

**The Role of Technology
in Secondary Education**

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Abstract

This paper will explore the state of technology in secondary education, specifically high schools in the area of Bryn Mawr College. Information was gathered through interviews of administrators and teachers, surveys of students, and observations of computer science and math classes. Although technology is present in the classroom, it is not necessarily used correctly or efficiently. Teachers and administrators are continuing to explore the role that technology is bound to assume in education. As these discoveries are taking place, educators and students are frustrated with the problems associated with the new implementation, but are also welcoming its potential success.

Introduction

The overall goal of a computer scientist is to create and maintain technological tools. This goal is established in education, where students are exposed to technology. In order to continue to increase the technology produced, it is necessary to make technology a pivotal part of education. However, to allow technology to become more than an enhancement tool in schools, administrators and teachers need to embrace the advantages that technology has to offer without fear of change. I feel it is important as a computer scientist and future educator to understand how the members of the educational world are reacting to this incorporation and how we can use technology to address the issues it has caused.

Throughout history the term technology has been used to describe “a manner of accomplishing a task especially using technical processes, methods, or knowledge” (Merriam-Webster Dictionary). The “technical processes, methods, or knowledge” have changed over time because technology has changed. As a result of the looseness associated with this term, chalkboards may still be considered an advanced technology. However, chalkboards are also associated with the traditional forms of education that are becoming out of date considering the current technology available to students outside of the classroom. For the purposes of this study, I have chosen to focus on more modern technology, such as computers, white boards, interactive whiteboards, graphing

calculators, and audio and visual equipment. In other words, the use of the word technology refers to any technology-based tool introduced into the classroom within the past fifteen years.

Technology in secondary schools is no longer limited to word processing and computer games; it has extended to animation classes, lessons using interactive whiteboards, web design, and beyond. As such, schools are currently viewed as having a positive and influential position regarding technology. Through this relationship, both education and technology have the possibility to thrive.

Currently there is an abundance of technology available to educators and a few teachers are slowly, but positively, making technology central to education. However, there are obstacles to be faced at every corner on the road to its implementation. The availability of technology does not mean that educators know how to use it or how to incorporate it into daily classroom activities. This is mainly because there is no rubric to follow as these educators are forging new territory. As a result, the technology is not being used to its potential, used improperly, or not used at all.

A full exploration of schools' current technology states will help expose the problems present in the integration of technology and education. This can be achieved through understanding the current relationships that schools, in general, administrators, teachers, and students have developed with technology. Only by exposing these problems will the ongoing trend of technology expansion continue.

Research Methods

The main steps I took to research the role of technology in high schools were to perform interviews with teachers and administrators at various high schools. In order to gain the opinions of students I created an online survey. The interviews and survey focus on how people interact with and feel about technology. The purpose of this focus is to determine the extent that technology is available and whether it is helpful or limiting. Supplementing the interviews and surveys are my observations of three computer science classes and a math class I made during the 2004-2005 school year. Interviewing and surveying members of schools, with varying levels of status, was intended to give a full

representation of the school's own perception of its use of technology. Through out this process, my questions and focus changed slightly as a result of the information I have received from educators.

Although the interviews did not strictly follow the questions detailed, the general topics were always discussed. Throughout the interview process, my expectations and understanding of educational technology were altered by the varied uses of technologies in each school. By interviewing administrators and teachers and surveying students, I hoped to gain a different perspective regarding the role technology has within education at the high school level. In addition, the interviews and surveys gave me data such as: the availability of technology, the forms of technology in use, and plans for the use of technology in specific schools.

Beyond the general topic of technology in education, I also gained knowledge regarding AP Computer Science classes. I chose to focus on computer science classes because it is the one class where technology is a necessary element. This positive rapport is thought of as a prime example of the potential for technology in education. Specifically, I hoped to learn the overall attitude toward this class from all those involved, as well as the issues that teachers must overcome in order for the class to be successful.

Interview and Survey Questions

The following are the final questions – written in italics – asked of or discussed with administrators, teachers, and students. The questions are grouped into similar blocks. Each block is followed by reasons why they were included in my research. Many questions were used simply to acquire background information in order to understand the school's state of technology from different viewpoints in the system. Transcripts of the interviews can be found in Appendix A, arranged in alphabetical order, and surveys can be found in Appendix B. Please note, all names and schools have been replaced by pseudonyms.

Teachers and Administrators

- *what is the current state of technology in your school district?*

- *what is your technology plan?*
- *what forms of technology are available? And what is the level of their availability?*
- *what education do teachers and students receive re the use of technology, esp. its utilization in the classroom?*
- *what is your equipment budget, especially with respect to replacement?*
- *what is your commitment to keeping the technology up to date?*
- *how often are computers being used in your school/classroom? for what purposes/what classes?*
- *is use encouraged? And in what ways?*

These questions were important to get an understanding of the school's relationship with technology. Specifically, they offered background information regarding how the school uses technology, according to administrators and teachers. Asking the same questions of both teachers and administrators gives some insight into the outcomes of the school's technology plan.

Teachers (asked in addition to the questions above)

- *what classes do you teach?*
- *do you use technology in all of them? Which? Is it beneficial?*
- *how do students respond?*
- *what improvements would you like to see?*

The purpose of these questions was to get an idea of the relationship teachers have built with technology. Knowing what classes they teach was important in developing an understanding about where technology is being used and to what extent. These questions were asked of both computer science and non-computer science teachers in an effort to see if there was a difference in answers depending on the courses taught.

Computer Science Teachers

- *do you have any formal background in computer science?*

Many computer science teachers, usually previous math and science teachers, are forced

into the position by the administration. For example, in my placement, the administration asked a math teacher to take a college-level computer science course in order to teach computer science the following semester. This question was important in understanding a teacher's attitude towards teaching computer science.

- *what classes do you teach? how long have you taught computer science?*
- *do you only teach in Java? what other languages?*
- *how are assignments expected to be done?*
- *are computers available to students outside of class (in school and at home)?*

As schools do not hire strictly computer science teachers, many are not permanent. However, it is also the case that one person teaches all of the computer science classes offered because he/she is the only qualified person to do so. Thereby limiting the courses offered and putting the students at a disadvantage. In addition, the confidence that a teacher has to offer directly reflects his/her experience in teaching computer science; this also affects students' perceptions of teacher competency.

- *is the computer science curriculum supported by the administration?*
- *what software do you believe is necessary*
- *do you have the necessary software?*
- *are there enough computers?*
- *do you receive training for the computers?*

These questions helped me ascertain the importance that a school places on computer science, an elective course. Also, the attitudes that the teacher has toward the course became evident from these questions. If a teacher is passionate about the subject, they have ideas outside of the curriculum on how to structure the class, and, they usually act upon these ideas.

- *what is the student participation level?*
 - *are students truly interested in the class? Why do you think students take the class?*

While the previous questions focused on the administration and teachers, they show the importance with which students regard computer science courses.

- *what software are you required to use?*

- *is this your choice or the administration's?*
- *how sufficient is it?*
- *how did you learn to use it? (self, training, college courses, etc.)*
- *how competent do you feel in its use?*

Due to the recent change in the language used to teach AP Computer Science, these questions were intended to extract teachers' frustrations with the change. In addition to doing this, the questions brought to the surface other difficulties teachers were having with the course, the administration, and the technology.

Students

- *do you know how to use technology? Yes or no.*
- *do your teachers know how to use technology? Yes or no.*

Students and teachers' understanding of technology is a reflection of the importance his/her school places on technology literacy; and, therefore, the importance placed upon technology in general.

- *how often do you use technology in school? 2-3 times a week, weekly, monthly, less than monthly, or never.*
- *How often do your teachers use technology as part of instruction? 2-3 times a week, weekly, monthly, less than monthly, or never.*
- *what classes do you use technology in? Fill in.*

The actual implementation of any form of technology is vital in understanding students' perspectives on the role technology has in their education.

- *do you think using technology in classes improves them? Please explain. Fill in.*
- *please explain how technology does or does not make classes better. Fill in.*

These questions offer yet another perspective on the implementation of technology. In addition, the answers are a way of checking the effectiveness of combining education and technology by those who are most affected by it.

- *what forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc. Fill in.*

The variety of technology available at school affects both how and how often it is used in

the classroom.

- *what forms of technology do you have access to at home? Fill in.*

If technology is present in a student's home then he/she is more likely to be efficient in its use, and, hence, their competency is not a complete reflection of training received at school. However, through interviews of teachers and administrators I have learned that this is not necessarily true. Instead, it is a reflection on the students' dependence on technology.

Initially, I believed that technology tools were limited to software and other such computer technology. Therefore, my questions are focused on the forms of technology that are available, not necessarily the uses of the available technology. As a result of my presence in a high school computer science classroom, I was concerned with the uses of computers in the classroom by both teachers and students beyond programming. Therefore, I was not expecting the attention given to technology by the administration for administrative purposes. Although I began my research concerned with the implementation of technology within the classroom, I finished my research with an understanding of the influence technology has on the structure of educational institutions.

Historical Background and Background Research

Technology has always played a pivotal role in the development of education. From textbooks to Xerox machines to computers, technology has helped create and shape the current state of education. Making the question of correct utilization of computer technology even more pressing is the increase in accessibility of computer technology in schools. Technology is constantly developing, making educators hard-pressed to sift through the so-called educational tools to find those that will be most effective. The major concerns in schools today are software and computers, determining which are: most effective, least expensive, easiest to update and maintain, and most accepted by the students and teachers. Although technology has the potential to play a pivotal role in all classrooms, educators are not yet welcoming it with open minds (Romano, 2003). In order to understand the current issues between education and technology, one must take

into consideration their long history.

Prior to computers, the most recent technology presented to teachers as the new approach to education was television. In an attempt to understand how the past promises of technology have failed, Luehrmann (1993) and Provenzo, Brett, and McCloskey (1999) conducted research that concluded neither technology nor education were open to each other enough to be successful. When televisions were introduced as the newest approach to education, time and money were thrown into the idea with little inhibition. In the end, television use was limited to showing educational videos or collecting dust in the corner (Romano, 2003). Currently, there has been an abundance of technology tools created specifically for education. Unlike the adoption of televisions, a technology not intended for use in the classroom, education has turned its back on these educationally aimed tools. “Mostly you will find [in a classroom] a person at the front of the room talking to the class about the material in the textbook, writing on the chalkboard, or just possibly using an overhead projector. Information technology seems to have bypassed the classroom” (Luehrmann, 1993, p. 6).

The typical classroom of the early 1980s and before was built around a chalkboard, textbooks, and teacher instruction. This changed with the introduction of the computer, typically in the form of computer labs, to schools of all levels. Computers presented a challenge for administrators and teachers because they were forced to incorporate this new technology into their curriculum and expand the definition of a classroom. Luckily for educators, computers of that time were relatively unsophisticated with limited word processing abilities, minimal software, and sparing paraphernalia. As a result, computers became more of a resource – used for educational games and some remedial instruction – than a part of the classroom (Provenzo, Brett, & McCloskey, 1999; Romano, 2003).

As technology has become cheaper and easier to use, its role and presence has increased in children's educational experiences. When this trend began, there was typically at least one computer in every classroom. Despite this fact, computers have remained less valued than the traditional elements of a classroom. However, they have begun to impose a threat to teachers: namely that computers would replace them. As a

result, teachers have been unwilling to embrace the increasingly new advances in technology and adapt them into the curriculum in order to expand students' learning experiences (Romano, 2003).

Beichner (1993) suggests that the key to bridging the gap between teachers and technology is to redefine the role of the teacher. "As computers begin to provide students with access to vast amounts of information and powerful new ways to explore it, teachers become not so much authorities as guides. Giving up the traditional role as 'the fount of knowledge' might be threatening to some teachers, coupled with the fact that some students will inevitably know more about computers than their teachers" (Beichner, 1993, p. 114). Even though students are capable of learning from technology without the aid of the teacher, in particular through the use of subject-specific computer software, does not mean that the human element required by education will be broken. Students will always need encouragement and reinforcement to achieve to their potential. "Strategies for change in what happens in the classroom must be based on the truth that human beings have always been conditioned to learn under the guidance of other humans" (Romano, 2003, p. 15).

Perhaps the easiest way to solve these problems is by ensuring that teachers are exposed to technology prior to ever teaching. The proper preparation preservice educators receive will help aid their comfort level with technology inside of a classroom. Keirns' study (1993) concluded that after taking a college course to improve their computer competency, teachers became more confident in their computer skills and learned more about the advantages of using the computer for educational purposes. These conclusions have been reached in a number of case studies, supporting the conclusion that teachers are open to the use of technology, but they are looking for guidance (Beichner, 1993; Burke, 1986; Wilkinson & Patterson, 1983). "[E]ven though self-instruction has worked for some teachers, we cannot reasonably expect all new teachers to become computer literate on their own. . . . If teachers are to take full advantage [of] technology, and be aware of its limitations, they need to begin learning about technology during their preservice coursework" (Beichner, 1993, p. 111).

Although the problems that teachers face when implementing technology can be

partially solved by educating them in the uses of technology, it is futile unless they know how to bring technology to their students. “The most important thing a school can do with a computer is to teach students to become literate users of the computer, not just recipients of computerized lessons” (Luehrmann, 1993, p. 6). There are two key ways that students are exposed to technology: software and computer science. Software includes subject-specific software, such as remedial math software. In addition, students have access to word processing and presentation software (Wilkinson & Patterson, 1983). The closest that students come to interacting with technology on a fundamental level is through computer science. Computer science allows students to create programs, essentially their own software, giving them a different view of the capabilities of computers. “Learning to program a computer to perform user defined tasks frequently involves several learning experiences that are not otherwise attainable. . . . By writing computer programs, children develop a familiarity with the computer learning environment that they do not get from working with a prepared software program” (Burke, 1986, p. 229). As technology continues to develop, educators and students need to discover how to use all aspects of it in the educational setting.

Technology In Use

Technology has a daily presence in our lives, whether it is a traffic light, running water, manufactured clothing, or cell phones. Even though we have functioned without them, these are forms of technology, for one reason or another and not without opposition, that have become staples in our lives. These and similar advances set a precedence for the incorporation of new technology in education. Nonetheless, education has been slow to adopt the new advances in technology that will ultimately be a benefit for all those involved in education. The following section will detail the issues that high school administrators, teachers, and students have with the current role that technology plays within education. The first section, Interviews and Surveys, will focus on the information gained from the interviews and surveys performed. The Observation Section will focus on my time spent in Middletown High School, as well as the interviews and surveys performed there.

Interviews and Surveys Section

As education embraces technology, the main problem encountered is how to use it as easily and effectively as a chalkboard. Teachers, whether or not they are accepting of technology, are not given enough direction in its advantages and uses. Many school districts rely on workshops or “professional development” days to expose teachers to the new implementations of technology, such as grading and attendance systems. However, the instruction given during these service days is not followed-up with support in the classroom. Instead, teachers are left on their own to work through the bugs of the system. Ms. Coleman has experienced these impediments, “it takes a lot of time to learn how to use [the technology], but you get to know the glitches if you stick with it” (Appendix A). However, these “glitches,” which easily become overwhelming, are the reason why her colleagues give up on using technology. In addition to learning how to use the software, the integration of such systems into the daily life of a classroom is a challenge in itself. Smooth transitions between technology and traditional elements in a classroom is a skill that is not taught, but left up to experience.

The presence of teachers who wrote their lesson plans when they first started teaching and are unwilling to or afraid of change is only the beginning of the difficulties of integrating technology into the educational system. However, these are not the only teachers holding education back from embracing technology. Although newer teachers are more prepared to use technology because it was present in their education, they also are not knowledgeable about technology’s potential in the classroom. Mr. Bradley acknowledges the difficulty of resistance to this addition in education, but believes “that if they see their peers doing it then they will . . . embrace technology and use it” (Appendix A).

Displaying websites and applets on a projection screen is one thing, using a Smart Board and subject-specific software is another. Technology can be more than a simple replacement to the chalkboard or worksheet; it has the potential to revolutionize the educational system for each learner in a different way. Instead of reading from a textbook or taking notes as a teacher lectures, technology offers an interactive learning experience. One way this is happening is through the replacement of textbooks with

textbook/software bundles in which the software is created specifically as an enhancement to the textbook. “While the emphasis isn't on abolishing text per se, or that students shouldn't be encouraged to read books, what is being acknowledged is that technology products indeed enhance education, offering a more engaging and complete learning experience. One in which sight, sound, interaction and inquiry are married with hands-on exercises and led by a mentor who is not constrained by someone else's teaching style” (Greenfield, 1993, p. 215). A potential use of this technology is to address different learning styles in one classroom, in one lesson. For example, Mr. Barker scans materials such as book problems, pictures, and worksheets during class. He then brings the documents into Smart Notebook, the software he uses for lecture purposes, to annotate. He believes that for students this process is “very valuable to make direct connections” (Appendix A).

Multimedia is one of the most current, successful fads to integrate technology into education. As Ehrlich and Reynolds (1993) suggest, multimedia is appealing to students of all different learning styles because it creates a diverse educational environment. “Multimedia can change the look and feel of learning by providing an opportunity to reach people of different learning styles, different skill levels, and in different geographical areas; multimedia offers the potential to reduce the learning curve and accelerate the learning process” (Ehrlich & Reynolds, 1993, p. 44). A student touched upon this in his explanation of how technology makes classes better, “technology makes it possible to get more out of class by not only taking notes, but also seeing examples of what you are supposed to be learning in class. It is also more interesting and easier to focus on” (Student L, Appendix B). Similarly, Brown and Green (2002) found that students are not only intrigued by how multimedia presents information, they want to use the multimedia tools themselves. Multimedia is only one form of technology that students are drawn to. Examples of multimedia that are used in the classroom, are ActivBoards, Numonics, or Smart Boards – interactive whiteboards – and ELMO – a real-time projector.

Teachers are supportive of students becoming technologically literate; they agree that it is important for students to be able to understand and connect with the technology

they are using. However, there are dangers inherent in using multimedia; mainly, using it when it is unnecessary. This problem was identified in some of the student surveys: “[My] Spanish teacher uses tech[nology] for projects that would be more efficient without” (Student I, Appendix B). Not only did students recognize their teachers inept use of technology, they felt that teachers do not make wholehearted attempts in their use: “the majority of the time, teachers only use [ActivBoards] because they are there, not because they have a real reason to use them” (Student B, Appendix B). In addition, majority of the teachers I interviewed, although ranging in teaching experience, did not feel competent in using the technology available to them. The administration attempts to address these problems through training during in-service¹ days, as previously mentioned. However, such attempts are usually unsuccessful. The answer to raising teacher confidence is to expose them to technology prior to teaching. Although this results in teachers not necessarily knowing the most up-to-date technology, it will increase their comfort level with it giving them the ability to transfer their skills to newer technology. It is also necessary to show them that mediating technology and education will not become their sole responsibility.

After surveying practicing teachers, Beichner (1993) concluded that computers allow students to take control of their education, making teachers into facilitators and “guides,” rather than just lecturers. In order to fully embrace technology, there is a need to restructure the current education system that stresses teacher instruction, into a system that is focused on how best to teach as many students as possible. If this transition is to be successful, administrators must be aware of the threat technology places on educators by reassuring them that “what the evolution of textbooks really does is place control of content in the hands of teachers” (Greenfield, 1993, p. 215). Multimedia is one way that technology allows teachers to be instructors, but at the same time, lessons are enhanced through the use of technology both as a presentation tool as well as an interactive tool. For example, one way that students successfully interact with technology is through group work. Since there usually are not enough computers available for every student, the

¹ In-service, also called professional development, days are held during the school year. Teachers report to school as normal, but instead of teaching, they attend workshops in specific educational areas. A variation of this is when teachers attend school regularly for half a day and then a substitute takes over their classes so they can go to a workshop.

implementation of technology has reinforced group work. This emphasis is particularly helpful for students to not only improve their technology literacy, but to learn about the material from each other (Bruder, 1993).

While a teacher may be willing and eager to use technology, he/she may be discouraged by the extra time and energy they must put into using it because they do not receive adequate instruction. Although Ms. Coleman believes that the use of technology would benefit her math classes, she also realizes that there is not enough time to teach the curriculum as well as develop and create technology, since it is not there. As a result of the absence of technology in many classes, “technology is not used to its full potential” (Coleman, Appendix A). There are numerous consequences that a classroom faces when a teacher is discouraged by technology. Lessons do not benefit from the incorporation of various forms of technology, and, therefore, students have a limited learning experience compared to what is possible. Not only will the teacher not use technology, neither will his/her students. These students will be at a disadvantage because of their limited exposure and interaction with technology. One way to lessen the apprehension that teachers have regarding technology is to provide an incentive for both learning how to use it and actually employing it in the classroom.

The few teachers that are truly interested in using technology take the time to teach themselves the benefits of expanding their educational philosophy. In turn, they expose their colleagues to the benefits by example. Schools often rely upon these “master teachers” as support for their colleagues; however, teachers do not take their so-called expertise seriously. Mr. Bailey is a “technology mentor;” he is responsible for holding technology-training sessions for the teachers. When teachers attend they often do so just to receive the extra pay and normally do not feel these sessions are useful. Even Mr. Bailey feels the school is not doing a good job implementing their technology plan; the result is that teachers are behind when it comes to such things as printing and using the grade book software. Students are also aware of their teachers’ inabilities, “students like [the technology] . . . but [they] know teachers don't know how to use it” (Bailey, Appendix A).

Students are perceptive of the problems caused by teacher incompetence: “some

pieces of technology do not help because teachers do not know how to use them efficiently enough” (Student B, Appendix B). “[Technology] doesn't [make classes better] because teachers usually just use technology, they don't completely understand technology, and often the technology doesn't actually help further what the class is trying to teach” (Student H, Appendix B). However, students also appreciate technology, but their reasons typically only refer to the forms of presentation that it affords. Despite the efforts of such advantageous teachers as “master teachers” and “technology mentors” technology is not receiving enough support, from both administrators and teachers, to be successful.

Support is essential for any part of a system to succeed. In the case of technology and education, support is necessary not only in the form of educating teachers in its use, but also in support for the technology in use, maintenance of the existing technology, and encouragement from the administration to use the technology. In order to achieve this, sufficient support staff to troubleshoot problems with software and hardware is required. It seems somewhat premature that at the high school level a Technology Help Desk would be necessary, but this is a solution that Ms. Hubert came to through her work at Scottsman High School. In order to address the issues that administrators, faculty, staff, and students have with technology, it is vital to have reliable support staff, in addition to “master teachers.” Although Ms. Hubert has only two part-time employees working with her, the school's Help Desk is involved in all aspects of technology; she has created usage guidelines, is in charge of technology maintenance, and trains the faculty, among other things. Having staff whose sole purpose is to deal with technology issues is helpful in maintaining a school's positive relationship with technology.

The term Help Desk does not necessarily refer to technology support staff. In majority of the schools I visited, the support staff was not usually on school grounds as they were the staff for the entire school district. The relationship between the teachers interviewed and the support staff was generally positive, however, this may be because the teachers have chosen to use technology in their classrooms. Mr. Bailey, Ms. Coleman, and Mr. Murphy all work in the same school district but have different opinions regarding the technology support staff they share. Ms. Coleman and Mr. Murphy feel that

the staff is very supportive: “they make their best effort to help” (Coleman, Appendix A). Since Mr. Murphy is usually the “test case” for new equipment used in the district, he feels that the staff is very receptive. However, he is aware that he is lucky in that most people do not have as good of a relationship with the staff as he does. This is where Mr. Bailey comes in. Through out the year he and the support staff have not been on the best of terms. He does not feel that there is any support at Lakeview; in other words, he believes that no one knows about the technology except for him. Mr. Barker is in a similar situation as Mr. Bailey, he feels that he does most of the work himself. Nonetheless, he also feels that his support staff is very responsive. It is important that both teachers and support staff cooperate in establishing an association with technology.

Despite the possible best interests of a school in employing technology, it is often done for the purpose of using it as a status symbol. Although this affords teachers technology support, it can also cause strains in other aspects of the school. For example, Ms. Coleman feels that the administrators invest so much in technology at Middletown High School because they “want to be the district with the latest and greatest” (Appendix A). The result of this is that although she receives immediate support for a broken laptop, her request for chalk continues to be ignored. She believes that the administration's priorities are not always aligned with creating a successful educational environment, but an impressive one. Not only is this apparent in the range of technology tools available for the classroom, but also in the emphasis on school- and district-wide software.

Attendance and/or grading programs are used significantly in four of the schools where I have performed interviews. Mr. Barker uses an electronic grade book on his palm pilot that he can attach to his home computer; this program has made his grade transcription much more efficient. Also, Marshall High School is in the process of creating a student assessment database “in order to allow for more data driven decision making” (Marshall High School District website). Teachers at Lakeview High School are required to use the attendance and grading software provided by the administration. Currently Scottsman High School uses grading software, in addition, they are implementing a new information system that will allow parents to access student records. Middletown School District uses an attendance system through out the district that is

accessible online. Center Street School District has recently adopted an online assessment system called Performance Tracker. The main purpose of this type of system is to increase the availability of the results of student assessment, including both local and national assessments with an emphasis on student achievement scores, in the district.

Prior to using Performance Tracker, all achievement data was cataloged in Excel format, which required more time and work on behalf of the staff. Although Performance Tracker has taken a great deal of setup time – entering student information and previous and current test scores – the administration believes that this work will begin to taper off. The district's teachers currently do not use Performance Tracker extensively, but training and support is in place to increase its use. Ms. Alder, the district's Supervisor of Curriculum Development and Data Analysis, is often the middleman between the software and the teachers. Currently, she summarizes significant portions of the data for the teachers, in hopes of making it easier to access and use. In addition, the district holds weekly mandatory data dialogs to go over the information she supplies. There is also an emphasis placed on master teachers and department heads as guides to the system. This may be another beneficial use of a Help Desk: to provide support regarding how to use the system.

The great advantage of using Performance Tracker is that it allows teachers to see a student's strengths and weaknesses. However, this can also cause problems. There is a danger in grouping students according to abilities, especially test scores. This has the potential to affect the already controversial discussion of homogeneous learning. Furthermore, it causes fear among teachers surrounding the concept of accountability. As teacher names will be a part of student records, Ms. Alder is fearful that teachers will begin to worry how they look in reflection of student performance. In addition, there is the possibility that teachers will begin teaching to the test in order to improve student test scores. For this reason Ms. Alder chose to exclude the exact questions from the students' results, but includes the topic instead. She hopes that teachers will be able to overcome their fears and realize that the administration wants to work with them in an effort to help the students, not penalize the teachers. Ms. Alder feels that she has already seen the positive results of the implementation of Performance Tracker, helping her believe that

the benefits will only continue, “it will pay off and kids will be the winners” (Appendix A).

The benefit to using an assessment tool is that the information gained can be used in combination with computers for individualized learning. One way this is done is by using technology for remedial purposes. For instance, the Center Street School District has placed four to five computers in every elementary school classroom for the sole purpose of remediation. However, in order to continue this idea in high schools it would be beneficial to personalize the technology based upon students’ assessment results. Instead of composing a lesson plan structured around the teacher, by using the computer and the assessment database, it could be structured around the student. Combining remedial software and a student’s assessment results would help teachers address students’ strengths and weaknesses on an individual basis. The tutorial that teachers receive for using Performance Tracker includes creating an “action plan” based upon student results; however, this is still the teacher’s responsibility to create. Despite this potential benefit, it is important to keep in mind the debate surrounding homogeneous versus heterogeneous learning, as discussed previously. Knowing students’ strengths and weaknesses has the potential to pigeonhole students in a certain track. Teachers and administrators should remain aware of this side effect of assessment trackers in order for their implementation to be successful.

Observation Section

Middletown High School is located in an affluent suburban area that places a high priority on education. Weekly, I observe two math and computer science teachers: Mr. Murphy and Ms. Coleman. I spend most of my time with Mr. Murphy observing three of his classes: AP Computer Science, Algebra II, and Computer Science II. My observations of Ms. Coleman are limited only to the Computer Science I class, composed mostly of underclassmen. The enrollment of computer science classes is entirely males; last semester there was one female student in the Computer Science I class, but she chose not to continue.

In the three computer science classes I play the role of a teacher’s aide;

specifically, I help the students with any problems they encounter. I will often help students in Mr. Murphy's class if he is not able to solve their problems. While in Mr. Murphy's class I supplement his computer science background, in Ms. Coleman's class my role is to get help to as many students as possible. I assume slightly different roles in Mr. Murphy and Ms. Coleman's classes because, I believe, Mr. Murphy is not as confident as Ms. Coleman about teaching the material. Also, Mr. Murphy has more of a background role than Ms. Coleman, forcing the students to make the extra effort. The different relationships I have with the teachers has undoubtedly influenced my attitude toward their teaching styles, and, therefore, my observations of their classrooms. However, I believe the conclusions reached in this study are based on my observations of the level of learning occurring amongst the students.

The term computer science usually evokes images of students seated in front of computers creating incomprehensible programs or students surrounded by computer parts. At my placement, if a student were to describe his computer science class, he would refer to computers and software that allows them to create and run programs. Educators' and students' views of technology, which is implemented most often and thoroughly in a computer science classroom, generally do not reach beyond the use of computers. Despite the presence of up-to-date technology at Middletown High School, the technology is not being used to its full potential. That is, students use the computers primarily for playing games and the teachers use the technology for PowerPoint presentations.

Embracing new technology in a classroom is a difficult task, especially when it is unreliable and the teacher does not have experience with technology. In the case of Mr. Murphy and Ms. Coleman, they are both very interested in the potential uses of technology in their classrooms. This can be seen in their dependence on their laptops and ActivBoards. However, is this new dependence an improvement from the former dependence on the chalkboard? Is this having a positive effect on student learning or is it another distraction? There is a fine line between an improvement and a detriment in a classroom. As a result of the little training that teachers receive regarding the use of technology in the classroom, it is up to individual teachers to learn how to maintain

technology as an educational improvement.

Mr. Murphy

The main focus of Mr. Murphy's classroom is the ActivBoard mounted in the center of his white board, located in front of a projector that is connected to the laptop supplied by the school. Mr. Murphy uses all four tools daily as a math and computer science teacher. The presence of computer technology is most prominent in his two computer science classes: AP Computer Science and Computer Science II, which he has taught for one and three and a half years, respectively. The availability of laptops for ten students and a computer lab virtually next door to his classroom make technology available for daily use. However, there are a number of obstacles that Mr. Murphy must face in order to incorporate technology into his lesson plans.

Although technology is present in the classroom, it is not always in working condition. For example, there are not always enough laptops to be used individually by the students; this is a requirement of any computer science curriculum. A major hindrance to using computers is the school's network. Throughout the entire year the network has been a source of frustration for both the students and teachers; rarely a day goes by without comment regarding this problem. In general, the school district has changed the setup of the network a few times, causing a change in the file-saving system. Also, the network performs slowly, in turn slowing the momentum of both students and classes. The speed of the system has forced Mr. Murphy to move the AP Computer Science class to the lab down the hall, where the computers are newer and than the laptops. This move defeats the purpose of placing laptops in his classroom.

Despite the obstacles to using technology effectively in his classroom, Mr. Murphy has embraced its presence and potential. He believes that “computers are the next big wave in educational change” if used correctly in the curriculum (Appendix A). Enhancing his classes is his genuine interest in all aspects of technology; you can see his enthusiasm when using the ActivBoard or when speaking with his students about the latest Apple operating system. However, even though he is a technology resource for other teachers, he is often incapable of making technology a constant element in his

teaching. Frequently Mr. Murphy is selected as a technology guinea pig; he is the first to receive such educational technologies as the ActivBoard, therefore, he does not receive training in its use, forcing him to improvise in class. This can be best seen in the transitions he makes between writing on the board or lecturing and using the projector. Typically, this transition is far from smooth: the system is not hooked-up correctly, the display is not registering on the ActivBoard, or he cannot find the material on his computer that he would like to display. These problems result in wasted class time and helping students small attention spans disappear.

Ms. Coleman

Although Ms. Coleman has had no experience in the computer science field until recently, she has made the switch from math teacher to math and computer science teacher with little trouble. This is undoubtedly a result of her positive attitude and willingness to change; she thinks that teaching computer science is “awesome.” My observations of Ms. Coleman are limited to the Computer Science I semester long class, which she is teaching for only the second time this semester. The obstacles she faces every day – slow network, incorrect installation of software, software bugs, etc. – do not allow for much variation in the class. Her classroom, which contains a chalkboard, laptops, a projector, and an ActivBoard, is used only for the purpose of lectures and tests. The class moves upstairs to a computer lab for programming purposes. Ms. Coleman is then forced to transport her materials, including the textbook and her laptop, to the lab.

Computer Science Classes

Every day in AP Computer Science, students either enter the classroom to ask if they are spending the period in the computer lab or students go straight to the lab. Students prefer to use the computers in the lab over the laptops because the laptops are too slow to handle their programs. On the rare occasions that class is held in the classroom a number of students will ask the question, “Why are we here” (Field Notes, March 17, 2005)? Students are often disappointed if not using a computer in some way; even if they are not going to the computer lab, they prefer to use the laptops than a pen

and paper or listening to and watching a presentation. Mr. Murphy has unintentionally taught his students to be very hands-on, relying solely upon their programming skills instead of the thought process. In other words, when they come across a problem or a new concept, they prefer to write a program to fix or implement it, rather than actually working through it and understanding it. Moreover, the main consequence of allowing computers to assume a central role in the classroom is that it gives the students even more distractions: games and Internet access. In addition, students sometimes do work for other classes, typically involving word processing. In one student's survey, technology is helpful in getting students' attention in class because "students are more interested in something that they can actively do, rather than follow along when reviewing a handout." However, the same student said there are major drawbacks in using technology, "technology offers students access to the Internet, which can cause distractions from what the student should be working on." These complications combined with the teacher's lackadaisical attitude, make "this a very disorganized class" (Student, Field Notes, March 17, 2005).

Although the computer lab is rather cramped – a small, windowless, square room with computers lining the walls – the AP Computer Science students thrive in this environment. Even though the teacher is not always present in the lab, often leaving the students to their own devices, they are productive. "Students really only talk when they have a programming question and then they do not direct the question to anyone in particular, but someone pretty much always responds – they work well together for the most part" (Field Notes, March 3, 2005). Whether students have a question regarding programming or the software they are using, they more often than not discuss it amongst each other. Typically, only when the questions address topics that they have not yet learned do they ask the teacher or me for help. The lack of the teacher's presence has allowed his students to become skeptical about his expertise in the subject; students have made comments saying they do not trust Mr. Murphy to help them because he does not know the material. Students, therefore, become dependent on technology as their teacher.

In the Computer Science II class the structure and relationships are very different. Although Mr. Murphy teaches the Computer Science II class as well as AP Computer

Science, he has more control over the Computer Science II students. The class is built mainly on individual work; however, the students often rely on Mr. Murphy and each other for help. In this class, Mr. Murphy shows a command over the language and concepts, which are most likely because he has more experience teaching this class and with the programming language. Adding to the teacher's command of the class is the fact that it is held in his classroom, using the laptops. On the rare occasions that the class is doing something other than programming, as soon as Mr. Murphy allows them to get a laptop students run to them. Typically, the students are “pretty quiet (at least quieter than the AP Computer Science class) and focused on the project[s]” (Field Notes, February 10, 2005).

The advantage of having laptops available for every student in this class is that students can bring their work to the teacher by bringing him their laptop. As a result, the teacher is able to run their programs right away and see what the student is doing and where things are going wrong. In addition, the use of memory sticks, which Mr. Murphy suggested that students purchase for class, created a new way to turn in assignments. Instead of printing the code of an assignment, Mr. Murphy has the students save their projects to his memory stick; he later runs the programs on his own computer in order to check them. Portability is the main advantage that this class has over many others. Even though the class requires the use of computers, which are typically stationary, the use of laptops and memory sticks allow the class to be unrestricted.

A major detriment that technology has caused in Mr. Murphy's class is that he has become dependent on the technology. In the AP Computer Science class tests and sample programs are provided by the textbook and in the Computer Science I class sample programs and answers are provided, all of which are available to use on the computer. Despite the ease in which Mr. Murphy could put together a lesson plan, he, more often than not, is unprepared for his lessons. Time is taken up by searching for materials on his computer that need to be printed or displayed for the students to view. Luckily, the technology available minimizes the amount of time wasted; printers and Xerox machines are easily accessible. As Mr. Murphy is preparing for the lesson, students surf the web, talk amongst themselves, or do work for other classes. In the end, this makes it difficult

for Mr. Murphy to regain their attention and students question his competency.

Unlike Mr. Murphy's classes, the Computer Science I class is very respectful of Ms. Coleman's authority and is usually focused on completing the current task. Although I have never observed Ms. Coleman discipline a student for getting off task, her teaching style does not allow for students to go far. Her presence is felt in all corners of the room, both the computer lab and the classroom, because she does not stay in one place for long. Generally, Ms. Coleman likes to be the main focus during a lecture and she makes herself available through out a class period as a source of help. Students seem to respect her knowledge of the subject and are always willing to help her and each other. Similar to Mr. Murphy's classes, classroom time is limited; however, I have never heard a student complain about not being in the lab. In addition, students are not allowed to use the laptops during a lesson.

Math Classes

In the past school year I have seen students use computers once in a math class. This current semester, I have only observed an Algebra II class taught by Mr. Murphy once a week. The subject alone does not allow for computer implementation: there is little to no software available to enhance the students learning experience because there are few topics that can be addressed using a program. The presence of laptops in this classroom makes no difference in the Algebra II curriculum. In addition, there is no student-dependence on computer technology as there is in the computer science classrooms. However, a white board and a Xerox machine are both key elements to every lesson. Although technology does not play a pivotal role in this math class, it is still affected by it.

Conclusion

Understanding the current relationships that technology has built with teachers and students is vital to the success of education. In order to understand the advantages inherent in the combination of technology and education, it is necessary to study how technology is being used and its effect on those involved. Once this has been done,

administrators and other educators can make informed decisions regarding what technology to include in an educational setting, how to train teachers to use the technology, and at what level students should be exposed to technology.

Educational technology is not limited to computers in the corner of a classroom. Rather, it is in every facet of education. The forms of presentation that it offers are a benefit to any teacher, student, and classroom. Students are making technology their own, individualizing their relationship with it through such things as multimedia. Teachers are discovering the easy solutions it offers menial tasks like attendance and grade keeping; software has been created to relieve teachers of the grunt work of their jobs. Therefore, teachers are given more time to focus their energy on teaching, where technology is also waiting to help. Assessment databases are used to identify students' abilities, therefore, they aid in maintaining an individualized technology. Technology can be used to reach all students at the appropriate level.

While many educators believe that technology is the way of the future, there are a multitude of problems to fix before technology becomes an integral part of education. The main issues that arise daily in any classroom are student behavior, the limited use of technology, striking a balance between traditional and technological educational tools, and student and teacher dependence on technology. Student behavior is always a concern stepping into a classroom, however technology gives students new distractions. Oftentimes students give the computer more attention than the teacher, playing games or learning on their own. This causes unnecessary tension between students and teachers because teachers are forced to discipline more. In the three computer science classes described above, technology is a daily part of the learning experience. Nonetheless, it performs limited functions; PowerPoint presentations and programming are not the sole purpose of computers. Technology has the potential to enhance the traditional elements of education, while not assuming their role. In other words, technology should not become another excuse for teachers to lose spontaneity in their lessons.

The descriptions and interpretations that are offered in the observation section support the conclusion that, although computer science is thought of as the true fusion of technology and education, it is not. Computer science courses deal with limited

technology, mainly computers, and do not have the opportunity to take advantage of the multitude of educational technology available. Also, teacher style is a major factor in how efficiently and fully technology is implemented. Additional research would be useful in discovering exactly how to best integrate teaching styles with technology. Teaching and learning styles are the two core components of a classroom. Therefore, it is also important to recognize the connections between teaching and learning styles and technology in order to create a successful classroom.

Furthermore, I feel that it is best for teachers to learn from each other. Learning about the problems other educators deal with regarding technology can only help future implementers. This is where the use of master teachers or technology mentors will play an important role. Schools need to take advantage of these teachers who are excelling and use them as more than just a reference, but as a prominent resource for other teachers. The creation of a Help Desk would also help in fulfilling the needs of teachers making the effort to embrace technology. Whether the administrator, teacher, or student is facing a hardware crisis or a software complication, without help they will not have the confidence to continue.

Despite the difficulties that educators face with the integration of technology into education, they have to face the realization that it will never be easy and it will never end. The continuous development of new technology will force educators to constantly reform their educational philosophy. It will not be like the chalkboard or the textbook; the plans they make for today's technology will not be transferable to tomorrow's. Therefore, they must continue to want to explore and expand educational environments through the use of technology. Administrators need to remain aware of the challenges teachers are facing with technology and be willing to support them in whatever way necessary. With the true integration of technology into education, education will never be the same; the two will continue evolving hand-in-hand.

Appendix A: Administrator and Teacher Interviews

Arranged in alphabetical order.

Ms. Alder

Supervisor of Curriculum Development and Data Analysis

Center Street School District

Interview Date: 3/15/2005

- curriculum design (what we use to create a curriculum) – the process; instructional practices; staff development for new teachers → master teacher (mentoring to colleagues, formative assessment practices (study groups))
 - assessment
 - largest portion, aligned with instruction and curriculum
 - achievement data (SAT, AP, PSSA, local (benchmark – 4 weeks – reading, milestone – 6/8 weeks – math))
 - helps teachers understand where students are
 - she is self-taught on how to use the software/understanding the statistics
 - demographic data
 - attitudes/ beliefs (teacher surveys re implementing curriculum; gives feedback; encourage to do with students as well)
 - need technology connection (used to do with excel sheet: broken down by grades/schools (sometimes teachers) get demographics to get factors impacting performance; now use Tech Paths → alternate performance → school computers ←trying to connect all of this, trying to get data together (right now all over district))
 - the state expectations are the floor
 - Performance Tracker
 - access through the internet

- need to have a question in mind before using it, otherwise it is too overwhelming
- helps build templates for local assessments ← they were one of the first to do this, so worked with the company
- need to make it friendly at teacher level or else it won't be used
- teachers don't get student information across districts, so certain people get certain information
 - people are at different levels, want the teachers to ask for the information instead of forcing it on them
- can define what information looking for (who you are assessing and on what) → can create focus group
- can see specifics of students (student groups, names) and his/her entire assessment record → can see exactly where strengths and weaknesses are
- a lot of training is necessary → she summarizes a lot of the information → data dialogs to go over this information is mandatory weekly, emphasis on master teachers and department heads
- local assessments: doesn't post questions because don't want teachers to teach to the question → redirect and provide additional support to labs based on results
- danger: grouping kids (which she doesn't believe in), homogeneous grouping
- helps see kids clearly
- bubble answer sheets go straight in open-ended, have rubrics
- surveys teachers yearly: how feel about tool; receives monthly report of how often a teacher uses it; would like to join grading with it
- balance by requiring a portfolio with test and actual work to show parents
- working on exposing this to parents, in very early stages, need teacher and parent input → more accountability for teachers (needs more development in grading, classroom assessment purposes → what needs to be part of the grade book → HW committee – HW shouldn't count as a grade)
- committees are helpful for teachers; never give them a formula, but educates them on how to grade, etc.
- danger of technology: averages are not the best way to grade: “least effective way”

- developing capacity is greatest challenge, esp. older employees; data input is greatest challenge re assessment; time management (for her and the teachers) provide release time so are pulled out of class for extra development time; need secretaries
- resistance: fear factor of accountability afraid there will be teachers that circumvent and care about how they look in reflection of student performance (but feels they will learn that it is useful, between each other and administration), need to work together on all levels
- will really make the changes
- gets down to student level ← best thing about technology
- the information is driving what is done in the classroom
- “scores do not lie” ← paying attention improves the scores (she's seen it); “it will pay off and kids will be the winners”
- pressure of narrowing curriculum to the test, the testing trap
- she is currently enrolled in a doctoral program at Penn

Mr. Bailey

Computer Science Teacher

Lakeview High School, Middletown School District

Interview Date: 3/1/2005

- 2 standard physics, algebra I, AP computer science; he interacts with a cross-section of students as a result of the classes he teaches
- 4 kids in AP computer science, very intimate group
- uses PC laptops, he originally was using them in his physics class, was supposed to use Macs in AP computer science, but they were too slow, so decided to use the PCs
- 1st year teaching AP, 2nd year teaching (in general and at Lakeview)
- Lakeview does not offer computer science I or II
- undergraduate degree in physics from Swarthmore
- worked for 8 years as an engineer

- no one else was interested in teaching computer science
- problem with class layout, students are distracted, need to see students' screens in order to solve this problem, but does not know how to set up the classroom in order to see the students' screens and teach effectively
- academic decathlon coach
- has an endless fascination with computer science, like how it's taught, very different between schools
- Philadelphia Classic Computer Science Competition at University of Pennsylvania – held by undergraduates, was the other week, both he and the students really enjoyed it
- the high school is made of modular buildings, they have a wireless network throughout it though
- uses the same book as at Middletown High School
- his website has the following links: textbook, Karel J Robot, Robocode, exams (project and midterm topics), Marine Biology Case Study, Jamtester, and other links (resources)
- background in computer science: 1 computer programming class at Swarthmore, but used them often as an engineer, attended the AP computer science workshop over summer (lasted 1 week long)
- support for the computer science curriculum: needs new computers, has requested it, no one else really knows it, no support here, able to get curriculum materials, support online from other teachers
- software: BlueJ, suggested by Murphy, would have liked to use Eclipse – has no administrator access (frustrating), some people bring in (JBuilder or JCreator), all pretty much free so easy to access for students at home; likes BlueJ – don't need test classes, diagrams good, learned trial and error, built-in tutorial
- availability of computers: have enough computers for the four of them, originally had 14 sign up to take the class (the intro/intermediate teacher encouraged all of them to sign-up, he thinks she just wanted to make sure the school offered the class), not very formal, borrow from other teacher
- training: no training; workshops on how to use the computers/applications; gave

laptops to ALL teachers that wanted it (6 hours of training required)

he is a technology mentor ← very casual, teachers get paid to go to his meetings, don't do good job implementing technology plan! such as printing and the grade book (teachers are behind!); most feel classes aren't useful

power point, DVD, use them for preparation, data acquisition, have to use attendance and grades, small group with students beyond interest work, not really in math

students like it – can pull up information to show them easily, but know teachers don't know how to use it, like concrete example

- switch between Java and C++: didn't teach AP last year – some teacher's are frustrated over change because just changed to C++, the students picked up on Java easily/quickly (this is CS not computer programming) ← they used C++ in previous classes (some students said they dropped it because of the change, but he doesn't believe that), doesn't feel C++ was really formally taught
- languages teaches in: Basic, Scheme, Perl, Assembly, C/C++ a little, Visual Basic, Lab View
feels comfortable teaching in Java (exact syntax different to know when know so many others) – students good at it – glad he learned it but not a “master programmer”
the fun part
- how assignments are expected to be done: feels awkward discussing if everyone has a computer at home – they all can do at home, some assignments are – ALL guys!
Treated as an elective/not a core class – doesn't give much homework (worksheets by hand, book problems)
discussion and some problems in class, would have liked smaller projects – will teach CS I and II next year, wants I to be enjoyable
- has strong science and math students, but CD programming barely there
- really liked Karel J Robot (good concepts)
- 19 – work center, 5 computers, have BlueJ (that's all they would do), kids have free periods/study hall and some classes have computers to use in them
- check out JStick? Or JJ? ← memory stick with compiler, would like to get it next year, would be helpful for student access

- has some desktops, talk of getting each student a laptop
- no curriculum for computer science, there is for others, mostly centered on book chapters; got his syllabi from ETS (AP requirements) and other teachers online → problem with introductory classes; if administration doesn't know well then there is little guidance
- something to do after AP test: palm pilot programming
- other technology: TV/digital editing, computer labs, all rooms have projection system, not all have TVs, has smart board in social studies room – a few through out district, graphing calculators, calculator-based labs, data acquisition technology
- he feels the main concern is now that they have the technology: do you have any time to learn how to use it???? need more instruction
- would love to expand the department

Mr. Barker

Teacher

Marshall High School

Interview Date: 3/2/2005

- 1 algebra 2 honors, 2 pre-calculus, lower level math (2nd half of algebra)
- 8th year at Marshall
- undergraduate and masters: chemical engineering at Villanova
- wanted to work with kids because of his own, can still use his chemical engineering background (given it a sense of reality), real-life examples, tries to incorporate other things though
- Smart Board (5 years), Smart Sympodium (3 years) – prefers the Sympodium because then he is not in the ways of the students, it outputs to the computer, projector, TV
 - brighter picture, can see it clearer then the chalk board
 - uses for ALL notes
 - Smart Notebook – software, uses Sketchpad for demos (ex: ambiguous case)

- Board is pressure touch sensitive, the Sympodium is stylus sensitive
- problem with Board: alignment has to be perfect between the projector and the board, has to redo anytime the projector or wires are hit
- lots of visuals → easier to understand
- shadow management ← problem at board, block the board while writing
- issue when students go up to work on a problem, can't put hand on board
- only teacher who uses both, others use 1 or the other
- class notes can be located on school's general directory (available within library, not outside school) and he loads them to his web page
- time saver, helps kids not be afraid to ask questions since the software saves previous notes on the screen (there is a type of toolbar with small pictures of all the screens)
- emphasis on lots of ways to solve problems, helps showing comparison methods
- uses for ALL classes
- web page, uploads notes every day in PDF format
- lots of kids use it, depend on the web for assignments, “real big resource”, ~500 hits in 1 week
- 1st year to put this level of effort in site , including worksheets, recommendations for calculators, helps for students who don't have ability to be in class
- Virtual High School
 - student goes to the computer lab 1 period a day
 - interact with postings online (teacher and other students), students are from all over the country and some outside the country (good for learning group work) – need good time management and writing skills
 - recruit students (they have to get recommendations and tell their skill levels)
 - this allows for flexibility with course offerings; way to get into areas of study not offered at school
 - limited seats available
 - courses last 1 semester
 - 12 students this year, participation growing yearly

- he is the “site coordinator,” makes sure kids don't encounter equipment issues, hears grades from teachers and advises students (but there is a heavy emphasis on own management)
- services are available 24 hours a day
- doesn't ever really use overhead, dislikes it
- graphing calculators plug into TI Presenter which hooks into projector; uses calculators daily (believes that is students know the methodology, then can use technology to explore more/faster); using calculators, can get confirmation if right/wrong (“independently verify if they've done the work correctly”)
- he changed the class lighting (took out the bulbs to the front-most lights) in order to remove the glare from the Smart Board
- in the classroom, he has 2 PCs, a laser printer, TV, projector overhead, TI Presenter, scanner, video splitter (4 places, now)
- usually talks to students about how to use the equipment
- other classes are held in his classroom
- requires honors classes to purchase graphing calculators
 - he never used one before teaching
 - is not concerned about students being able to get one
- learned how to use the technology all on his own, had some familiarity from before, he holds little workshops/he is the contact/setup guy, he doesn't believe that he is an expert, but he's used it the most
- the math department feels that it, implementing the technology, is a good direction to go; a cross-section of teachers (young and old), old are intimidated (Symposium is very straight-forward, which is an advantage), people are making good headway
- “input from kids and parents is fantastic”; it's impressive; kids missing it when it's not there, easier to see
- department just bought 2 more Sympodiums, still trying to get more!
- “Math Planning Center” - area for the teachers to plan and talk
- easy to make corrections, good backup to kids questions → more accountability for students, they do not have as many excuses

- goal: use of Smart Board results in higher performances, but he doesn't feel they are far enough in yet in order to come to any conclusions
- would be tough going back to just using the chalkboard
- school given award money for performances on the PSSA, used it for that, all departments got one
 - foreign languages he helped
 - reading specialists
 - social studies (Mnemonic Smart Board)
 - BIG in math department
- disadvantage of Symposium is not actually teaching at the board (can't point at things...)
- feels fortunate, found it in the math room and asked to use it
- software: Fathom (deals with statistics primarily, displays functions)
- some assignments use Sketchpad, go to computer lab (more use in geometry, esp. lower level ← most teachers do it)
 - they generate ALL the work
- still working on integration (need to teach students how to use the software – time consuming) – PSSAs make things/timing tough
- initially more time-consuming – learning curve
 - it's worth the time
 - easier to teach with Smart Board (no chalk, don't have to regenerate work done before)
 - advertises website
- software is available for all locations, but they may have to do install/load themselves
- support: does own troubleshooting, very responsive technology people, tends to do most on own, gaining a lot of attention
- every teacher has own computer cart in classroom
- scans problems/pictures/worksheets during class, brings into Smart Notebook and annotates it ← VERY valuable to make direct connections
- prints copies of class notes for all

- with graphing calculator have computer-based lab (CBL), can hook-up different sensors to it (uses distant sensors)
- electronic grade books (uses his on his palm pilot which he hooks up at home)
 - checks homework daily so made grade transcription easier
- all worksheets and tests are computer generated
- kids very literate in word processing, doesn't usually purchase software, just uses it here
 - esp. Virtual High School kids are good
 - graphing calculators used a lot for games, but teachers talked to students about it and it stopped
 - find kids do take advantage of technology in school, to check work or blast through easy stuff and focus on hard stuff
 - he uses calculator more than most others, there are kids who rely on calculators, but they get blasted on the test
- potential for increasing rate of learning

Mr. Bradley

Chief Information Officer

Center Street School District

Interview Date: 3/15/2005

- CIO, works on the global level
- the computer specialist was formerly a teacher, creating curriculum
- he manages data, maintains curriculum, students, and teachers
- Terra Novas
- cabinet member deals with technology across district, including computers and payroll, entire picture so supports are in place to improve; work with curriculum office for staff development training; online attendance and grades, analyzing data (especially PSSAs)
 - much quicker, able to move students forward, given to teachers before school starts

so can adjust; “data becomes more vital”

- current state of technology in the school district: fiber infrastructure between buildings → use of internet 2, ability to have distance learning, “more than 1 classroom doing its thing,” one of largest and most efficient districts, streaming video, synergy video (schedule video/cd rom events in classroom), trying to provide tools to teach to make more efficient and effective use of their time, moving technology in and making more like a university; \$ - will spend anyway, might as well be up to date and interactive
- replacement schedule to keep computers current (push-down theory is bad), updates done 3-5 years, depending on what used for; focus on labs (update every 3 years) – reallocate those then, depending on instructional needs in building; infrastructures important because of network, have to monitor all activities (next year will be able to know who does what when on the network) because of state and federal guidelines
- budget: separate administrator from instructional (your school is your money); 1.5 (03-04), 1.2 (04-05, cut, problem, lots of costs are ongoing (maintenance - \$40,000; software - \$10/12,000; copiers; phones - \$180,000), 1.7 (05-06, projected); it's a business, running and maintaining buildings; replacement: \$350,000 – will vary, big this year because the administration buildings are moving
- teacher workstations, online grade book needs to be fast
- maintenance: buy over time is key, don't buy in bulk
- technology review committee: community, parents, principals, administrators, teachers, supervisors, department chairs, and computer resource teachers (← who he has contact with, sometimes need to change software or just changing how thinking done); need assessments and survey
- anytime there is a change → resistance, tries to get all on board (feels that if they see their peers doing it then they will); need to get people used to it (development, people sent to help); embrace technology and use it (see with email and internet) and saves time, puts responsibility on students
- computers in all classrooms, K-5 have 4 computers for remediation and one for teacher; open labs

Mrs. Coleman

Math and Computer Science Teacher

Middletown High School, Middletown School District

Interview Date: March 31, 2005

- courses: standard algebra 2, computer science I, mathematics applications 3 (special education geometry)
- try to use in math applications, but they learn better one-on-one, takes too long for them; inspiration and iMovie projects, geometry sketchpad (better for her to demo) – beneficial when it works; algebra 2 is too big and there is not the right software for most topics
- “learn without knowing they are learning”
- she would like the students to have “practice” through the use of software ← a game at an algebra 2 level (there are some available for algebra 1), practice problems
- transition from being just a math teacher to a computer science teacher as well: “it's awesome”; teach for 1 day and they learn for 3 days (productive learning, won't forget); algebra 2 teach every day, harder to remember (too much curriculum), students need more practice, would like to use technology there; CS curriculum had more time to discover, they have to discover things; “I don't wanna be here at all”
- a lot of parents put their kids in the computer science I class, they thought it was an applications class, half the class dropped it when they found out that it was programming; she likes to allow the parents to get involved if they work with computers
- support! they make their best effort to help her, both her and tech support are frustrated over the state of the laptops
- beneficial for all classes, but not enough time to teach curriculum, develop and create technology (have to create it because it's not there!), she would use it if it were there (she uses PowerPoint now, but only as a way of presenting information); technology is not used to its full potential

- support from administration; they like anything in technology; “want to be the district with the latest and greatest”; hold in-services (on anything, but definitely on technology), faculty is awesome, some teachers don't use technology and won't ask for help, it takes a lot of time to learn how to use it, but you get to know the glitches if you stick with it; feels the administration has strange priorities, they don't care about other things as much as they do about technology (she points out that they are there right away if there is a problem with the laptops, but she doesn't have enough chalk)
- the administration asks the teachers what technology they use in class so they can hold workshops where the teachers teach each other
- problem with teachers who have had their lesson plans written for the last 30 years, they do not want to change
- problems: have to put software on the computers themselves, have to find time in teaching schedule to include any sort of technology (computer lab time, students can't do this out of class, so she must plan for it), students still aren't technology literate (although they have computers at home, they don't use them for the same purposes as at school, students don't even know some of the basics of word processing, which can make things more difficult for the teacher)

Mr. Donaghue

Curriculum Technology Specialist

Center School District

Interview Date: 3/15/2005

- curriculum technology specialist; under curriculum and technology; help develop curriculum that integrates technology; staff development
- does curriculum for social studies, technology ed, business ed, family and consumer science
- works with department heads to integrate technology
- responsive; way to bridge and vary practice in classroom; technology available to show teachers how to make that bridge (Elmo, Smart Boards, streaming (can get

curriculum from there – soft piece, students have hard so can go over on the board and write on it and go through)

- last year had mimics; trying to get Smart Boards in 24/25 rooms
- proper development and looking at resources will make a smoother transition; software and hardware that gives instant access to students and teachers (can download curriculum off of website from anywhere); allows for curriculum to be implemented and deployed → everything equal
- professional development: ~6 full days, either in curriculum or technology, also pull out of class to train specific things; helpful because they can immediately use, once technology is more available then will use more; new way to interact (no longer need whiteboard or chalkboard)
- all development geared to using the technology, so done within next few years
- can deliver any media
- so interactive and easy to use/intuitive so kids can use it, they are gaining the literacy to use it
- setup done by technicians, he and his associates set up the classrooms
- instant video
- all on same page (administration, no conflict of interest, all know what is available)

Ms. Fleming(.), Mr. Jameson (-), both (x)

Math and AP Computer Science Teacher, Math and Introduction to Computer Science Teacher

Washington High School

Interview Date: March 11, 2005

- different because of Java (input/output), transition too soon (C++ – 4 years ago, Pascal – 10 or 12 years ago), having to write new programs – content still there
- expense with programming more than others
- 10 years in industry, helpful, 2 years in programming

- difference in approach after industry, realistic about programming
 - new computers since 2001
 - Sun SDK, BlueJ, JCreator (AP, can see package), free ware
- no technology support, only 3 people work there for the entire district
 - difficulty getting enough working computers, had to double up students, not a good introduction to the subject
- x aren't told about technology software glitches
 - computer courses are being canceled nationally!
- the case study is changing
 - they are starting to change the course study as well, used to be Big Int
 - Computer Science I is still taught in Basic (handle and manipulate files which don't get in C++ or Java); no longer have Computer Science II (hardware-based class), couldn't get updated hardware; then intro turns to Java (object-oriented begins immediately)
 - enrollment has gone up, 18 in CS I
 - students get pulled out for labs, AP sciences have changed to 2 periods, so make it difficult for students to stay caught up
- intro classes beginning to fade because it is a large investment to get into AP (brings it down to AP)
 - they like the intro classes, can tailor it to a real life situation in Basic
 - would like to get first semester, 9th grade in CS I
- exposure to more than one language is a plus
- free ware is sent home with the students on the first day, would like to use jump drives but they don't work
- applets used for demoing
 - uses graphing calculators in class
- x students are missing number sense
 - newer teachers are more comfortable using technology
- computer science teachers use less because they know the greater use of technology than addition
- better understanding/connection if do on own

- allows students to use calculators to check their answers
- x they've both chosen to teach computer science because they've had a background in it; even the technology people don't have a background
- 2 of 18 students are girls in CS I
- computer science teachers are orphaned, would be better to join with CAD or have some interaction
- there is an emphasis on grade school technology
- 2/8 are girls in AP, girls have less confidence
- guidance tells students that it is a hard elective
- students are willing to do enhancement things on own, limited time in class (extra help, come in for lunch, etc.)

Mrs. Hubert

Coordinator of Technology Services

Scottsman High School

Interview Date: 3/3/2005

- coordinator of technology services
 - help desk (students, staff, faculty, administrators)
- PC and Mac
- 17 labs, mobile networks, just HS
- computer, printer, TV in every classroom
 - have cable, in process of putting on a filter
 - trying to get VCR/DVD combo, too
- TV studio in progress (currently just a club)
 - purchasing equipment, designating a room
 - township channel
- technology is used often, daily, power point (teachers and students)
 - students work at home and bring work in or email it to her and she can either

print it or put it in the teacher's directory

- block scheduling (teach 3 of 4 periods)
- some more comfortable using technology
 - grades done electronically
 - in-service days through out year, sometimes after school
 - Delaware County IU - can go there for classes
 - going to new information system, new equipment, web-based (parents will be able to access student records)
- 5 years here
- budget: 100,000+, mostly sufficient, depends on what she is buying
 - mostly Mac district
 - starting 3 year program to put in PCs for teachers
- administration is very receptive
 - buy but don't support it (TCO)
 - not enough people to do it, but a lot to do
- students always trying to hack into the system
 - eliminated floppies and CDs
 - no palm pilots, iPods, etc.
 - because of viruses and hacking
 - limited printing pages (9/10/11 – 15 pages/day, senior project (all year, controversial subject matter, present, refute it, in front of a panel) – 30 pages/day)
 - 5MB = folder size limit
 - security; student servers; all groups of people have servers because of confidentiality
 - can send help desk email to print or move file
- 2 other staff members, 6 hours each
- “very forward thinking district”
 - lots of electives
 - project lead the way

- electronic art
- digital video course
- web design course
- CAD
- \$400,000 grant for new 9th grade academy (technology is a big part)
 - supply with Smart Boards (have 4 currently) and maybe more
 - learning centers: science, foreign language, English – 4/5 student computers each
 - wireless iBooks (classroom comes to you)
 - can fit into curriculum
- 3/4 years update
- most take advantage, younger are more comfortable using it as a tool
- 3 large group instruction rooms with mounted LCD
- software:
 - generalized software (office, etc.)
 - curriculum coordinators work with department heads to determine if want/can use software – there is a process (science uses data studio) → lots of hands-on
 - every department has own, mostly sciences, math, foreign languages, music, CAD, business, engineering
 - midi lab (electronic keyboards) – music
- try to give students as much as they can to get their feet wet, students very receptive, but don't like security (but necessary...)
- problems:
 - \$ gotten better
 - created help desk, really become organized
 - keep buying more → challenge to keep building running
 - LOTS of responsibilities, multitasking (documentation – enjoys this, but has turned into nuts and bolts kind of job)
- undergraduate: graphic design, graduate: instructional technology
- back up servers daily
- offers testing

- all computer parts (hardware, licensing, etc.)

Mr. Murphy

Middletown High School, Middletown School District

Interview Date: 2/22/2005

- Undergraduate degree in math required computer programming (Fortran), Advanced Fortran, and assembly language; Java course at Burlington County College – Cisco (sp?) Program
- 3 and ½ years teaching intro and intermediate computer science classes (taught in C++), 1st year teaching AP
- the administration has no idea what's done so he has a lot of leeway, he is given things but he is never reviewed by the administration, they want the program so they will support him
- making software work is part of the problem – XCode has problems so must use BlueJ (this can also be used at home), would also like to teach students to use command line
- his decision to use BlueJ, used in his college Java course → the administration will never say no to a free program
- need computers that work! Do not have the computers/software available, still missing 1 working laptop in order to have one for every student in the AP class; there are labs that are accessible, but it is a hassle (other classes need them, located on other side of the building that are hard to reach especially when have other classes before and after computer science)
- computers are available to students outside of class, can sign-up to use other labs after and before school, can use laptop outside of class (students come in during their study halls and work in the back of the room or in the lab while Murphy teaches another class)
- administration encourages him to go to the AP workshops (offered over the summer), to go back to school (he has to pay for it upfront, limited reimbursements also they are

a hassle to complete in time, lots of paperwork), if not in program can ---- out on workshops

- genuinely interested in ALL; have interest in computers, technology, and programming
- computer applications, web design, TV studio, animation classes (all different departments), different outlook of students, more college bound, computer science kids are unique, into problem solving, logic, determined
- yes, BlueJ is sufficient, “cool teaching program,” shows relationships, students respond well (load at home)
- “not at all,” considers self sufficient, there's no one to teach it/to go to, older teachers don't like to share a lot, not many others, logistics, what's available teacher-wise
- didn't offer last year, changed curriculum, newer textbooks, used to teach, intro (1 semester) and AP
- likes Java, prefers it, it's current, lots of applications, transferable, less backdoor magic than other languages
- C++ gives idea of functions, used AP headers in C++, structured into to programming, good background
- can't finish C++ at home, Java will start finishing at home, 90% if not all have computers at home (general for school)
- tech support: good relationship with director and support staff; has been the test case with equipment, they are pretty receptive (he's lucky!) most people don't have good relationships
- “computers are next big wave in educational change” -- use in curriculum correctly
- monitoring software would be useful, but can't get it from school, monitors show up on this, can lock out computers while teaching, send them individual messages, hate having to tell them to stop, what's on his can show on theirs
- 100% useful in teaching math (esp. geometry) → another crucial teaching tool, students respond well/soak it up, product of sesame street generation (stimulation is necessary), won't just read a book
- has to be used correctly, still trying to figure out how to insert in curriculum (have to drop topics) will be able to pick up other things based on understanding the big ones

- other teachers aren't tech savvy, they give up and go back to teaching

Mr. Paglia

Northeast High School

Director of Information Systems

Interview Date: 2/22/2005

- all districts
- 7 computers in all classes, with printer, each teacher has a computer
- 15-20 labs, wireless technology, wireless laptops, and mobile carts
- digital TV studio
- tech ed lab at HS
- plotting and graphing
- project lead the way (engineering, college credit)
- some teachers grab on easier
- new teachers equipped to handle technology in the classroom
- it enhances a lesson
- aids in differentiated instruction in elementary school
- used every day
- a lot of money
- workshops through out district, state mandated 180 credits
- Stony Creek Academy IU – different pieces of technology
- \$100,000/year – small, most gotten through bond issues
- high, everything up to date
 - 3.2 GHz
 - all teachers get new computers
 - Windows XP Service Pack 2
 - Office 2003
 - use Look for email

- communication software up to date
- curriculum is up to date, depending on the software (updates by the company)
- “want to make sure that the same thing using at home is the same thing using at school”
- security: make AdAware, Spyware running rampant on systems

Appendix B: *Student Surveys*

Grouped according to school and class.

Middletown High School – Computer Science I

Student A

School: Middletown High School

Subject filling this out for: Computer Science I

Grade: 10

Age: 16

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? No.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Weekly.

What classes do you use technology in?

Computer Science

Do you think using technology in classes improves them? Please explain.

I think it makes things quicker, and easier to change. It also allows more things to be shown to us (stuff from online and such)

Please explain how technology does or does not make classes better.

It makes things easier to edit, find, look up, etc.

It does not make it better when the teachers don't know how to use it ;)

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Computers/laptops/calculators/probably could get video stuff, if I needed it

What forms of technology do you have access to at home?

Computer/laptop/internet/video stuff/TV

Additional comments.

Some teachers use computers and technology everyday, but most have a hard time doing there attendance on the computer.

Student B

School: Middletown High School

Subject filling this out for: Computer Science I

Grade: 11

Age: 17

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Daily.

What classes do you use technology in?

Computer Science, English, History, Math

Do you think using technology in classes improves them? Please explain.

In some. The use of activeboards makes everything slow and inefficient, while the use of projectors (the expensive ones that hook up to the computer) does improve class because you can project power points and other displays.

Please explain how technology does or does not make classes better.

Some pieces of technology do not help because the teachers do not know how to use them efficiently enough. An example of this is the activeboard. The majority of the time, teachers only use them because they are there, not because they have a real reason to use them.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Projectors, computers (mostly mac :- () activeboards

What forms of technology do you have access to at home?

Computer

Student C

School: Middletown High School

Subject filling this out for: Computer Science I

Grade: 9

Age: 15

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Daily.

What classes do you use technology in?

Humanities (History + English), Math, Computer Science, Biology, Spanish

Do you think using technology in classes improves them? Please explain.

Yes I do

Please explain how technology does or does not make classes better.

Technology results in better attention from students, different ways of presenting, ect

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

computers, VCRs, TVs, cameras, zip drives, floppy drives, Smart Boards, calculators

What forms of technology do you have access to at home?

Computer, TV, VCR, camera, calculators

Student D

School: Middletown High School

Subject filling this out for: Computer Science I

Grade: 9

Age: 14

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Daily.

What classes do you use technology in?

Biology, English, Computer Science

Do you think using technology in classes improves them? Please explain.

Yes because it makes things easier

Please explain how technology does or does not make classes better.

It does because it just makes classes more interactive and fun.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Computers

What forms of technology do you have access to at home?

TV, Computer, Stereo, etc.

Middletown High School – Computer Science II

Student E

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 12

Age: 18

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Weekly.

What classes do you use technology in?

Computer Science 2, AP Physics Mechanics, Science and Mystery Fiction, American Government, CADD(computer aided drafting and design)

Do you think using technology in classes improves them? Please explain.

Yes. Technology is a better way to get the students' attention. Students are more interested in something that they can actively do rather than follow along when reviewing a hand out.

Please explain how technology does or does not make classes better.

Technology offers students access to the internet, which can cause distractions from what the student should be working on.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Computers, Internet, Televisions, Video Camera's, Projectors, Printers, Copying machines.

What forms of technology do you have access to at home?

TVs, Computers, DVD Players, Videogame Systems, Printers, VCR, Digital Camera, Internet.

Student F

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 11

Age: 16

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? No.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Weekly.

What classes do you use technology in?

ALL OF THEM... except gym

Do you think using technology in classes improves them? Please explain.

Yes.

Please explain how technology does or does not make classes better.

It makes it easy to type things. And keep organized.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Everything... except luxury electronics suchs as cellphones

What forms of technology do you have access to at home?

EVERYTHING... seriously... no smart board though

Student G

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 11

Age: 17

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Weekly.

What classes do you use technology in?

English, Math, Orchestra, Computer Science, Spanish

Do you think using technology in classes improves them? Please explain.

Yes, it makes it much easier to understand and learn the concepts

Please explain how technology does or does not make classes better.

Sometimes more time is lost on troubleshooting a problem than actually learning

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Laptops

What forms of technology do you have access to at home?

computer, laptop, tv, mp3 player, videogames

Student H

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 11

Age: 17

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Weekly.

What classes do you use technology in?

Physics, Math, Computer Science and Spanish

Do you think using technology in classes improves them? Please explain.

No. Usually teachers know how to use technology, but not well.

Please explain how technology does or does not make classes better.

It doesn't because teachers usually just use technology they don't completely understand technology and often the technology doesn't actually help further what the class is trying to teach.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Smart boards (those things are terrible), computers, TVs, projectors, and some teachers have camcorders which they'll use in class

What forms of technology do you have access to at home?

Tvs computers, wireless high speed internet, and of course the vaunted Dreamcast.

Student I

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 11

Age: 17

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Daily.

What classes do you use technology in?

spanish, calc, physics, comp sci, cad

Do you think using technology in classes improves them? Please explain.

yes, smartboards are really useful

Please explain how technology does or does not make classes better.

spanish teacher uses tech for projects that would be more efficient with out

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

computers, dv cameras, smart boards

What forms of technology do you have access to at home?

Computer

Student J

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 9

Age: 15

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? Less than monthly.

What classes do you use technology in?

Computer Science, Futures, English (Computer Lab)

Do you think using technology in classes improves them? Please explain.

Yes, I think that technology in classes improve the class because the students become more interested in the information being givin. The Smart-Board :: GREAT INVENTION

Please explain how technology does or does not make classes better.

Look above.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Computers, Laptops, Televisions, Projectors, Smart Boards

What forms of technology do you have access to at home?

Everything

Student K

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 11

Age: 16

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? No.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? 2-3 times a week.

What classes do you use technology in?

Orchestra(w00t w00t), Computer Sciences, Free periods

Do you think using technology in classes improves them? Please explain.

Depends on the class.. classes such as gym and math classes usually don't need technology of any kind, but could sometime be supplemented by videos or visual programs.

Please explain how technology does or does not make classes better.

Teachers can have prepared notes easily accessible on projection systems, usually technology of any kind makes a class more interesting, by principle.

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

Computers, Projectors, smartboards, laptops, printers, copiers, activeboards, TV studio, portable sound system.

What forms of technology do you have access to at home?

personal computer, camcorder

Student L

School: Middletown High School

Subject filling this out for: Computer Science II

Grade: 12

Age: 18

Gender: Male

Do you know how to use technology? Yes.

Do your teachers know how to use technology? Yes.

How often do you use technology in school? Daily.

How often do your teachers use technology as part of instruction? 2-3 times a week.

What classes do you use technology in?

American Government, Computer Science II, Physics, CAD II

Do you think using technology in classes improves them? Please explain.

Yes.

Please explain how technology does or does not make classes better.

Technology makes it possible to get more out of class by not only taking notes but also seeing examples of what you are supposed to be learning in class. It is also more interesting and easier to focus on. Some forms of Technology also make it more convenient to do homework (turnitin.com, and webassign.com).

What forms of technology do you have access to at school? For example, video recording equipment, computers, televisions, etc.

- Computers
- Lightware Projectors
- Smart Boards
- Active Boards
- Televisions
- Video Recording Equipment

What forms of technology do you have access to at home?

- Computer
- Televisions

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