kidspiration, pod casting, and digital storytelling. The teachers learned how to create their own lessons based on the technology introduced and their specific content. Other teachers critiqued their work to help improve it. All of the participants felt excited about the lessons that they created and looked forward to using them with their students. The projects that the teachers created during the institute improved as the eight-week class progressed. Although the institute was deemed a success, teachers reported several challenges in integrating technology into their classrooms on their own. They sited lack of familiarity with technology, lack of administrative support, no technical support, not enough professional development, no time to collaborate with other colleagues, and uncertainty about behavior management while using technology with kids.

Spires, Lee, & Turner (2008) acknowledged that “student’s desires and needs to have more access to technology as a tool for learning poses serious demands on schools and districts” (p.15). To implement technology successfully several issues need to be addressed; 21st century tools in the classroom, including appropriate hardware and software; connectivity and networks; professional development; and technical support. This study cited lack of funding as the main reason these areas are lacking. For example, some states invest in the hardware for the classrooms but then don’t have the bandwidth and connectivity across the state to use hardware. According to this article more states are attempting to deal with technology issues at a statewide level rather than a district level.

The study by Nelson, Arthur, Jensen, & Van Horn emphasized that “having visionary and agile school leaders is essential” (p. 50). Without a leader that models technology teachers will not be as willing to make the shift. Well-designed professional development was also stressed in this study. The teachers working on the curriculum loft received a year of professional development and a stipend for creating lessons for the loft. Lastly technology support was crucial. The technology department reviewed what software was being used or not used, made sure computers were in working order, and helped to repair problems.

Another aspect to consider when implementing technology is classroom management. In Mouza’s study of the 100 days project classroom management was a
challenge initially. Teachers struggled with how to rotate students through centers while other children used the two computers available in the room. The teachers found that as they progressed through the units their management skills improved. Another noted challenge was time constraints. The teachers discovered that there was quite a bit of up-front planning: finding appropriate websites, and collecting resources. Teachers acknowledged that this would not be as much of an issue the following year. The last challenge was due to equipment failure or glitches with wireless connection and software. All of the teachers in this study stated that the two things that helped them overcome their challenges were professional development and administrative support. They felt that the professional development was key because it helped them build their technological skills, helped with classroom management, and introduced them to new tools and resources to incorporate with their curriculum. Administrative support was essential for teachers to get release time to attend workshops, and setting aside time so the teachers could collaborate with one another.

**Implications and Conclusions**

The research for this literature review overwhelmingly emphasized how technology truly does motivate students in school. The teacher and student interviews, classroom observations, and student surveys all revealed that students want their education to incorporate technology tools that they know and love. Students feel that using technology is more relevant than books and that tech will prepare them to be 21st century learners and workers. They want their education to reflect the world in which we live.

Secondly, the research showed that technology is a wonderful way for teachers to differentiate instruction. In math students can use web-based activities at their level to reinforce their skills, English language learners can listen to a novel on an ipod while following along in a book, and high academic achievers can take research projects a step further by embedding, videos, music, and photos.

The biggest implication of the research is that although many teachers want to incorporate technology, and have even been given equipment, much more support is needed to make the integration successful. A tech savvy and supportive administrator is imperative. Without the necessary leadership teachers may find it difficult to make the
transition. Quality professional development is also crucial. Teachers have to be introduced to programs, tools, and hardware that are going to enhance their current curriculum. Adequate time was also mentioned in several articles. Time for professional development, lesson planning, practice, and to collaborate with colleagues was mentioned most frequently. Lastly, a technology coach or support person made a big difference in the success of the research studies. Many teachers are not trained with a technology background and have a difficult time envisioning how to integrate it into their lessons. Furthermore, many teachers do not know how to maneuver their way around software or hardware if there are glitches.

In conclusion the research showed strong evidence that incorporating technology in classrooms is essential to motivate, engage, and lead our children to be 21st century thinkers and learners. Although teachers are used to being the head of the class, it seems they will need a lot of help and support themselves to make the technology transition ensue.

Bibliography


