Middle School and Technology Usage: A Case Study

T.J. Wolfe

Abstract

The purpose of this study was to examine the effectiveness of technology use in the classroom and propose new ways to implement it. A group of 70 middle school students participated in a 4-week technology research study that was designed to investigate the effectiveness of technology in the middle-school classroom. Results suggest that for students to be successful in the future workplace, technology should be integrated into the curriculum.

Keywords: middle school, technology, case study

Middle School and Technology Usage: A Case Study

Technology is at the core of virtually every aspect of our daily lives (United States Department of Education, 2010). It is in our living rooms, pockets, automobiles, and it is in our schools. The Kaiser Family Foundation (Rideout, Vandewater, Wartella, &Henry J. Kaiser Family Foundation, 2003) conducted a study on children and teen technology usage, finding that children and teens spent 2.75 hours per week using home computers. Seventy percent of 4-6 year-olds have used a computer. In any given day, 68% of children under 2 years of age will use a screen media, for an average of just over 2 hours. Young people have been and will continue to be born into a digital world where creating, changing, and sharing information with each other is a constant. Teachers may need to adopt a new framework for educating this and the next generation of students.

Students have many opportunities to learn on their own at school, especially with the increased availability of computers and Internet connections. The Internet provides access to unlimited resources and instant information. There are more than 91 million searches performed on Google each day (Searches performed on Google each day, 2011). Students are now able to type a topic into an Internet search engine and instantly watch streaming video, listen to podcasts, read Wikipedia explanations, and respond to blog entries. To understand current education, the history of technology in education will be discussed. Then, current trends and future possibilities of technology usage will be explored. Finally, strategies teachers can use to implement and incorporate technology into their classrooms will be discussed.

History of Technology in Education
Everett Murdock, Professor Emeritus at California State University, Long Beach, has written extensively on instructional technology and its history. He explained that one of the earliest forms of technology in education took place in 1780, when public schools adopted the teacher/manager model in which teachers were the primary manger of classroom instruction and assessment (Murdock, 2011). In response to the sending of Russia's Sputnik space vehicle into space, President Eisenhower passed the National Defense Education Act in 1958, which brought new money and new technology into schools. Mainframes and minicomputers were in wide use in business and a few software companies began to develop mainframe and minicomputer-based instructional programs (Murdock, 2011). Apple Computers, Inc. attempted to promote educational use of computers in 1975 by donating many Apple 1s. In 1979, an estimated fifteen million personal computers (PCs) were being used worldwide with PC-based spreadsheets accompanying them. In 1986, 25% of high schools were using PCs for college and career guidance (Murdock, 2011). By 1990, just before the technology boom, multimedia PCs were being used in many classrooms across the country. Simulations, educational databases, and other types of Computer Assisted Instruction (CAI) programs were being delivered on CD-ROM disks. In 1994, digital video, virtual reality, and 3-D systems captured the attention of many young people. Most classrooms incorporated at least one PC, but not all teachers had access to a computer for instructional use. In 1995, the Internet and the World Wide Web began to catch on as businesses, schools, and individuals created web pages. The Internet was widely discussed in education as new graphics and multimedia tools were developed for the delivery of information and instruction using the Internet. Many schools were rewiring for Internet access, while a few schools installed web servers and provided faculty with a way to create instructional web pages. From 1997 until present, the use of the Internet has grown. It has become one of the world’s largest databases of information, graphics, and streaming videos. Larger computer storage capacity and the growing prevalence of CD-ROM and DVD drives in PCs have made it easier for educators to store large graphic, video, and sound files for educational applications (Murdock, 2011).

Current Use of Computers in Education

The term computer now has many faces. Since the launch of the PC in the mid-1980s, a computer was seen as a central processing unit (CPU), monitor, keyboard, and mouse. Skip forward to the 21st century where cell phones, mp3 players, data projectors, laptops, and even toys are packed with sophisticated and high-powered computer software that continues to change and grow by the minute. High school students are text messaging each other every day. College attendees are downloading files into their dorm rooms from different states all over the country. Term papers are e-mailed to professors across the world through classes taught strictly on the Internet. The face of education is changing; the face of learning is changing.

Wireless laptops are helping students learn how to dissect frogs through a virtual dissection. Classrooms are handing out iPods so that students can watch Podcasts as a part of homework assignments. Data projectors are taking the place of televisions, where students can interact with the white board from their seats through the use of wireless tablets. Students learn math equations by playing versions of Who Wants to be a Millionaire or Jeopardy from software installed on a computer and projected onto the wall for all to see. Students are split into teams and compete against one another using hand held devices that record answers, and teachers can save data for display in the classroom. Many teachers are creating instructional videos and placing them on Internet websites such as YouTube and TeacherTube. Students are being assigned projects that involve recording video and then editing voice, music, and pictures to create topic presentations.

The Future of Technology in Education

The future of technology in education may see increased adoption of the one-to-one model, where each student is given his or her own laptop computer to use in completing class assignments. Research supports using new electronic technologies in education to provide the structural support needed in order to bring meaning to core subject areas (Targia & Gregoire, 2006). Work may include typing journal entries for Language Arts class through software on the Internet, creating a virtual spreadsheet to show the Gross Domestic Products of the top 10 countries around the world for Social Studies, making a plot and whisker graph for use in a Math class using downloaded software, and charting the carbon dioxide (CO2) emissions of the principal’s car for Science and then Blogging about it as part of a homework assignment. Researchers have developed software that allows students to use handheld devices to collect data for such examples (Roschelle, Penuel, Yarnall, Shechtman, & Tatar, 2005). With laptop computers for each student, school systems can look to acquire more hardware to enable buildings to use wireless network and Internet access. Along with students, teachers will have the ability to take a laptop computer home to continue working on papers that are e-mailed by students, create tests and quizzes, or open up live chat rooms for students to attend after-school tutoring. The functionalities of an iPod can be taken into the classroom by allowing students to synchronize them with the teacher’s computer to access videos to watch for homework, watch video projects created by other students, or share educational podcasts with one another. The future of technology in education looks bright; the major challenge is keeping up with the speed of change.
Technology in the Classroom

The advent of new technologies is not only changing the face of education, it is redefining the classroom itself. In public schools across the country, 97% of teachers reported that they had one or more computers in their classroom (Institute of Educational Sciences, 2009). Teachers will have to adapt to the growing Internet environment to gain a wealth of information. But because technology and society are always in a state of change, good teachers will find and use a variety of resources to help them present interesting and relevant information to students (Reeve, 2006). The year 2007 marked the 60th anniversary of the end of World War II. Baby boomers are beginning to retire, with a large exit of teachers as a possibility. What better time to put as much technology in the classroom as possible? With young people right out of college with a fresh and new perspective, young teachers will fill the vacant teacher seats that are becoming available. With new technology entering the classrooms and new teachers entering the job place, the old pencil-and-paper ways of learning make way for the new digital generation. Researchers believe that educators and educational agencies must stress teaching and learning in 21st century content, skills, and assessments (Donovan, Hartley, & Strudler, 2007).

Methods

To research the effectiveness of technology in middle school learning, 70 sixth-grade middle school students participated in a 4-week research study. The study was broken into two sections: a control group and an experimental group. All students remained in their normal classrooms, learning the scheduled curriculum. Students in the control group learned without the use of technology (e.g., computers, data projectors, whiteboards, iPods), while the experimental group allowed students to access all technology resources available to the teacher. Students’ grades were kept in a spreadsheet and analyzed at the conclusion of the study.

In the first 2-week section, students were involved in their normal teacher-prepared lessons and curriculum with the exception of controlling for technology. Lessons were, in large part, straight from the textbook, worksheets, and quiz questions. At the end of the first 2 weeks, the students completed a survey of their thoughts and attitudes toward their learning with questions such as, “What form of teaching helped you learn best?” and, “What form of technology helped you learn the best?” The second section of the study involved inclusion of new technology in the lessons. Video streaming, podcasting, wireless tablet use, laptops, data projectors, and power points were used in conjunction with normal lesson plans. The students took another survey at the end of the second section to evaluate their thoughts and feelings. Assessments were used intermittently during the month and a final assessment at the end of the study. Worksheets, section reviews, and quizzes were the primary forms of assessment.

Results

Findings from this study indicate that students learned best when using technology. Results show that 69% of students agree that technology helped them learn, compared to 31% of students who said they learned best without technology. When asked what form of technology helped them most, a majority of students recorded that a mix of all of the technology resources—which included computers/laptops, video streaming, and notes with a data projector—helped best. When asked if the students could predict their grade during the two week period when technology was used, 78% of students predicted a letter grade of B or higher. Students were also asked if more technology should be used in the classroom. A majority (59%) of students said yes, while 25% were not sure. Sixty-three percent of students surveyed believed all classrooms should utilize more technology.

After two weeks of learning without the use of technology, 69% of students surveyed believed their grades would be better if technology was used. Twenty percent of the students believed they earned a grade of C or below during the first 2 weeks of the study without the use of technology. Nearly all of the students answered that other teachers used technology in the classroom. At home, students responded that textbook reading helped them learn class material best. When in a classroom that does not use technology, a combination of textbook reading, worksheets, and quizzes helped them learn best. The results of the two surveys are listed in Tables 1 and 2 for further observation and analysis.

<table>
<thead>
<tr>
<th>Textbook Reading</th>
<th>Worksheets</th>
<th>Quizzes</th>
<th>All of the Above</th>
<th>None of the Above</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Question #2: At home, what helps you learn class material better?

<table>
<thead>
<tr>
<th>Textbook reading</th>
<th>Worksheets</th>
<th>Quizzes</th>
<th>All of the Above</th>
<th>None of the Above</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>12</td>
<td>1</td>
<td>13</td>
<td>11</td>
</tr>
</tbody>
</table>

Question #3: Do any other teachers use technology in the classroom?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>4</td>
</tr>
</tbody>
</table>

Question #4: What grade do you believe you have earned during these past two weeks?

<table>
<thead>
<tr>
<th>93-100 (A)</th>
<th>86-92 (B)</th>
<th>79-85 (C)</th>
<th>70-78 (D)</th>
<th>Below 70 (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>24</td>
<td>11</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Question #5: Do you believe your grades would be better if technology were used?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 2

Answers to Technology Research Survey after the Last 2 Weeks with Technology

Question #1: What form of teaching helped you learn best?

<table>
<thead>
<tr>
<th>With Technology</th>
<th>Without Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>17</td>
</tr>
</tbody>
</table>

Question #2: What form of technology helped you learn the best?

<table>
<thead>
<tr>
<th>Video</th>
<th>Notes with</th>
<th>Other ________</th>
</tr>
</thead>
</table>
Discussion

Findings from this study were noteworthy in several ways. Although students overwhelmingly agreed that they learned best when using technology, many students wrote additional comments in the margin of the survey that reflected thoughts of not needing any more technology. Several students commented that they were just fine with the amount of technology that was currently used in the classroom. Many students also commented that they learned the same amount of material with or without technology.

A large number of students circled more than one answer on some questions. Particularly, question number one on the survey ("What form of teaching helped you learn best?"). After the last 2 weeks with technology, many students answered both with and without technology. In those cases, answers were omitted from analysis. It is interesting that many students believe a mix of teaching with and without technology would help them learn best.

In accordance with the current study, teachers and administrators from one-to-one schools reported new depths of academic inquiry, researching, and understanding on the part of students. They found that their students are acquiring 21st century skills through this new style of learning. Unfortunately, these 21st century skills are not yet assessed on most high-stakes tests. We need to incorporate more technology into the classrooms, our kids are depending on it, and the future leaders of our smaller and smaller world are waiting for it. Researchers believe that educators and educational agencies must stress teaching and learning in 21st century content, skills, and assessments (Donovan et al., 2007)

In a world of rapid change, people must adapt quickly. The future holds an even greater speed of change and growth. To keep up with these changes, students will need to master the tools of the trade. They will need to synchronize computers, edit podcasts, create web material, download files, e-mail data, and stream video. Education is one of the keys to mastering these skills. Schools need to move faster to stay afloat in this sea of technology. These skills also carry over to peer communication, job-related activities, and hobby enjoyment. This study garnered data that is useful for teachers, schools, and organizations to motivate them to incorporate more technology into the classroom, and into
the hands of each individual involved.

References


Institute of Educational Sciences (2009). Teacher’s Use of Educational Technology in U.S. Public Schools.


Number of searches performed on Google each day. (2011). Retrieved from http://searchenginewatch.com/2156461


Authors

**T.J. Wolfe** is a Ph.D. student and Technology Coach at North Carolina State University. He spent 5 years as a middle school science teacher, where he was voted Teacher of the Year. His areas of research include digital learning and productivity, one-to-one computing, virtual worlds, and Web 2.0 integration. (For more information please visit www.thecatchesystem.com.)

Correspondence can be sent to North Carolina State University, 402 Poe Hall, Campus Box 7801, Raleigh, NC, 27695.

E-mail: tjwolfe@ncsu.edu