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The Effects of Technology in Society and Education

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by

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TABLE OF CONTENTS

Technology has changed society throughout history. Over the last few decades, cellular devices, iPads, iPods, computers, and most importantly the internet have completely overhauled the way people interact in society and the way educators work in schools. Technology implementation in schools is pivotal to student success post high school due to the changing times and high demands for tech savvy personnel. It is imperative that teachers of the 21st century adjust to the technological revolution and not only prepare themselves but prepare their students for the technological real world. Technology has changed the way society looks, and the way the classroom looks and there will be no return to chalk boards and writing letters. The 21st century society demands a technologically advanced person and the 21st century classroom requires the same.

Information has been disseminated throughout America in a variety of different ways. Dating back to the colonial days the first information system was led by Paul Revere and consisted of horseback riders named Midnight Riders that went from town to town passing along information. This system was the first structure for distributing information throughout different territories. Due to the invention of the printing press by Johannes Gutenberg in the 15th century and the spread of such technology to America, the original postal system was established. Benjamin Franklin created a new way for information to be passed along in a more efficient way than horseback. By using the printing press to make mass copies, the postal system developed to spread news countrywide in the shortest amount of time possible. The original high way of information was the Erie Canal. With the building of "Clinton's Ditch" as it was known the state of New York now had a fast way to spread not only goods and people, but information as well from the Atlantic Coast to the Midwest. The Erie Canal was the 19th century's version of the night riders, and more specifically, it was a prelude to what could be accomplished when information can be passed along a network in an accelerated way. These systems of transferring news and information were highly developed for their respective times in history. North Americans were getting on the information highway as early as the 1700s, and have been using it as a critical building block of their social, economic, and political world ever since. The information highway, however, did not truly come to fruition until the late 1900s with the introduction of the personal computer. American sociologist and Harvard professor, Daniel Bell, used the term telematics to describe the growing connection between telecommunications and the computer. The term telematics and the computer in general, "express a new reality, an

innovation that has the possibility of transforming society in the way that railroads and electricity did in the nineteenth century."[1]

The computer has taken the shift towards technology and precedents set by the industrial revolution of the 1800s to a new level. The growth of the personal computer and the use of the internet have forced a shift in society that will never look back. Developments throughout history have happened to ultimately make life easier on humans. Tools to help cut and shape, or lift and move to make certain work more efficient. However, the focus has shifted to tools that do not just make physical labor easier, but tools that "classify and modify information rather merely transmitting it or preserving it."[2] Computers help perform tasks effectively and efficiently so that human error can be avoided. Although computers were first used for government and big businesses, it is now common for personal computers to be used on a daily basis. The transition caused by the use of personal computers has impacted the world in many different ways. There have been social and economic impacts that have marvelously shifted the way the present day American lives his or her life. There have been many immense and influential impacts on society due to the development of the computer.

Computers have had an unbelievably positive impact on society. Due to the advancement of computers, space exploration took place, vehicles were designed differently, the entertainment world became more entertaining, and medical science made more cures for diseases. The computers impacted society in many ways. Life became instantaneously easier. Some people say that computers are taking away manpower, and that may be true, but computers did make the impossible possible. One area the

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[1] Simon Nora and Alain Minc, *The Computerization of Society* (Mit Press, 1981), 7.
[2] Neill Graham, *The Mind Tool: Computers and their Impact on Society* (Michigan: West Pub. Co., 1989), 19.

computer impacted on is the business area. Business uses computers for keeping track of accounts, money, and inventory. Another area the computer impacted is the entertainment world. Computers made it possible to enhance graphics and special effects. Education has transformed due to current day usage of the computer in the classroom. Computers help students in any way they need, including researching, typing, and searching. Teachers use computers as well. They use computers to keep track of grades, type out instruction for their students, engage students in the classroom, and stay in contact with parents and co-workers. The advancement of the computer has affected the medical profession as well. According to educator and author, Edwin Dolan, "calculations necessary to medical research are being done by computers at astonishing rates of speed, a procedure that is increasing the likelihood of finding cures for serious illness."[3] Computers are used to help perform surgeries, come up with new medications, keep track of patients, and also organize the data for medical distribution. There have been many positive results because of the introduction of computers into everyday life. However, not all the results from the introduction of computers into society have been positive, as there are negative components that go along with this advancement of technology as well.

One of the large scale impacts the computer has had on society is the way it has changed social interactions amongst people. Relationships amongst people have altered due to computers and the internet. Author Robert Kling proposes that "the ways that people work and communicate via computer networks destabilize many conventional

[3] Walter Mathews, *Monster or Messiah?* (Michigan: University Press of Mississippi, 1980), 37.

social categories."[4] The usage of these interactions takes place as if they are at distinct places but really they are at their homes or work. These types of interactions would have been only possible from face to face meetings prior to this invention but due to the computer these boundaries have been blurred. Historian and author Walter Mathews, takes Kling's argument a step further and breaks down the different kinds of groups of people that either agree or disagree with the use of computers. Mathews places one group of people as followers of fifth century B.C. leader Democritus of Greece, and the other group as followers of the belief of Socrates, a contemporary of Democritus. The followers of Democritus have no difficulty in coming to terms with the computer. These people believe the computer is a new species that must be interacted with, they understand it is an intelligent machine, and they understand a "brain is a computer and a computer is a brain" and that both work together to advance society.[5] On the other hand, the followers of Socrates find it difficult to understand the computer and feel threatened by it. These people are unable and unwilling to accept the computer as a brain and the brain as a computer and "insist upon the significance of qualities of human experience that have not at this point been reduced meaningfully simply to quantities, they read the literature on the computer written by followers of Democritus and they fear for the future of human society."[6] Mathews argues that people need to accept the computer and its capabilities if there are going to be any advancement of human society while coexisting with the new technology.

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[4] Rob Kling, *Computerization and Controversy: Value Conflicts and Social Choices* (Morgan Kaufmann, 1996) 427.
[5] Mathews, *Monster or Messiah?,* 48.
[6] Ibid.

The social problems presented by the computer are easy to see and understand according to some authors on the topic. However, why the computer has had the impact it has had must be addressed when fully comprehending all that the computer does to society. There are many characteristics which are considered factors in the social impact of computer technology. Technology is not value neutral, so to say, as it has been thought, but rather the computer and the advancement of technology contains grand adjustments to society that are far from neutral. Blaise W. Liffick, Ph.D., in the department of computer science at Millersville University, argues there are twelve major characteristics of the social impact that has come about due to the computer. Some of Dr. Liffick's characteristics include ubiquity, magnification, accessibility, reproducibility and distributability, lack of accountability, temporality, spatiality, and shifting of relationships/changes in intercommunication protocols.[7] Liffick uses the term ubiquity to express how computers appear basically everywhere in this modern day. Even when people do not encounter computers directly in modern convenience devices, "the utility companies are recording usage, the phone company records incoming calls, answering machine might be recording a message while we are doing something else, and someone is performing a credit check on us."[8] Computers tend toward magnification in several different ways. "First, the explosion of the availability of information is due in large part to the computer's ability to generate, collect, and store an ever increasing amount of raw data."[9] Data can be collected and synthesized at such a rapid pace that there is more time to divulge into the information and understand what lies beneath the surface. Information is accessible to an unprecedented number of people regardless of their location. Lelia

[7] Blaise Liffick, *Social Impact Characteristics of Computer Technology*, (1995).
[8] Ibid.
[9] Ibid.

Green, educator, professor, and a senior lecturer teaching at the School of Communications and Multimedia at Edith Cowan University, argues a similar point, "given access to technology, and with the necessary skills in place, Internet communication can be converted into public property and harnessed to the process of community-building in both real life and virtual life."[10] Many people are unaware of the information they are exposing on the computer and the impact that can carry over from virtual to real life. Cyberspace has become a major issue in society and the general consensus does not seem to have a proper understanding of the realities of this "virtual world."

Computers have had a tremendous impact on human interaction with other humans. According to David Bell, reader in Cultural Studies at Staffordshire University, "technology and society are kept separate, even held in opposition to one another: technology causes social change."[11] Computers have created social change due to the uses of them as well as acceptance into society by people. Media and communications technologies, or telematics, as referred to earlier, further disconnect people from reality and push towards a virtual world. Relationships among people have drastically changed since the introduction of the personal computer. Interpersonal relationships are uniquely different than ever before. In most circumstances, due to geographic location, convenience, or comfortableness, human to human interaction is much different in the 21st century than the 20th and prior to. In particular, the use of email has been shown to eliminate a lot of the usual visual and verbal cues we often use in communicating with one another. In addition to removing such cues, computer-mediated communications

[10] Lelia Green, *Communication, Technology and Society* (Australia: Allen and Unwin, 2002) 47.
[11] David Bell, *An Introduction to Cybercultures* (Psychology Press, 2001) 66.

mask attributes such as race, gender, age, or physical disability, in addition, perhaps, to the person's social or management status within an organization with the use of the virtual world. However, many people, especially younger generations, are losing the ability to properly communicate in face to face situations because of being accustom to conversing in what has become known as cyberspace. The computer reduced family interaction just as the television did prior to and this technology changes the boundaries between households and the larger world. It is more convenient to send an e-mail than make a phone call or visit an office, but a sense of personal relationship is lost and in some situations, never learned. According to Alfred Dupont Chandler, professor of business history, Emeritus, at Harvard Business School, and James W. Cortada, historian with a Ph.D. in modern history, "networked computers allowed people to communicate with others whom they never met and join groups of people that will never meet face-to-face."[12] Since the introduction of cyber world and social network individuals have postponed building personal identity and focused to virtual identity. Social science historian and author, Dianne Currier, focuses on the disconnection between the material body and the virtual presentation. People are free to appear in whichever form they want and come across as an entirely different person. "Consciousness is downloaded and bodies are redundant" thus leaves room for individuals to appear as desired while intentionally or unintentionally breaking away from the real world.[13] Individuals can essentially re-program themselves as the product of independent choice and self-directed representation. When individuals get too caught up in the opportunities presented by the

[12] Alfred Chandler and James Cortada, *A Nation Transformed by Information*. (Oxford: Oxford University Press, 2003) 259.
[13] Pramod K Nayar, *The New Media and Cybercultures Anthology.* (United Kingdom: Blackwell Publishing, 2010) 256.

capabilities of the computer and virtual society, they become disconnected from the real world and no longer build personal relationships. In the year 2000, the Stanford Institute for the Quantitative Study of Society released a report entitled *Internet and Society*. "The study concluded that the internet…might be creating feelings of isolation among those who go online…if the internet causes people to spend substantially less time in real human contact, it might have negative social consequences."[14] In another study performed by the Journal of Psychosocial Research on Cyberspace on internet usage of 1049 adolescents, the study discovered that at the end of the study, "it was revealed that…adolescents' loneliness was associated with both increased Internet usage and Internet attitudes. Adolescents who reported excessive uses of the Internet for web surfing, instant messaging, emailing and online games had a significantly higher mean score of loneliness than those who did not."[15] Besides the issue of personal relationships and self-modification, since the introduction and advancement of the computer society as a whole has become increasingly impatient.

Due to computers and automated systems, the frequently used quote "patience is a virtue" has become a severe understatement. A major social consequence of the transformation of computers is that humans are no longer exemplifying any patience in most aspects of life. "It seems that computer technology is to blame in large part for the 'speed up' of modern society - everything has to get done faster, be there sooner, and be available immediately."[16] An enormous impact on the business world, especially, is that due to the transformation of computers, people can work together on projects and not

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[14] Judith Galas, *Computers and the Internet* (Greenhaven Press, 2002) 126
[15] Yavuz Erdoğa, "Exploring the Relationships among Internet Usage, Internet Attitudes and Loneliness of Turkish Adolescents," *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, article 4 (2008).
[16] Liffick, *Social Impact Characteristics of Computer Technology.*

have to actually be together. The modern day business is global and has the capability of interacting with all facets of the company regardless of time or location. Thus, also creating a scenario in which services are available twenty-four hours a day, seven days a week. The social impact of this is plentiful as people begin to expect all aspects of life to be at that moment and at the most convenience. The fact that America, specifically, is becoming increasingly impatient stems from the advancement of the computer and of technology in general. It is rare that when someone is speaking about technology they wish it would move at a slower rate. E.J. Montini, columnist for the *Arizona Republic*, published, "Technology has made us impatient. We no longer enjoy pausing. Or remembering. We log on, tune in, dial up and speed off like drag racers, leaving in our wake a swirling cloud of historical dust, memory, perspective and people."[17] Studies on impatience led some to believe that if a person is too impatient it could lead to health deficiencies. In 2003, the *Journal of the American Medical Association* "pointed out that impatience may lead to increased risk of hypertension among young adults. Also, in 2004, a report in the *Journal of Biosocial Science* linked a rise in American impatience with an increase in obesity."[18] Computers have lasting effects in all areas of society whether it is intended or not. In the case of computers and technology moving faster and speeding up society, some people may be experiencing more problems than a slow internet connection. Unfortunately, or fortunately, not all people have access to the internet, for the good or the bad.

The National Telecommunications and Information Administration (NTIA) has found that there is a "significant 'digital divide' separating American information 'haves'

[17] Linton Weeks, "Impatient Nation: I Can't Wait For You to Read This," *NPR*, December 6, 2010.
[18] Ibid.

and 'have nots'" that is continually widening.[19] Americans are more connected than ever before and the number of households owning a computer is increasing every year. All demographic groups and geographic locations have more access to computers, maintaining up to speed on the modern day skill set. However, the younger, lower income, certain minority groups in rural areas or the inner part of cities are considered the information poor. According to a 1998 study by the NTIA "urban households with incomes of $75,000 and higher are more than…nine times as likely to have a computer at home…Whites are more likely to have access from home than Blacks or Hispanics from any location."[20] There is a seemingly infinite gap between those that have access to a computer and the internet and those that do not. An additional study done in 1997 by the ongoing Current Population Survey (CPS) shows that the number of households at all income levels had more household computers than reported in 1993. However, the digital divide increased over that time period by about 7 percent and the study showed that white households were still more than twice as likely to own a computer as Black or Hispanic households.[21] In more recent study done by the Economics and Statistics Administration and the National Telecommunications and Information Administration in the U.S. Department of Commerce in 2011, "The results indicate that households with lower incomes and less education, as well as Blacks, Hispanics, people with disabilities, and rural residents were less likely to have home Internet access service."[22] The study shows that home computer use and Internet adoption are strongly associated with income. "Almost half (46 percent) of the households in the lowest-income category did not have a

[19] Galas, *Computers and the Internet,* 104.
[20] Ibid. 105.
[21] Chandler, *A Nation Transformed by Information*, 268.
[22] U.S. Department of Commerce. *Exploring the Digital Nation - Computer and Internet Use at Home*. 2011.

computer, compared to only four percent of the highest-income households."[23] The study done in 2011 coincides directly with the earlier studies even though it is in an entirely different era. Aforementioned studies prove that there is a significant gap in computer usage between the classes which provides for an unfair advantage to the "haves."

William Wresch, chairman of the department of mathematics and computing at the University of Wisconsin, argues that the gap between these two groups is helpful to one side and detrimental to the other, making it difficult for a "have not" to become a "haves." In the scenario of a job search, one that has access to a computer will acquire knowledge on economic trends, job opportunities, professional societies, and organizational information. On the other hand, one may not have access to a computer or even be knowledgeable enough to learn how to use it to a beneficial potential, the "have not" does not have enough money to purchase a computer so that person just gets left behind. Many businesses take résumés online and do not even accept paper copies. Once the "haves" utilize the opportunities presented, it is not uncommon to not want to share such luxuries in fear of losing stature in that profession. It is difficult for those that do not have computers and knowledge on how to take advantage of the information highway to become more successful. As the Information Age moves forward it is ever important that the gap between the "haves" and "have nots" is decreasing and no American is left behind. At the same time the computer helps some people advance, it often times deskills workers and takes away from blue collar work.

A major social problem aside from interpersonal relationships changing and the divide amongst societies classes is the ability level of people, as a whole, decreasing. Since computers have become more and more prevalent in business it is deskilling

[23] Ibid.

traditional blue collar workers and majority of workers as well. Nicholas Carr provides evidence as to how human thought have been shaped through the centuries by the tools of the mind, everything from the alphabet to maps, to the printing press, the clock, and the computer. Carr believes that computers, when used to find, store, and/or share information can literally "reroute our neural pathways."[24] Carr explains original literature was designed to improve thinking levels and propose deeper, analytical thought. On the other hand, the computer emphasizes quick answers with little to no human thought involved at all. Computers complete more tasks causing the human operator to do less. Many examples of this are present in today's society. An airline pilot spends most of the flight watching a computer fly the plane. In industry, many jobs consist of people pushing the buttons that start the machinery, which is controlled by computers. Even in the most basic form of a computer, a calculator, people are being deskilled. Individuals feel the effects of the computer takeover on their everyday lives. There is an increasing amount of "economic pressures that determine where they can find work, where it is expensive or cheap to live, and where they can most conveniently and effectively gain access to resources, facilities, and services that they need."[25] Not only are computers deskilling workers, but the risk of jobs being outsourced to different areas of the world has become a very real situation. Thomas Friedman argues the point that because the world is "flat," meaning that computer technology has figuratively decreased the distance between countries around the world, it is very likely that businesses will have production take place outside of the native land in order to save money and get products at a lesser

[24] Nicholas Carr, *The Shallows: What the Internet Is Doing to Our Brain*, (U.S.A.: W.W. Norton and Company, 2011).
[25] William J. Mitchell, *E-Topia: "Urban Life, Jim – But not as we know it",* (Massachusetts: Massachusetts Institute of Technology, 1999), 99.

cost. For blue collared workers that are uncomfortable or unknowledgeable about computers, the job market is becoming thinner and the likelihood of maintaining a well paying position is diminishing. It is almost a requirement for any job in the 21st century to have computer background or training and for the upper echelon positions there is extensive preparation that is necessary. Throughout the world the advancement of the computer has lead to the deskilling of employees because the computer does almost everything on its own with the appropriate programmed system. The economy has been impacted in many ways due to the shift, or transformation, of society with the advancement of the computer.

Computers have also had a tremendous economic impact on society. According to author Frederick John Murray Laver, there are "effects such as those that arise in the collection and presentation of economic data, in economic analyses, and in the preparation of forecasts. All of these are relevant to the formulation of economic policies by governments and corporations."[26] Some effects of the use of the computer for economic purposes is that data collected, though may be accurate, may also by misleading and/or misused. It is difficult to define economic data accurately. The increase use of the computer also favors the quantitative rather than the qualitative. Meaning, vast amounts of data may be collected but it is essential that the data acquired is measured for its intended purposes with precision. However, in terms of analysis, computers are difficult to be topped. Once a computer is programmed for calculations it would be inconceivable to use other resources to complete those computations. Computers are large enough to hold seemingly infinite numbers, they are programmed to

[26] Frederick John Murray Laver, *Computers and Social Change* (U.S.A.: Cambridge University Press, 1980), 23

handle any mathematical relationship, processes can be quickly completed repeatedly to check for accuracy, and lastly, by using a computer the user is forced to have a definitive search or thesis. Computers may have a tremendous economic impact, but at the same time have to be handled with great caution and care. According to Kling, much of what is encountered in the press identifies computer-based systems with cost savings, efficiency, and productivity, that these consequences of computerization seem almost natural. Computer-based systems are central to developing a dynamic economy which is competitive internationally. In one way or another, computers are apart of every business and assist all aspects of the free market process.[27] Computers have become essential for economic health and well being. However, computers have also led to large scale unemployment in industries where people do not have necessary computing skills. Regardless, "the computer is here to stay; its very existence suggests that it must be dealt with"[28]

"The prime objectives in most commercial and industrial applications of computers have been to increase efficiency and to secure economies."[29] Unfortunately, the job market is hugely affected by the introduction of the computer, and it is continually getting worse. Initially, the mundane jobs, like working on an assembly line, were overtaken by computers. However, more recently, computers are eclipsing all jobs, even intellectual ones. David Autor, an MIT economist, believes "back at the turn of the 20th century, about 38 percent of all American workers were working on farms. At present, it is 2 percent."[30] New machines and technology have overtaken many of the duties of a

[27] Kling, *Computerization and Controversy*
[28] Mathews, *Monster or Messiah?,* 9.
[29] Laver, *Computers and Social Change*, 34.
[30] Chris Arnold, "How Technology is Eliminating Higher-Skill Jobs" (2011).

farmer. Therefore, the job of multiple farmers can be done by simply one person with the appropriate machinery. Machines took over a lot of farm work, but new industries and new jobs were created. Laver argues that that all successful policies for increasing labor production have not come from more physical labor, but from advancement in technology. The computer is no different. "The characteristics of computers that allow them to be used to increase productivity are their high speed, low operating costs, and the programmability which enables them to act as automatic control mechanisms."[31] It is a simple fact for business owners that computers can be programmed to operate at a pace that is faster and more precise than any human operator can maintain. It is an often overlooked fact that an increased in production often implies a decrease in employment. Similarly to the way the printing press changed the way newspapers were produced and distributed, the computer is having the same impact in the business world. It is not necessary to have multiple journalists and writers working for a newspaper company to send out more copies, the machine simply produces more of the same work that was done by a select few. "Machines used to take over work that was physically hard or dangerous or just monotonous. But now, [Autor] says, we are losing higher-skill, better-paying jobs to machines — like bank tellers, airline check-in agents, accountants and whole floors of actuaries in insurance companies."[32]

Bernard Carl Rosen, id emeritus distinguished adjunct professor in residence at the American University School of Public Affairs, declared the second great transformation of our society in the modern era has demoted manufacturing to a position

[31] Laver, *Computers and Social Change*, 35.
[32] Arnold, "How Technology is Eliminating Higher-Skill Jobs" (2011).

that is secondary to the service industries, thus originating today's information society.[33] This second great transformation created a situation where uneducated blue collar workers, union members especially, saw computers as a threat and were fearful that their positions would be replaced by the new technology, specifically computers. Rosen carries on with discussion about the "New Elite" in which the typical working class is becoming obsolete and a new social order is being established based on new values and new social relationships. Information processors will be taking over the role that the physical labor workers possessed prior to the transformation. The "New Elite" are highly skilled information specialists that need extensive and multifaceted training to complete their jobs. Rosen argued the "New Elite" was being created from the transformation. NY Times columnist and Pulitzer Prize winning author Thomas L. Friedman claimed that the key to thriving as an individual in what he referred to as the "flat world" is to become an untouchable, which he defines as someone whose jobs cannot be "outsourced, digitized, or automated." The world is "flat" according to Friedman because of the advancement of technologies and the ability to work from anywhere in the world with anyone else that is anywhere in the world, as long as both were at computers. Friedman predicts that untouchable jobs in the new flat world will fall into three categories. Workers that are specialized, localized, and people in the middle class that are in danger of their jobs being outsourced.[34] The demand for the lowest level jobs remains close to the same, seeing as how computers cannot clean houses or perform janitorial duty, as does upper level jobs like doctors, scientists, and engineers, since human operation is

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[33] Bernard Carl Rose, *Winners and Losers of the Information Revolution: Psychosocial Change and its Discontents*, (U.S.A.: Praeger Publishers, 1998).
[34] Thomas L. Friedman, *The World is Flat: A Brief History of the 21st Century*, (New York: Macmillan, 2007).

necessary even with the advanced technology in those fields. However, the middle level and more personal interactive positions are being taken over by more efficient, errorless computer systems. National Public Radio author and radio personality, Chris Arnold, proclaims that "going forward, the worry is there is going to be a greater need for people to do minimum-wage restaurant busboy-type work and less need for $30-an-hour office workers."[35] According to the Modern Technology Council, "the big concern with losing jobs to machines is among the less educated classes. So much manufacturing has become automated that only about a fourth of current human employees are needed. Most production can be done by a machine."[36] This is beneficial for the company because labor costs are significantly down, but this also provides less opportunity for the majority of the employees. The computer has direct and indirect ways of taking jobs away.

Author Walter Mathews argues the computer impacts all dimensions of society and it is not necessary to be a highly trained individual to access such technology. Mathews argues there are direct applications that affect the computer age. One example of a direct application is the "automation of the 'paper shuffling' and related tasks associated with daily transactions between individuals and organizations."[37] Paychecks are an excellent example because most employees now receive direct deposit into bank accounts, or if not, the paycheck received is generated by a computer. "Banking has computerized most aspects of the processing of checks and maintenance accounts, facilitating recent moves into such areas as automatic bill payment and installation of electronic tellers."[38] The entire banking industry has changed since the introduction of

[35] Arnold, "How Technology is Eliminating Higher-Skill Jobs" (2011).
[36] Modern Technology Council, *Technology is Taking Over Jobs and Shifting the Job Market*, (2012).
[37] Mathews, *Monster or Messiah?,* 26.
[38] Ibid. 27.

the computer. People can now access their accounts and adjust funds from their personal computers from the comfort of their own home. The days of taking a check to the bank to deposit it is in the past and now all accounts can be maintained by using the computer. Credit card transactions, account billings, loan repayments, and hotels are now processed by a computer and it is nearly impossible to try to utilize those luxuries without one. The computer has even moved in grocery stores, supermarkets, and retail. "Consumer purchases are made through automatic reading of product/price codes which generates a printed bill for the customer and provides current information for inventory control and sales trends."[39] It is inevitable that the transformation to computer based technology has hit full stride and these direct applications of the computer have an immediate and lifestyle transformational affect on society. Along with these major changes, there are indirect ways as well that the computer impacts society.

Mathews believes that aside from the significant role in daily life that computers have, computers are also indirectly responsible for coordination and control of numerous functions and processes of many different segments of society. "Sophisticated computers systems are in operation for both ground and air traffic control. The flow of surface traffic in many major cities is facilitated by computer regulation."[40] Computers control traffic on the ground with traffic lights and control traffic in the air by informing the user when and where it is necessary for pilots to land airplanes. Without the use of computers pilots would not have the luxury of radar, exact air traffic control, or knowledge of weather patterns. Computers are used not only in the production of industrial products, Mathews argues, but in the design and distribution of such products. "In the field of

[39] Ibid.
[40] Ibid. 28.

health care, computers not only serve as a tool for recordkeeping and administration but also have increasing roles in the monitoring and diagnosis of patients and in control and analysis of laboratory tests."[41] It is unnecessary for people to possess those roles and work those jobs because computerization automatically aids people in keeping track of medical history, thus removing jobs in the medical field. Government relies heavily on computers to "handle the unwieldy volume of data necessary to maintain numerous programs and the underlying tax structure in the governmental sphere."[42] The political process is basically controlled by computers as candidates can discover public opinion almost instantaneously and voting records are maintained accurately via computer systems. Also, the court system is able to move through litigation more rapidly as well as produce trial transcripts instantly. Computers allow the "study of probable effects of certain actions and provides insights into complex processes or conditions such as pollution control, river flow, and water supply."[43] Hardly any area of society has not felt some impact of computers. The advancement of computers indisputably hinders the job market, but in some ways it contributes to new openings that otherwise would not have been possible.

However, in certain scenarios, the computer and the advancement of technology can stimulate job growth. Assembly line workers were run out of positions due to the automation of the automobile. On the other hand, white collar positions opened due to the high output of automobiles and need for human accountability along the computerized process. "Those engaged in the manufacture, programming and operation of computers point to the many thousands of entirely new jobs which these activities have

[41] Ibid.
[42] Ibid.
[43] Ibid. 29.

created, and to the opportunities that lie ahead."[44] Due to the fast and inexpensive production and the reshaping of distribution systems "it is creating vast virtual marketplaces for labor, services, and goods that provide sellers with access to more potential buyers, but at the same time give buyers more choices and more detailed, accurate, and up-to-date price and availability information."[45] For companies, it becomes less expensive to advertise and instead of printing and mailing ads, a business can just place the same material on a web page, thus, providing more money to spend elsewhere, and in some scenarios, for employees. With the advancement of computer technology, new jobs develop that were nonexistent beforehand. Software programmers, video game creators, and film and music producers have created new markets for profits to be made by both business and employees. In a report done by Anat Rafaeli, MA and PhD in Industrial and Organizational Psychology from the Ohio State University, she explains that one attitude discovered towards computers was "the computer as a beneficial tool to be utilized by man."[46] Rafaeli argues that the more an employee works with computers, the more positive that employee's attitude will be. She claims that the reason employees do not want to work with computers or have a negative connotation attached to them is because of little experience working with the computer and its software. After completing her study, Rafaeli comes to the conclusion that "the effect of job involvement and organizational commitment on negative attitudes is independent of the main effect of usage of computers."[47] It is necessary to move forward with computer technology for many advanced countries for the simple fact that competitive countries are doing the

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[44] Laver, *Computers and Social Change*, 37.
[45] Mitchell, *E-topia,* 71.
[46] Anat Rafaeli, "Employee Attitudes Towards working with Computers." Journal of Occupational Behaviour, vol. 7, no. 2 (1986): 90.
[47] Ibid. 98.

exact same thing. James Cortada urges that those new fields created by the advancement of the computer will not exist in countries that lack the appropriate modern communication infrastructure, such as wireless internet services. Two of the most prevalently impacted fields of study due to the advancement of the computer are science and technology.

"Computers have turned out the way they have because they are social and cultural as well as technological objects – and, of course, they are political and economic objects, too."[48] The world is shrinking in the sense that any person can speak with any other person through the computer and the natural barriers of distance, language, or time zones are irrelevant. "It is possible to send large amounts of data, messages, video, etc. virtually anywhere in the world via networks such as internet."[49] There is no question that computing has changed the world. The industrial revolution began the shift from agriculture to industry, but the introduction of the computer is what began taking people off of farms and forcing them to find jobs in the factories. The advancement of technology and the computer created difficult scenarios for the working class, as new technology took over their jobs while the positions that were available were being shipped overseas for inexpensive labor. The computer made it possible to outsource due to the fact that this technology "shrunk" the world and brought all countries together to be able to work with one another even from various geographic locations. The major social impact due to the computer was the adjustment in human to human relationships. The virtual world is interfering with the real world and numerous studies have been done to show that excessive time on the computer leads to depression, obesity, and/or social

[48] Bell, *An introduction to Cybercultures*, 66.
[49] Liffick, *Social Impact Characteristics of Computer Technology.*

awkwardness. Modern day economies however thrive on the advancement of technology and schools are not far behind. Most, if not all, educational buildings are incorporating technology and the use of computers into everyday school for students. It is important that students receive the proper training on how to use computers because the jobs that will continue to be available are the white collared jobs that require proper and complex training on a computer system. Although the institution of the computer and new technology had some negative effects on the population, the schools are preparing to fill the void left by those workers that refuse to revolutionize and learn the necessary components of a computer to become successful in the new Information Era.

There are many factors that go into creating a SMART classroom and technologically advanced school. Money must be spent on equipment and teacher training, and then the training must translate into the classroom where the technology is applied to student learning. There is a national initiative of moving towards a one to one classroom where every student has a personal laptop to work on. This push is backed by the positive feedback technology use in the classroom receives as well as the determination that the future jobs of the nation are related to computers and technology. Students coming out of high school need to be able to apply those skills, so technology integration is imperative for schools of the 21st Century.

Creating Advanced Schools

Certain characteristics are required of schools to become recognized as technologically advanced schools. It is not only necessary for there to be sufficient funds to purchase the equipment, but, also, the necessary training for teachers to feel comfortable using the new technology. In order for a school to create a technologically

sophisticated environment, the people within the building must be actively involved in utilizing the technology to its fullest potential. It takes the school district, the administration, and the supporting staffs to all come together and work towards creating a technologically advanced school.

The use of technology in education has been present throughout history. Over the last century, schools have modified their approach to teaching as well as the methods that are used to enhance student learning. Chalk and slate were at one time the newest technology. From there, technological changes have gone from film, radio, and television to desk-top computers and now onto interactive white boards and SMART Technology.[50] The capabilities teachers have with new technology give them the ability to differentiate lessons for better overall learning. Microsoft PowerPoint is one of the most popular technology tools used in any classroom. SMART Technologies has integrated the SMART Board software with PowerPoint thus combining the newest technology with the most popular.[51] This brief description shows that new technology is being implemented into the classroom. Unfortunately, due to high costs, the more advanced the new equipment becomes, the less likely schools are to acquiring it for their classrooms.

Without sufficient funds, it is difficult for schools to obtain technologically advanced classrooms. SMART technology is the most recent equipment to enter the classroom. In 2002, SMART Boards ranged from $999.00 to $1,999.00, and that was for just the board. If a school wanted to better allocate their finances and purchase the rolling floor stand accessory, which makes the technology more accessible to all teachers,

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[50] Larry Cuban, *Teachers and Machines; The Classroom Use of Technology Since 1920*, (New York: Teacher College Press, 1986), 5.
[51] Mike Ballard, "SMARTBoard Interactive Whiteboards," *Multimedia Schools* 9, no. 5 (2002): 55.

it would pay an additional amount of somewhere between $429.00 to $499.00. Any school that desires new technology must have the capacity to purchase it. However, even with sufficient funds, a technological integration effort is only as strong as the administrative support behind it.[52]

A vital aspect of creating a technologically advanced school is having a technologically advanced administration. School administrators can establish databases and spreadsheets as well as quickly send that information out to their staffs. Data is the driving force behind most educational decisions and curriculum or staff changes. Test scores, students' performances, and teacher evaluations are all important pieces of information that every administrative body needs to track. To enhance student use of technology there are a number of procedures an administrator could follow. The administrator may allow students to have a meaningful voice in setting school policy in regards to technology use. The principal could make one hundred percent engagement the goal and use a collaboration model to relate curriculum to students through the use of technology. He/she running the school may allow the teachers to have a guidance model rather than an instructing one, leaving more responsibility with the students. To enhance technology in the classroom, the administration would have to orient the school toward the future, keep the computer lab open late, and promote technology use while moving towards a one to one computing ratio. Once the teachers see the head of the school not only use technology to relay information, but also encourage its use from students, an environment is created where technology is acceptable in the classroom as well.[53]

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[52] Ibid.
[53] Marc Prensky, "Turning On the Lights," *Educational Leadership* 65, no. 6 (2008): 41.

However, key to the success of a one to one computing initiative in the K-12 environment is the role of the teacher.[54]

Retired Admiral Hyman Rickover said, "Changing schools is like moving a graveyard."[55] Teachers have their syllabi and unit plans, but in many cases, technology is not always integrated into those plans. Since most educational buildings are moving towards more technology and computers in the classroom, teachers must learn about the technology and how it can be implemented into their teaching. This is time consuming and in the eyes of educators that have been professionals for a number of years, this may be considered unnecessary. A teacher's time is precious. Therefore, teachers use the technology when it proves to be accessible, effective, and efficient. Most of the time teachers use computers in ways that address their most direct needs. In order for that to change, schools must offer seminars and training sessions in order to properly prepare teachers to utilize the new technology to its fullest potential. It is the responsibility of the administrative body as well as the district to establish such training seminars so that the school can be a well-rounded, technologically advanced place of instruction because the survival of computer uses is determined largely by their compatibility with the aims of teachers.[56]

Classroom Use

As schools progress in the 21st Century, technology is being used more frequently on a regular basis. With the growth of internet and other interactive technologies in the past three decades, information and communication technologies have emerged as

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[54] Loretta Donovan and Tim Green, "Two-Way Mirror: Technology-Rich K-8 and Teacher Education Programs," *Action In Teacher Education* 30, no. 4 (2009): 47.
[55] Cuban, *Teachers and Machines: The Classroom Use of Technology since 1920*, 6.
[56] Yong Zhao and Kenneth A. Frank, "Factors Affecting Technology Uses in Schools: An Ecological Perspective," *American Educational Research Journal* 40, no. 4 (2003): 816.

important tools for teaching and learning.[57] The most frequently used technologies in schools are e-mail, telephone systems, and overhead projectors and computers in the classroom.[58] However, as new teachers enter the profession they are expanding past those basic technologies and integrating more technology to units and lessons. Teaching with technology is essential to the development of students for the 21st Century.

Computers are the most popular equipment and most widely used technology throughout all schools. The Office of Technology Assessment estimates that the number of computers in K-12 schools increased by 300,000 to 400,000 a year during the past decade.[59] According to surveys done in the United States, in 1981, eighteen percent of schools had computers and sixteen percent used computers for instructional purposes. In 1991, ninety-eight percent of schools had computers and ninety-eight percent used them for educational intentions. Also, from 1985 to 1991 the student to computer ratio went from one hundred and twenty-five to one to eighteen to one.[60] In 2002, the ratio of students to computers was seven to one, and for an internet-connected computer it was nine to one.[61] A 2006 report states that in addition to large-scale initiatives – with an estimated thirty-six thousand student laptops in Maine; twenty-five thousand in Virginia; and sixty-three thousand in Georgia – there are hundreds of one to one initiatives, on a smaller scale, occurring across the U.S. in all types of schools.[62] Until that one to one

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[57] Lisbeth Kitson, Margaret Fletcher, Judith Kearney, and TX. Coll. of Education. Houston Univ., "Continuity and Change in Literacy Practices: A Move towards Multiliteracies," *Journal Of Classroom Interaction* 4142, no. 2,1 (2007): 29.
[58] Zhao, *Factors Affecting Technology Uses in Schools: An Ecological Perspective*, 820.
[59] Ismat Abdal-Haqq and Washington, DC, ERIC Clearinghouse on Teaching and Teacher Education, *Infusing Technology into Preservice Teacher Education* (1995).
[60] Larry Cuban, "Computers Meet Classroom: Classroom Wins," *Teachers College Record* 95, no. 2 (1993): 189.
[61] Cathleen Norris, Elliot Soloway, and Terry Sullivan, "Examining 25 Years of Technology in U.S. Education," *Communications Of The ACM* 45, no. 8 (2002): 17.
[62] Donovan, *Two-Way Mirror: Technology-Rich K-8 and Teacher Education Programs*, 45.

ratio is fully met by all large-scale schools, teachers will have to work with what they have, use other means of technology, and branch off from the computer to introduce new lessons and material.

There are other means of technology that involve computers, but not on an individual basis. According to one social studies teacher, he or she developed multimedia presentations that combined visual and audio images pertaining to certain periods and events in U.S. History.[63] Other techniques included showing students how to perform historical research and data analysis. PowerPoint's with an overhead projector is an excellent way to include technology daily while only using one computer. By using this technique, teachers can give the class notes or quizzes, watch clips from a movie, or give an example of how to properly search the internet. Another way to take advantage of a classroom with a solo computer is to use a Classroom Performance System. The CPS enables the teacher to put a question on display via the computer and the students, using a remote control device, select their answers. Using infrared, their responses are directly transmitted to the computer for immediate results.[64] This not only keeps students from drifting off, but it differentiates lessons to incorporate active involvement, as well as providing immediate feedback. Students and teachers can use iTunes to record lessons for student playback or students can create movies using iMovie for a project or presentation. In science classes, students can perform a dissection on the computer before actually doing it in practice and know what to look for. Also, the students can use a ProScope to get detailed images of matter, and then draw it themselves on a larger

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[63] Vivian H. Wright and Elizabeth K. Wilson, "Using Technology in the Social Studies Classroom: The Journey of Two Teachers," *Journal Of Social Studies Research* 33, no. 2 (2009): 140.
[64] Ibid., 142.

scale. These methods of differentiated instruction are applicable to the classroom and include integrated technology.[65]

It is no longer sufficient to use technology for one way instruction. The new frontier in the classroom is student interaction with technology. It is now necessary to use technology to enhance engagement and promote collaboration, bring in various media types, simulate activities, and bring in interactivity to classrooms.[66] Faculty can successfully present material in greater depth by implementing technology. Technology will eventually become as integral to the overall teacher education program as such elements as pedagogy, assessment, and classroom management.[67]

Limitations

There are many factors that affect technology use in the classroom, which leads to a distinct lack of differentiated instruction. School instruction is still mostly cookie cutter and one size fits all, despite the fact that we live in an era of customization.[68] Schools may experience financial issues when integrating technology, but, the basic problem is that some educators do not integrate technology into their instruction. There are conflicting ideas about the value of technology and hence conflicting advice to teachers about how technology should be used in schools.[69]

Concerns about the slow adoption of technology by teachers are not new. The constantly changing nature of technology makes it difficult for schools and teachers to stay current with new developments. The fact that technology can be quite unreliable

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[65] Donovan, *Two-Way Mirror: Technology-Rich K-8 and Teacher Education Programs*, 49.
[66] James Frazee and Ruth Greene, "Smart" classrooms: An IQ shift," *College & University Media Review* 12, no. 2 (2006): 45.
[67] Donovan, *Two-Way Mirror: Technology-Rich K-8 and Teacher Education Programs*, 54.
[68] Prensky, *Turning on the Lights*, 43.
[69] Zhao, *Factors Affecting Technology Uses in Schools: An Ecological Perspective*, 800.

makes it less appealing for teachers to invest their time in it.[70] Most teachers know how to teach their lessons without the implementation of technology. Inexperienced teachers may find it difficult to implement technology because they are still trying to acquire basic teaching skills. They must first master the content and the pedagogy that is associated with the curriculum. Until the material is mastered it is difficult to spend the time on figuring out what kind of new technology can be added to the lesson.[71] Educators need to examine what technologies are more useful or fit to particular tasks and which ones are less fit, therefore, are easily disposable.

Some teachers may not like the idea of technology in the classroom because those educators do not quite understand why it is important or relevant. The greatest deterrent to faculty use of available tools seemed to be insufficient time to develop a level of comfort with the technology.[72] Besides that, some teachers just do not approve of technology. In one situation a teacher was discouraged from using technology because the other teachers in the school rejected his use of digital videos. The other teachers complained about the noise the students made while videotaping and did not desire to learn the technology and the administration did not support the technology use. Professional development was non-existent and the media specialist discouraged student use of the computer lab machines in fear of the students putting wear and tear on the machinery.[73] This response from the other teachers in the building is understandable as only seventeen percent of district curriculum directors believed that the current professional development plans adequately prepared their teachers for technologically

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[70] Ibid., 806.
[71] Dian Schaffhauser, "Which Came First--The Technology or the Pedagogy?," *T.H.E. Journal* 36, no. 8 (2009): 28.
[72] Frazee, *"Smart" classrooms: An IQ shift*, 31.
[73] Wright, *Using Technology in the Social Studies Classroom: The Journey of Two Teachers*, 146.

enhanced environments.[74] Change in school computer use needs to be evolutionary rather than revolutionary. Innovations such as technology must be implemented with regard to the internal social structure of the school. School is usually about the past in most content areas, with, occasionally, some current events added in.[75] But, technology can bring the past alive for students to prepare them for the future. Courses on "futurism" are rarely taught, but there is a need for them to prepare students for future jobs and life after school. There needs to be a focus on augmenting technology in the classroom to work towards educating for the future.

Enhancing Use

There have been many strides taken by school administrators and teacher preparation programs to create technologically friendly educators. When teachers are given the opportunity and resources to experiment with computers, they are being given the opportunity to improve their technology proficiency and learn how computers may further their educational goals.[76] Without some sort of seminar or class to learn how technology can enhance student learning, teachers may be unwilling and/or unable to take time out of their busy schedules to learn the technology on their own. The process for teachers to become more knowledgeable in the technology field now begins when educators are at a pre-service level.[77]

Teachers are learning new technologies through training programs which results in some implementing that into their classrooms. There are numerous types of programs to prepare teachers to use technology in the classroom. These model programs include

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[74] Donovan, *Two-Way Mirror*, 47.
[75] Prensky, *Turning on the Lights*, 45.
[76] Zhao, *Factors Affecting Technology Uses in Schools: An Ecological Perspective*, 819.
[77] Wright, *Using Technology in the Social Studies Classroom: The Journey of Two Teachers*, 150.

required courses which teach potential educators how to use instructional technologies; exposure to technology rich K-12 classrooms, and collegial support for change.[78] Two other approaches to preparing teachers to integrate technology into teaching and learning include infusing technology integration into methods courses taught by content area experts and offering courses taught by educational technology faculty that addresses technology for teaching and learning. Additionally, pre-service and in service teachers can attend professional development workshops on the effective use of technology in the classroom.[79] It is important for teachers to complete courses and training sessions to become most adequately prepared for applying technology to future lessons. Some institutions also offer large lecture one day workshops for those educators that are more crunched for time.[80] All of the time teachers put in to learn about technology and how to apply it in the classroom is for the benefit of the students. This will be a continuous process because of rapidly developing technologies and progress. In the past decade, the criterion for pre-service teachers to incorporate technology has become more concentrated. Too often, the employment of technology is taught to be used as a tool to manage the classroom, rather than a pedagogical tool to support content teaching.[81]

It is a disservice to students to ignore technology in the classroom because it is an important aspect to the students' futures.[82] Students are more interested in lessons that incorporate technology over traditional lecture methods. To become more interesting to the typical student, schools need to give students the opportunity to use technology in schools, find out how students want to be taught, connect students to the world, and

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[78] Abdal-Haqq, *Infusing Technology into Preservice Teacher Education.*
[79] Donovan, *Two-Way Mirror: Technology-Rich K-8 and Teacher Education Programs*, 53.
[80] Frazee, *"Smart" classrooms: An IQ shift*, 27.
[81] Wright, *Using Technology in the Social Studies Classroom: The Journey of Two Teachers*, 149.
[82] Ibid., 139.

understand where the learners are going into the future, and help the students get there.[83] It is no longer a luxury to have technology in the classroom; integration of technology is a requirement for all schools to prepare learners in the 21st Century.

Methodology

Pleasant Valley High School is an excellent setting to observe the topic due to its enhanced technological capabilities. This school offers teachers new equipment and computer programs to improve lessons and student involvement in the classroom. This High School of 1,600 students is part of the largest suburban school district in Western New York, encompassing forty square miles and portions of three different towns. The community rallies behind the sports teams and supports school activities. Technology has positively affected the middle schools in the area and Pleasant Valley High School is beginning to take the necessary steps to create a similar environment for its students, staff, and faculty.

The school is well equipped with technology. Some classrooms are fully technologically equipped with a mounted SMART Board, ceiling projector, and speakers for audio. There are a handful of rooms like those that are available for teachers to request and use at their convenience. Also, almost all departments have a SMART Board on wheels that each teacher has the ability to sign out for a class period, or day. These boards are easily accessible and available. Each teacher has his or her own computer in the classroom. With this computer comes the ability to access SMART software so that even without the actual SMART Board a teacher can use what it has to offer. Thus, if there is difficulty in signing out a SMART Board, a teacher may still conduct the lesson

[83] Prensky, *Turning on the Lights*, 42.

he or she had planned for the day, just using the computer and white screen instead. Pleasant Valley High School, also, owns wireless presenters and keyboards, digital cameras, digital movie cameras, airliners, grade cams, document cameras, and CD and DVD burners. On their educational website, called WITTS, a teacher has the ability to sign out any one or more of these technologies on any given day for class use. For more individual work, the school has computer labs where teachers can bring their students for various types of assignments.

Although computer labs are routinely found in any high school, Pleasant Valley High School has about thirty computers in each lab where every student has his or her own personal computer to do individual or group work. All students have their own accounts and can work on as well as save work to his or her account name and later access it from his or her home desktop. The computers are filled with software that is available for students. There is Microsoft Office for basic essay writing and PowerPoint presentations, but, also much more. All students have access to Windows Photo Story and Movie Maker, Audacity, Picasa Three, Google Sketch Up and Google Earth, Windows Encoder, and SMART Notebooks. With these programs, students are able to create and edit videos, convert YouTube videos, see any place in the world, and create unique, individualized images. Not only do the students know how to use mostly all the technology Pleasant Valley has to offer, but they enjoy learning through it as well.

The student body at Pleasant Valley High School is mostly middle to upper class individuals who use technology in their everyday lives. In some situations, students understand the equipment better than the teachers. This was the case for Ms. Cardio and her ninth grade global class. The first day she set up the SMART Board, she was

confused on how to scroll from pen to pointer and change ink color, but her students showed her how to do everything she wanted to. It turns into the students showing the teacher how to use the technology, then the teacher integrating the technology into her lesson. The end result in this situation was the students were excited to learn and the teacher excited to teach with the technology. As I was able to observe, most students positively react to technology and understand it. Observations took place throughout a variety of classrooms and the one commonality was that when technology was used, students were engaged, regardless of grade level or subject area. In the classes students interact well with technology and Pleasant Valley High School is attempting to take advantage of that fact by continuing to collaborate with the University at Lampert to improve the equipment in the classrooms and make technology more readily available for the faculty and staff.

Observations were done in a several different classrooms with various age levels, subject matters, and technological equipment. The methods used were simple observation and fact recording. The focus was on technology availability in the classroom, teacher use of technology, and student reaction to technology use in the classroom. Observations were done during class time, followed by discussion with and interactions with many teachers after class to discuss technology use.

Observations

Classroom Use

Technology use in the classroom can be an exceptional tool to enhance learning. The teachers that were observed at Pleasant Valley High School use technology almost daily. Some use technology for simple note taking through PowerPoint presentations, while others use it as an interactive instrument to differentiate instruction and engage the

students in active learning. Through my observations, I learned the most popular form of technology use in the classroom is PowerPoint presentations. However, some teachers utilize the capabilities and various components of the computer for much more.

There were various grade levels observed where technology seemed to have impacted age groups differently. The first day a SMART Board was used in Ms. Cardio's ninth grade global class, the students were eager to help her set it up and learn from it. She was able to engage her students by connecting with them on a common interest, technology. This connection allows the teacher and students to work on the lesson together. Without this implementation of technology the teacher just lectures to the students while they take notes. Pure lecturing results in a select few students understanding the information at a later point in time when they try to do homework. The technology is most effective when used frequently enough to raise the level of understanding from both teacher and student perspectives.

Mrs. White uses PowerPoint almost daily in her social studies classroom, for both ninth grade global studies and twelfth grade economics. She has the slides appear clearly in print on the projector screen so there is no difficulty in reading the text. In her twelfth grade economics class, Mrs. White even had a group project involving that Microsoft Office tool. She split her class into groups of two and each one created a PowerPoint presentation on a different type of economic system. This use of technology not only showed the students that the teacher uses it, but, also, by applying the PowerPoint to the lecture method, it gave students ideas for when they are creating their own presentations. For those same economics classes, Mrs. White brought them to the computer lab to learn how to look up stocks for an on-going mandatory project. Once a week she checks their

figures to make sure that every student is checking the stocks at least once a week, thus, implementing technology use outside the classroom as well. For Mrs. White's ninth grade global class, she occasionally uses the overhead projector to give notes. As she explained she is in the process of switching notes over to a PowerPoint presentation. Mrs. White is adapting and integrating technology in her classroom. She has updated older lessons to better engage the students. Research supports the observations made those students in the 21st century have shorter attention spans. To maintain their concentration a lesson needs to be differentiated and apply technology. This allows different facets of learning to occur. Mrs. White reads a non-fiction picture book to her global nine classes every year, but this year she did not walk around with it in her hand while trying to both read and show the pictures to her ninth grade students. This year, she used a document camera, which looks like an overhead projector, but, instead, takes the picture and puts it directly on the white screen, rather than the outline of a blank piece of paper, she then read the book from the front of the room while the pictures were displayed on the big screen behind her. Teachers are beginning to understand how the pedagogy of the classroom is being changed by technology. Observations done at Pleasant Valley High School reveal that technology is consistently used in the classrooms. The observations at this High School of the special education teachers show the high levels of success when integrating technology into the classroom.

In the special education classrooms, technology is fully utilized. In Mr. Burton's co-taught global ten class he uses a SMART Board to bring up an activity that is identical to what his class has on paper in front of them. He goes through the assignment with them, having students come up and fill in the answers when they are called on. In her co-

taught ninth grade global class, Ms. Cardio implements her usage of the SMART Board by explaining what a ziggurat is. To do this she explained it in words, with pictures, and then clicked on a link that brought up a video of an exploration of a ziggurat. This was a good example of differentiated instruction through technology. The SMART Board offers capabilities to teach one lesson numerous ways, which will enhance the learning of each student. This observation may be the greatest implication and application of integrating technology into every lesson.

In a life skills math class, the interactive technology is utilized when Ms. Finch has her special education students walk up to the SMART Board and count change through a computer program. They get to leave their seats and work hands-on with the material that is being presented to them. The overhead projector is used in self-contained math and American history classes. The special education students pay more attention to the material being taught when they are given the opportunity to get out of their seats and perform an activity. Unfortunately, for a plethora of reasons, not all teachers are ready to commit fully to technology when conducting their lessons.

Teacher Use

For many reasons, teachers are resistant to change. Most educators do not openly welcome it and it takes time for them to become comfortable with new technology and its implementation into the classroom. After observing numerous social studies team meetings at Pleasant Valley High School, more than half the social studies teachers are not eager to switch to a technological classroom because they do not fully understand it, are not adequately prepared or comfortable with the technology, and do not see the need to change their lesson plans to fit technology into them. The team leader, Ms. Brown, said “I have plenty of equipment I am storing here, but I will never use it so please feel

free to come and take it from my room, I don't want it."[84] There is much resistance from teachers to revolutionize to a technologically advanced classroom.

At Pleasant Valley High School, there is an inadequate training program for teacher use of technology in the classroom, according to Mrs. White and Mrs. Johnson. Ms. Cardio just "waits for the students to show her how to use this stuff" when referring to new technology in the classroom.[85] One of the problems with Pleasant Valley High School, according to Mrs. White, is that "the school has a training seminar when they buy one piece of technology for the entire school."[86] A training session is a way to ensure that all educators become familiar with the new equipment and have an idea of how to use it. However, when there is only a small portion of that technology available, the faculty is not going to go out of their way to learn the technology and then hope they can sign it out for when they need it. In the example of Mrs. White using a paper map instead of a virtual one, she did that because of her normal routine and insufficient use of technology on a day-to-day basis. Upon getting the Google software at the school she was trained in its capabilities, however, she did not take the time to see all that it has to offer because at that time she had no projector to show the class what was on her computer screen. The one application that is commonly used and understood is PowerPoint presentations.

Along with many other teachers, Mrs. White uses it on a daily basis. However, due to inadequate training her teaching is redundant with this technology and some of her students, like with any other single teaching method are not as responsive as they once were. In her economics classes some students take notes and some just sit there,

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[84] Brian Sutton, personal observations, November 4, 2012.
[85] Brian Sutton, personal observations, October 29, 2012.
[86] Brian Sutton, personal observations, October 1, 2012.

completely disengaged. This is the result of Mrs. White not fully understanding how to incorporate new technology into her lessons and not reaching out to those students that have become disinterested in PowerPoint presentations and note taking. With the proper training she may be able to adjust her PowerPoint's to add new gadgets or just simply use an entirely new technology all together. She is ahead of other teachers although when it comes to application of technology.

In Mrs. Oliver's global ten co-taught class, there were zero signs of technology use, or even technology (besides the teacher computer in the back of the room). There were two teachers that handed out a guided notes packet and just stood at the front of the room and went through filling in the blanks with the students. Though this technique may be effective, it is not as proficient as it could be. There appeared to be extreme student boredom and lack of participation as the teachers had to pull answers out of their students. There was a definite lack of technology training in this classroom and an extreme lack of technology use for a class in the 21st century. The reasoning behind it is identical to the one that Mrs. White gave when questioned about technology use; "I do not have the time."[87]

Insufficient time is the number one reason for the lag in the integration of technology into classroom instruction. Technology is constantly changing and that makes it difficult for teachers, on top of all other things they have to do, to stay current with new developments. Also, the fact that technology is at times unreliable makes it less attractive for teachers to spend valuable time on.[88] Mrs. Black, who has been teaching at Pleasant Valley for a number of years said, "I am retiring in three years so I am not

[87] Brian Sutton, personal observations, September 24, 2012.
[88] Zhao, *Factors Affecting Technology Uses in Schools: An Ecological Perspective*, 812.

learning that stuff."[89] Mrs. Black has her own way of teaching and will not spend extra time to learn how to use technology in her classroom. This teacher regularly does not include technology in her lessons and does not plan to do so for her remaining years. Mrs. White on the other hand is attempting to integrate technology, but just does not have enough time in the day.

Mrs. White uses overhead projectors for some note taking in her global nine classes. Mrs. White proclaimed "putting my overhead screens into the computer as a PowerPoint is not at the top of my priority list because it is just not necessary."[90] She does not have enough time, nor see the need, to change her lessons from older technology to newer technology. Teachers are constantly busy with preparations, teaching lessons, grading papers, after school activities, and take home work, so to find time to adjust their already planned lessons to technologically advanced lessons, is not a priority. Pleasant Valley High School is showing that it is focusing on preparing their students for the future by purchasing new technologies.

Student Reaction

The students react to the material being taught when technology is involved in the teaching method. For a global nine class, Mrs. White gave a description on the chalk board and then pulled down a map to show an area of the world to her class, the students appeared uninterested. Had she pulled up Google Earth like Mr. Burton did in his class, to show a new country to the students, the level of interest would probably have been much higher. As seen in Ms. Cardio's tenth grade global class, when she sets up the SMART Board to begin class, her students eagerly ask, "Can I help with…" because they are so eager to get hands on with the technology. In fact, at the end of one of Ms.

[89] Brian Sutton, personal observations, October 15, 2012.
[90] Brian Sutton, personal observations, September 24, 2012.

Cardio's SMART Board driven lectures one student proclaimed, "Class is over already?!"[91] When a teacher is using a SMART Board, it is not only engaging at the time, but, also, the student can take those notes home with them, and later, when doing homework, students can interact with the lesson they experienced in class. Ms. Cardio prints out her SMART Board lessons and gives them to her class to bring home with them.[92] This removes the disconnect students experience when working on assignments at home without the assistance of the teacher.

When the level of excitement of the class rises, the content is not so difficult to teach because the students are actively engaged in the lesson. When Ms. Finch was having difficulty focusing her life skills math class, she mentioned if that they had to get through material before they could play a computer game at the end of class. This "game" was in line with what they were learning and the students were actually learning more through playing it than they were from Ms. Finch lecturing to them. One at a time, the student went up to the SMART Board and completed a section of the money counting game, and then they called on a classmate to do the same. This interaction was not only good for their educational growth, but for their personal and social growth as well. The centerpiece of this activity was the interactive white board because the class wanted to get out of their seats and use the technology. This is an important connection to make for special education students especially because being able to count money is a critical life skill. Most of the students in that class do not fully grasp the concept so to differentiate it and make it interactive, the students get more practice on this life skill.

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[91] Brian Sutton, personal observations, October 15, 2012.
[92] Brian Sutton, personal observations, October 15, 2012.

Technology is ever changing the education world and is only becoming more prevalent to the 21st century student. For a teacher to not employ technology in his or her classroom is a disservice to his or her students and is not completely preparing them for the "real world." Teachers that do not keep up with this transition will not be replaced by technology, but will be replaced by teachers that do use technology in the classroom. There are numerous reasons to use technology in the classroom. Some of these reasons include; technology is fun, it engages students in learning, it develops students' professional abilities that can be applied beyond high school, it is easier for teachers and reduces time spent on planning, it improves student test scores, it reaches different learning styles, it helps students with low attention spans, experts are available to engage students, and it encourages homework with assistance available online. Educational technology is a tool that can be used by an educator to increase learning as well as more easily design, deliver, facilitate, and manage instruction. Robert J. Marzano, PhD, is cofounder and CEO of Marzano Research Laboratory in Centennial, Colorado. A leading researcher in education, he is an author of more than 30 books and 150 articles on topics such as instruction, assessment, cognition, effective leadership, and school intervention. His practical translations of the most current research and theory into classroom strategies are internationally known and widely practiced by both teachers and administrators. Marzano has come up with eight specific strategies to improve student learning. These eight values are identifying similarities and differences, summarizing and note taking, homework and practice, nonlinguistic representations, cooperative learning, setting clear objectives and giving feedback, generating and testing hypotheses, and using cues, questions, and organizers. By combining these eight proven strategies with regular use of

technology any Social Studies teacher will be able to create an environment where learning will occur and true preparation for the 21st century will be ensured.

Marzano's first strategy emphasizes appropriate identification of similarities and differences. This is the ability to break a concept into its similar and dissimilar characteristics which allows students to understand and potentially solve complex problems by analyzing them in a more simple way.[93] Teachers can either directly present similarities and differences, accompanied by deep discussion and inquiry, or simply ask students to identify similarities and differences on their own. Technology can play a pivotal role in this strategy as teachers do not need to direct class from the front of the room but can send students on a web quest or have them create a chart or diagram to discover and show the different components of a topic and then reconvene to discuss and make analogies. An example of this in a social studies classroom would be the teacher introducing Native Americans and briefly discussing their history in the United States. The class could then perform a web quest and discover the fair, and unfair, treatments towards the Native Americans by the white man and create a diagram of a variety of pictures gauging from "Thanksgiving" to the "Trail of Tears." Students can use technology in this situation to break down the understanding of Native American history by analyzing the pros and cons as well as making analogies for peers to better understand content. After a brief amount of note taking, then being sent on their own to discover information on a concept, students can think, pair, and share to enter a deeper discussion on the topic with their own individual research.[94]

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[93] B. Gholson, D. Smither, A. Buhrman, and M.K. Duncan, *Applied Cognitive Psychology*, *10,* (1997), 15.
[94] R.J. Marzano, D.J. Pickering, and J.E. Pollock, *Classroom Instruction that Works,* (McREL, 2001), 17.

The next strategy emphasized by Marzano is referred to as summarizing and note taking. These skills promote greater comprehension by asking students to analyze a subject to expose what is important and then put it in their own words. Results have shown that taking more notes is better than fewer notes and it is critical to write the notes down because it allows time to process the information.[95] Teachers should encourage and give time for review and revision of notes as notes can be the best study guides for tests. When incorporating technology into note taking it elevates this strategy to a whole new level. In the 21st century there is a shift occurring towards what is referred to as a one to one classroom. Essentially this new classroom is designed for every student to have a personal laptop in front of them at their desks. Paper note taking is becoming a part of history as technology is taking over the classroom. Allowing students to take notes on their laptops as opposed to in the binders or following pre-printed and designed guided notes creates an opportunity for students to have the information in front of them already and allows students to build off of the notes that are already designed. If a student has a PowerPoint in front of them as the teacher goes through it in the front of the classroom then that student can make side notes, analogies, and metaphors to better understand the curriculum. When students do not need to rush and write down what the teacher has up on the board it allows them to spend more time summarizing and better understanding information.[96] Note taking is not the only change because of technology. Homework is beginning to look very different as well.

Homework and practice is an essential component to learning according to Marzano. Homework provides students with the opportunity to extend their learning

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[95] P. Nye, T.J. Crooks, M. Powlie, and G. Tripp, *Higher Education, 13(1),* (1984), 85-97, 44.
[96] Marzano, *Classroom Instruction that Works*, 46.

outside the classroom. However, the amount of homework assigned should vary by grade level and parent involvement should vary with ability level of student as well.[97] Teachers should explain the purpose of homework to both the student and the parent or guardian, and teachers should try to give feedback on all homework assigned. By using technology, the teacher, student, and parent/guardian are all on the same page. With the creation of intranet designs such as blackboard and parent-teacher connect student grades, assignments, and progress are able to be viewed from any computer at any time by teachers, students, and parents/guardians. In the past students have had the opportunity to tell a different story to teachers and parents in regards to grades and homework but through the use of an intranet all parties remain on the same wavelength of information. Intranet aside, homework and practice become much easier through the use of technology and the computer. Teachers can spend less time creating homework assignments because students can instead use websites to practice what was learned in a day's particular lesson. Also, teachers can receive direct scores from student practice and then provide immediate feedback to those students. The homework process becomes more applicable for students and provides them with the unique opportunity to take what they learned from class and practice it at home on the computer that same night. Having students use technology to practice learned material gives a real world feeling and not something the teacher made up to give out as an assignment. By using online resources and the internet, teachers can deliver timed quizzes for homework and have students report speed and accuracy. Also, difficult concepts can be a focus for homework and students have online resources to help them better understand said topic. It is nearly impossible to cover all

[97] T.W. Roderique, E. A. Pulloway, C.L. Cumblad, and M.H. Epstein, *Journal of Learning Disabilities, 27(8),* (1994), 481-487, 63.

the curriculum necessary in the time allotted so by having students practicing in a fun way through using technology that delivers helpful reports is an excellent way to prepare students for upcoming examinations. Homework and practice are ways of extending the school day and providing students with opportunities to refine and extend their knowledge.[98] Beyond providing more fun and interactive homework, technology use in the classroom is essential to nonlinguistic representations.

Nonlinguistic representations are another focus point of Marzano's that is necessary to reach the 21st century learner. Knowledge is stored in two forms: linguistic and visual. The more students use both forms in the classroom, the more opportunity they have to achieve. The use of nonlinguistic representation has proven to not only stimulate but also increase brain activity. This can be done through the incorporation of words and images or symbols to represent relationships and use of physical models and physical movement to represent information.[99] The internet has a plethora of information and after careful research a teacher can use company websites such as Google and YouTube to show images and/or videos that reinforce the information being taught that day. Students of the past had to imagine or look at pictures that were unclear or difficult to understand. However, students of the 21st century can travel through museums, take rides through historic landmarks, communicate with people across the world, and relive battles all from their classroom desk. Social Studies teachers should all be taking advantage of the great opportunities presented to them because of technology. Students of the 21st century are constantly engrossed in technological gadgets and to believe that true learning can occur without the use of such resources is inconceivable. Social Studies teachers

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[98] Marzano, *Classroom Instruction that Works,* 71.
[99] I. Gerlic and N. Jausovec, *Educational Technology Research and Development, 47(3),* (1999), 5-14, 73.

cover history and there are so many resources available that the days of standing in the front of the room and talking for an entire class is not allowing for students to understand and apply information through a variety of techniques. Visual, verbal, and kinesthetic learners all benefit from the use of technology and due to the high volume of interactive technology available it is easily incorporated into the classroom on a regular basis. Teachers can also allow students to own their learning by having them find their own visual resources to share with classmates or create an organizer that will help explanation of the information.[100] This activity would force students to synthesize information, which is one of the higher levels of Bloom's Taxonomy. Students working to share with classmates can be done independently or in a group setting to create a more comfortable and supportive atmosphere.

Dr. Marzano believes it is important for educators to use cooperative learning in the classroom. Teachers should organize students into cooperative groups to yield a positive effect on overall learning.[101] When applying cooperative learning strategies it is important to keep groups small so that students get intimate attention from other group members and the teacher. Also, by maintaining groups to small numbers, free loaders do not become as prevalent. When grouping students, educators should consider a variety of criteria, such as common experiences or interests, objectives, and designing group work around components such as positive interdependence, group processing, appropriate use of social skills, face-to-face interaction, and individual and group accountability. By fully utilizing technology students can be assigned to work on certain components of a project at home through group chats or even group video chats. There is free technology

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[100] C.L.C. Kulik and J.A. Kulik, *American Educational Research Journal, 19(3)*, (1982), 415-428, 85.
[101] J. Oakes, *Keeping Track: How Schools Structure Inequality,* New Haven, CT, Yale University Press, 1985), 85.

available through Google that allows individuals to work together via chat rooms or video conferences. Requiring students to complete tasks this way gives them a glimpse of real world possibilities, especially in the business world, and also gives them the opportunity to learn how to utilize certain technology that may help to know in the future. Cooperative learning in the classroom can be greatly enhanced by using technology. Student presentations can be augmented to show a variety of information through verbal information, pictures, videos, or even games. Students can be grouped together with students that are more and less technologically advanced so that peer assistance can be provided.[102] Along with groups, technology can also help students that feel anxiety when it comes to public speaking. If a student is not comfortable speaking in front of a class he or she can somewhat hide behind the technology and allow the presentation to do most of the talking. Although all students will have to speak in front of a group it is more comforting for those that do not like it to be able to use technology as the barrier between the class watching and that person presenting. In order for collaborative learning to benefit a classroom the students must receive clear instruction and guidance, as well as consistent feedback to ensure the appropriate technology is being utilized to gather and present the most accurate information.

Educators must set clear objectives for students in the classroom and provide consistent feedback. Goals should not be too specific; they should be easily adaptable to students' own objectives. The feedback a teacher gives will reinforce behaviors, whether it is positive or negative, therefore it is imperative that a teacher provides immediate feedback to students when they are working on an assignment or have completed an

[102] Marzano, *Classroom Instruction that Works*, 87.

assignment.[103] Setting objectives can provide students with a direction for their learning. A good way to complete this section of Marzano's philosophies is to set a core goal for a unit, and then encourage students to personalize that goal by identifying areas of interest to them. A student can create "KWL" charts in which he or she identify material they know, they want to know, and what they learned. Teachers should outline the specific goals that students must attain and the grade they will receive if they meet those goals. Technology can greatly improve these lines of communication. As students are working on particular tasks they can e-mail or call their teacher for clarification and receive very immediate feedback. If a student is practicing the curriculum out of the classroom he or she can still use an intranet to look up the notes, examples, and even chat with fellow students about the assignment. Students no longer have to finish an assignment at night and wait until a couple days later for the teacher to look it over and critique. Generally, feedback produces positive results. Teachers can never give too much; however, they should manage the form that feedback takes. Feedback cannot all be negative or all positive as it is important to emphasize the aspects of an assignment done well and the aspects that can use improvement or adjustment.[104] Due to the capabilities of technology, students can turn assignments in online and as they are being received the teacher can review and send back with comments. The grading rubric can be posted online so that students can check it regularly to ensure all aspects are being covered. Another way technology can be used is to have chat rooms where students provide feedback to one another as a way to allow them to feel comfortable communicating to a peer as well as working with the curriculum. Students can use the internet to verify knowledge, ensure

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[103] R.L. Bangert-Downs, C.C. Kulik, J.A. Kulik, and M. Morgan, *Review of Educational Research, 61(2),* (1991), 213-238, 96.
[104] Marzano, *Classroom Instruction that Works,* 97.

objectives are being met, read feedback, and also search a variety of hypothesis on different components of the curriculum in order to get various points of view.

Dr. Marzano believes it is critical for students to generate and test hypothesis. In a Social Studies classroom this is a bit more difficult because the focus is on history. However, it is exciting and important to review history from many different points of view and deciding what is closest to the truth. History teachers must ask students to take the information given to them, and researched on their own, and evaluate it to formulate their own opinion on the topic.[105] Whether a hypothesis is convinced or construed, students should clearly explain their hypotheses and conclusions. In order to assist in this process teachers can ask students to predict what would happen if an aspect of a familiar system, such as the government or transportation, were changed. Also, teachers can ask students to build something using limited resources. For example, a teacher can cover a topic in the traditional classroom style and have students try to formulate a conclusion or hypothesis on the matter.[106] By removing the technology students are forced to think about a variety of possibilities and circumstances that may or may not have existed within the topic and formulate their own opinion on the issue. Upon completion of that, technology can be re-introduced to the classroom and students can search to find information that supports or refutes their personal opinion on the topic. Teachers can have class discussions on the various conclusions and then choose one or two that seem to be the most applicable because of the research done to support it. After that, the teacher could set up a video conference with a class in the state or country where the event happened and see what students from a different place in the world feel about that

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[105] D.R. Lavoie, *Journal of Research in Science Teaching,* 36(10), (1999), 1127-1147, 105.
[106] Marzano, *Classroom Instruction that Works,* 110.

conclusion. By using technology a teacher can have students discover the validity of their hypothesis and also challenge them with other people that might be learning the same content from a different perspective. In order to have students formulate an appropriate hypothesis it is the responsibility of the teacher to scaffold the assignment properly.

According to Marzano, using cues, questions, and organizers is imperative to student success in the classroom. Cues, questions, and advance organizers help students use what they already know about a topic to enhance further learning. These tools should be highly analytical, should focus on what is important, and are most effective when presented before a learning experience.[107] Teachers can use technology to provide different kinds of organizers so that it is not the same experience for the students every time. Educators can use stories, skim a text, create a chart, an interactive diagram, or create a graphic image. There are many ways to expose students to information before they sit down and learn it. More importantly the questions that are being asked are how those questions are being asked. Close ended questions will not create a situation where thinking or explaining occurs.[108] It is important for educators to plan out his or her questions ahead of time and to keep them as open ended as possible, forcing students to explain their answers. In a one to one technological classroom teachers can challenge students to search the worldwide web to validate their answers or to question a peer's response. Students must be brought up to where the teacher wants them to be, it will not magically happen, therefore it is important to scaffold and use cues and questions to

[107] Ibid., 112.
[108] D.L. Redfield and E.W. Rousseau, *Review of Educational Research, 51(2),* (1981), 237-245, 113.

challenge students to better understand content.[109] By incorporating technology in the classroom it allows a student to feel comfortable to research his or her opinion before blurting out a response. Through the use of technology and appropriate wait time by the teacher, a student that is not confident in a specific subject can get positive reinforcement to eliminate the feelings of inadequacy.

It is critical for teachers to implement technology in the classroom of the 21st century. Students feel at ease with the technology and it can provide a fun learning environment where students and teachers interact and challenge one another. Dr. Robert Marzano has laid out some strategies for teachers to follow and by applying those techniques along with including technology students can be taken on an educational voyage that will result in learning. Through the use of technology teachers can make curriculum relevant to students. Due to the ability to constantly communicate via e-mail students feel there is guidance in whatever task they are completing. Teachers will still provide notes but of a different variety, just to ensure the information is being properly understood by the students. From there, educators can debrief the assignment and send students on their own for a personal learning experience. Upon completion of that the class can reconvene and debrief on their learning practices and the curriculum. By implementing technology students are not only more engaged in classroom activities but are being given the opportunity to prepare for the real world and acquire a unique set of skills that will separate them from peers in the future.

In order for teachers of the 21st century to employ these new techniques and modern styles of teaching they have to learn and understand the best practice of implementation. It is hoped that best teaching practices will be presented to and learned

[109] K. Tobin, *Review of Educational Research, 57,* (1987), 69-95, 114.

by students in collegiate educational programs. However, it is not guaranteed that in a college education program students will be taught best technological practice, and that is essential to becoming a highly qualified teacher. In order to pass along proper implementation of the technological strategies and best practices I created a professional development at All City High School in the city of Rochester, New York and also went and presented to an education undergraduate class at St. John Fisher College. By targeting in-service and pre-service teachers, I was able to help more experienced teachers change some traditional strategies and younger teachers create unit plans that incorporate the use of technology. Through delivering a professional development to my colleagues and speaking with undergraduate students I shared my research and findings on the benefits of implementing technology in the classroom.

This technique of creating a PowerPoint and presenting to various groups of people within the educational world is helpful for teachers on all levels and future teachers to see the impact technology can have on student success. The reason for choosing to design and present a professional development (PD) is because in my career I have noticed that teachers are not only looking for new and interesting professional developments to attend but also want to spend their valuable time at something worthwhile and directly applicable to the classroom. While delivering this PD at All City I engaged teachers of all ages and opened some eyes to the possibility with technology in the classroom. The PD consisted of Social Studies, English Language Arts, and Special Education teachers that push into classrooms. The reason for choosing to present the PD in the fashion that I did of having a PowerPoint with an open type forum was to engage in conversations with teachers and open the door for questions, personal experiences,

personal practices, and time for more tech-savvy teachers to help those that may need and want additional assistance. By creating a professional development that incorporates time for the teachers to dissect a lesson plan they commonly use and add technology to it, with the help of a colleague, it gave teachers the opportunity to see how through implementation of technology students can get more out of a typical lesson. Through using a PowerPoint I was able to hit multiple sensory's for different style learners. I included pictures and videos into the PowerPoint and kept few words on the slides so that there was more room for discussion and teachable moments. For the undergraduate teachers this technique was very helpful because there was only a small chunk of time, about 20-30 minutes of me talking and then they had the opportunity to read an article and respond to it, and then work with a partner to create a new lesson plan that incorporated technology in the most fun way they could.

The idea of implementing technology in the classroom is that it makes students feel more comfortable and makes the material appear more applicable in the real world since they can work on it through technology. However, one of the greatest components to implementing technology is that it makes teaching and learning fun and it lifts the ceiling on what students can produce. The teachers in the professional development at All City and the undergrad students at St. John Fisher both understood that learning is much more exciting to the 21st century student when a computer, a cell phone, an iPad, or a SMART Board is involved. One take home from the presentation is that teachers, and soon to be teachers, understood that even the shyest or wariest of students can become active participants in the classroom and even lead the way under the right circumstances. In the aftermath of the professional development and the presentation to the St. John

Fisher students I have been in constant contact with the attendees about appropriate ways to implement technology in the classroom.

As the students from St. John Fisher are doing their observation hours or student teaching for some, there are lots of lesson plans being written. Since meeting with those students I have received countless e-mails in regards to looking over lesson plans and checking to see if technology implementation is possible or inserted in the plan the right way. I have been sharing technologically advanced games I use in my classroom with those college students and explaining how to change them to fit his/her personal needs. The Fisher students that are student teaching have responded with positive feedback and one claims to have seen higher test results, though no statistics show that is exclusively due to the more frequent use of technology. Through meeting with these college students directly it enabled me to share my research with students that will be doing their own research in the near future as well as better understand not only what to expect upon entering the "real world" of education but also how to meet students where they are at and raise them up through using a common tool that is understood by students of all ages, which is technology. The teachers at All City yielded similar results.

I am slowly becoming known as the "Tech Guy" at All City High School after hosting the professional development. Colleagues have asked for materials I use and lessons I have developed that incorporate use of technology as well as have asked me to review some of their lesson plans to see where technology would be a good fit. It is excellent to see the research I have done formulate directly in front of me and help teachers throughout my school. Social Studies colleagues have taken time out of their busy schedule, as have I, to meet and common plan lessons to meet the demands of the

21st century learner. Students in my classes enjoy using technology and it a joy to be able to share that with fellow teachers and watch the implementation of such technological advancements yield positive results.

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