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THE EFFECT OF EDUCATION AND TECHNOLOGY ON THE WORKFORCE OF 2020

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I. Abstract

This thesis was done in response to a Hershey Corporation submission to the Center for Supply Chain Research. Hershey is looking prepare themselves to better meet the expectations of future employees specifically in regards to the education of and technological capabilities of the 2020 worker. This thesis provides a visionary look into the workforce of 2020 focusing on high school education, learning styles, and changing technology. Current literature, media, and interviews were used to create a framework for the future based on current data, projections, and ideas. This thesis is centered on the changes in education and technology for the new decade and how it will impact the training and skill sets of the hourly and low skilled workforce of 2020.

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II. Introduction

Hiring and retaining quality workers is fundamental to the success of a business. Today, high turnover and training costs can cost companies millions. Finding the right people for job positions is becoming more challenging as the gap between classroom education and the work place does not seem to be closing. As we move into the next decade, the expectations of employees will change as our education system and technology continues to evolve.

As a society, we have become much more advanced in the past twenty years. Technology is changing rapidly and new hi-tech gadgets seem to be available daily. The technology that five years ago was for the businessman and the wealthy is now in the backpacks of fourth graders. Children have grown up with computers, iPods, and Kindles and seemingly have no trouble adapting to new technology.

The next generation of workers brings with it a set of characteristics unlike any other generation in the nation's history. As the world becomes faster paced and changes to embrace technology, the youngest generation adjusts to that way of life. This millennial generation is unique in the way they communicate, read, solve problems, and learn. Educators and employers must adapt to the digital age and recognize the impact it is having on America's society, particularly the youngest generation, as they move into the workforce.

Hershey Corporation recognized the need for insight into the future workforce to remain up to date and competitive in the industry. Throughout the past decade, workers and technology have changed dramatically. Information technology has become a powerful force changing how businesses function and employees work. Staying on top of

changing expectations and technologies will help in recruiting and retaining quality workers. Hershey wanted information that could help them better understand the future workforce and what technology will bring in terms of training and business applications. This thesis focuses on how education and technology are changing and how corporations can apply this knowledge to current practices.

III. Methodology

When beginning my research, I first read many articles on projections for the year 2020. I did a literature review on current education and technology articles and the outlook for the future. Government agencies, statistical data, opinion pieces, and journal articles all played a part in my literature review. I also read articles about improving education and technology to form ideas on how businesses can prepare for the workforce in 2020. Finally, I interviewed five teachers and one education major: Matthew Lane, Christine Groff, David Masterson, Rebecca Turner, Gina Welsh, and Emily Nash who provided information on all aspects of education and students. These interviews are an integral part of my thesis results. They provided a lot of material and sparked my own ideas on how to better ready the workforce for the generation of 2020.

IV. Analysis

1. Education

a. Education Overview

Education is one of the most talked about topics in America today. It is the center of political debate and is of great importance for the future of our nation and its economy. The educational system is far from ideal, and as policymakers work to correct it, students are suffering the consequences of an imperfect system that is not always preparing them to be productive members of society. This section will discuss some of the recent shortcomings of the education system, where education is headed in the next ten years, and the impact this will have on the future workforce.

Much of the high school curriculum is fact-based and focused on testing. Standardized testing is currently used to evaluate teachers and school districts to see what students have learned. The results are then used to provide remedial education to those who do not perform well and withhold funding for schools that are not up to standard (Edwards, 2012.)

Standardized testing is very controversial. This testing is looked at negatively by many teachers and parents, and ultimately does not seem to be benefiting students. No Child Left Behind (NCLB), a continuation of the Elementary and Secondary Act first enacted in 1965, aims to improve all public schools and hold them responsible to national standards. The law requires academic progress with a goal of being 100 percent proficient by the 2013-2014 school year as well as annual testing for grades three through eight in

reading and mathematics. In 2010, thirty-eight percent of schools were not making adequate yearly progress according to NCLB (No Child Left Behind, 2011.)

NCLB has made schools that are not performing adequately more visible to the general public. For example, Blaine School is a low achieving school outside Philadelphia and a target school for the No Child Left Behind legislation. In 2001 when the legislation was enacted, only thirteen percent of middle schoolers were reading at grade level. By 2004, that number had increased to thirty-six percent (Wallis, 2007.) Advocates of NCLB believe the legislation is improving school districts and giving lower income families more opportunities for better education. They believe NCLB is lowering the achievement gap and improving the poorest performing schools by holding teachers and school districts responsible for the performance of the students (Wallis, 2007.)

Others, although having the same goals of teacher accountability and decreasing the achievement gap, do not believe that standardized testing and NCLB is an effective way to reach this goal. For the first time, the federal government is controlling state education by mandating teacher qualifications and standards for success. Teachers resent the system that focuses so much on examinations and not on broadening education (Wallis, 2007.) The results of NCLB is mixed. Although some schools are showing improvement, in many cases test scores are remaining constant or decreasing (Independent Test Results, 2012.)

Only seven percent of high school graduates are ready to move onto the next step whether it is more education or a job, without remediation (Taylor, 2011.) From 1970 to 2007 there has been a 139 percent increase in federal funding for schools with only slight changes in results: arguably positive or negative (Taylor, 2011.) Based on the 2011

National Assessment of Educational Progress (NAEP) fourth grade students are showing no change in reading abilities and eighth grade students are showing only slight improvements. In mathematics, both grade levels increased by one point from the previous year (Nation's Report Card, 2012.) Not only are test scores barely improving, but the information on the tests are often not pertinent for students, particularly those who aren't going to college.

Math and science shortages are severely affecting the nation's workforce according to the National Association of Manufacturers. However, the most frequently cited problems with employees include attendance, work ethic, and timeliness (Lewis, 2006.) These skills are not adequately being taught to high school students, and these are skills that are essential for everyone regardless of their future career path. Less and less time is spent on these skills, because of the pressure on teachers and school districts on the importance of standardized test scores (Groff, 2012.)

Much of the education section showcases data from the interviews conducted. The interviews occurred at Fairview Middle and High Schools outside of Erie Pennsylvania. The teachers include Gina Welsh a fifth grade science teacher, Rebecca Turner a ninth grade science teacher, Christine Groff a high school science teacher, Matthew Lane a high school English teacher, and David Masterson a high school math teacher. Also discussed is an interview with Emily Nash, a current Mercyhurst College education student. Appendix 1 includes the list of questions asked to each interviewee.

b. Today's Student

Students today are very different from students of the past. This generation is the first to grow up with computers and technology easily accessible for everyday use. Technology is not something to adapt to, but an everyday presence. This transformation has greatly shaped the way students' function and what they consider to be valuable.

Certain abilities are improving while others are getting worse as a result of technology, the new world environment, and education. These areas will be discussed in more detail later on. However, there are several areas in which this generation is simply different than previous generations.

One area is in the "gadgets" children use everyday- cell phones, iPods, tablets, and the apps, games, and communication that come with them. Although these technologies can be used on their own, typically they are used by this generation in conjunction with other activities (Lewis, 2006.) No matter what they are doing, children are also holding texting conversations, playing games, or looking something up on their phone. Multitasking is necessary for these children to be effective, and they are mastering this task.

Social media has transformed the way students interact with each other and what they know about each other. Privacy is very limited making students less willing to take risks. If they fail, everyone will see them. Someone will post a comment or a picture and the risk of failing is too great (Turner, 2012.) The internet and social media have many benefits, but in some ways it is making students more afraid to be creative and take risks. Bullying is on a much larger scale than was ever possible and for many the fear of ridicule from their peers is very great.

Students are also used to tools that allow them to do anything easily. Almost nothing they do in their personal lives requires a lot of time and everything can be done from their home computer. They are used to things being simple and easy (Masterson, 2012.) Education not only doesn't have state of the art tools, but also inherently requires laborious work for concept understanding, projects, and homework. Students see the disconnect between their lives and education and are unwilling to put in the time and effort to effectively learn class material. The amount of effort students are willing to invest increases when they can see the practical application of the material for the real world and their future, but often times they have trouble figuring out how information applies.

High school students today are more focused on finding information for completion as opposed to really learning material. When they need to find the answer to a question, they turn to Google or Wikipedia, read three sentences and have an answer. This is what they do in everyday life and this easy answer mentality is being incorrectly applied in an educational setting. Students read in a "browsing the Internet" way, focusing on short pieces of information and simple understanding. Reading in all areas is becoming much more superficial, and today's student does not know how to analyze long documents for a deep understanding (Groff, 2012.)

As reading diminishes so does research. The Internet is the source of information for everything, but not all information is created equal. Students struggle to differentiate between high and low quality pieces of information (Turner, 2012.)

Students today are not living up to the standards that the workforce is placing on them when they enter the "real world". Student life and education are disconnected and

education and the workforce are disconnected making the gap between student life and the workforce astronomical (Rich, 2011.) Students today are different because of the world they are growing up in, but there is hope for change. They must be taught the right skills to succeed in a way that makes sense to them. A student's need to understand why they should learn something and what they will gain from learning certain information or skills is not something to frown upon, but to embrace. High quality and efficiency need to be balanced and the school system needs to teach them how to do that. Today's student needs direction on how to succeed in the workforce, and the education system is falling short.

c. Teaching Today

Today's student is changing and the student of the future is likely to become more polarized. Obviously teachers play a large role in the development of students. Not all teachers are the same, but based on those interviewed for this research, several characteristics are fairly constant across the board and play a large role in the development of the student as they move through the education system.

The biggest problem with today's teacher is the inability to focus on a student's needs. All the teachers and the education major as well mentioned standardized testing as being detrimental to the student population. In Pennsylvania, fifth graders have three weeks of testing, eighth graders have four weeks, and typically an additional two weeks are devoted strictly to preparation for the tests (Welsh, 2012.) In many other districts and communities, preparation time is tripled or quadrupled. This testing is lost instruction time and takes time away from developing the skills that are valued in today's workforce

and in today's people. Today's teachers believe teaching should focus on how to learn, study, and work on developing soft skills, but the testing standards and environment does not allow time for that information to be taught.

Soft skills include creativity and innovation, problem solving, critical thinking, communication, collaboration, flexibility, adaptability, responsibility, and self direction (Welcome, 2012.) None of these skills are easily testable and none of these are currently being tested for on standardized tests. The emphasis on standardized testing is very extreme. "We are very far over on the pendulum of standardized testing. Hopefully this will swing back over and decrease the current emphasis on fact based learning," (Groff, 2012.) Teachers are inhibited by the testing and feel an enormous pressure to perform well. "The problem isn't with accountability, but current standardized testing is not the way to go about it," (Groff, 2012.)

There are strong movements toward teaching necessary skills, but there is simply not enough time to teach those, the general curriculum, and make sure students are prepared for the state examinations. Teachers are teaching to the exams. Anything not on these state examinations are "hit or miss" depending on the school district, teacher, and classroom. Many schools still are not performing at the state standard, which continues to decrease the amount of time spent on any material not on the exams. The disconnect between government standards, teachers' education and ideas, and student needs is stunningly large.

Testing is also affecting the attitudes of teachers. Basic education courses are instilling beliefs that government testing is inhibiting the growth of students and the effectiveness of teachers (Nash, 2012.) Nash, a junior at Mercyhurst College, stated that

ninety-eight percent of her education courses discuss No Child Left Behind. The courses have taught her that the government is causing the gap in education. “The government wants teachers and schools to be at a certain level, but are simultaneously cutting funding and jobs,” (Nash, 2012.) Whether this is true or not, it is creating an animosity and anger in teachers across the board.

Teachers are very defensive about the way they teach and are quick to disregard suggestions made by administration or government. Every teacher (and the education student) interviewed got very defensive when No Child Left Behind was mentioned. All of them had a lot to say to defend themselves and justify what they are currently doing in the classroom. The research questions were very open and inquisitive solely to gain research information. The teachers were aware of this and yet really couldn’t control how defensive they got. It seems to be fairly engrained in these teachers, either from first hand experience or the education they have received, that the testing is bad for them and for the students as well.

Teachers believe they know what works in their own classrooms and get angry when they are told to change by outside sources. College courses in education teach research and evidence based teaching techniques for the students to use when they have their own classrooms. These teachers have degrees that have taught them how to manage a classroom, develop a routine, stay organized, and how to teach effectively (Nash, 2012.) Teachers, who have faith in their education and have seen the research behind the methods they use as well as successful application in their own classrooms, are unlikely to change to new ways of teaching or new government suggestions. Many teachers have

positive intentions and want to do what works. In some cases, this is taking a negative toll on students, as teachers are unwilling to adapt to a student's changing needs.

The interviews conducted at Fairview Middle and High Schools provided insight into the nature of many teachers' attitudes. None of the teachers interviewed have changed their teaching techniques in the past ten years except for the inclusion of more technology in the classroom. Where technology is used, it is fairly minimal. The experience with technology in the classroom is generally less than what students are getting outside of the classroom.

Computer usage is one example of that. According to the U.S. Census Bureau in 2009, 74.3 percent of individuals in Pennsylvania (68.7 percent nationally) live in households with Internet access (Computer and Internet Use, 2009.) Having a computer at home was not a question asked in 2009, (it was last asked in 2003 with 61.8 percent having a computer at home) but it is very likely that this number has increased dramatically in the past nine years (Computer and Internet Use, 2009.) The internet is so easily accessible from computers, mobile devices, and tablets, that young students don't consider it to be a tool, but more just a part of everyday life.

Matt Lane, an English teacher at Fairview High School, talked about how he uses computers in his classroom almost daily for writing and reading assignments in his English classes. David Masterson, a math teacher at Fairview High School, has utilized webinars and intends to take a virtual field trip with his class. He has also used a program where students can text in answers and it polls the results. These methods tend to help in keeping students engaged and interested in the material. Computers have become such a part of daily life that the devices have naturally become part of the classroom when they

are available. Yes, computers incorporate more technology and teach students skills that they can use in the workplace, but technology has advanced way beyond the general use of the internet and Microsoft Word, and most students already have a basic understanding of both to function effectively (Horn, 2011.)

These teachers are aware that education lags behind the outside life of a student. When the goal is educating students with limited resources, once teachers find what works, they tend to stick to it. There isn't much variance in the students year to year and they do not expect there to be any major changes in the next ten years besides gradual technology implementation. Teachers do not expect education techniques to change, but do expect slight changes as technology develops to keep students engaged. The teachers also commented that adaptations are made each year as they evaluate the needs of the class as a whole and see where remedial education is needed.

Pressure on middle and elementary school teachers to provide individual attention to the specific needs of each child is increasing. Having small class sizes is one of the easiest ways to provide students with individual attention. Small class sizes have been credited with improving test scores, closing achievement gaps, fewer high school dropouts, and higher student success (Class Size Reduction, 2012.) According to the Pennsylvania State Education Association, optimal class size for second through fifth graders is eighteen or fewer students. Welsh stated that her fifth grade classroom had thirty students (Welsh, 2012.) Teachers are being told what should be done, but are not given the resources to follow through effectively.

Today's teacher is frustrated. Classes are too large, testing is too restrictive, there is too little time, and there are too many people telling them exactly what they should be doing and how to do it.

d. Student's Decreasing Abilities

The shortcomings of students today is evident in test scores, literature, and through the teachers who interact with these students everyday.

Critical reading or reading for information is getting worse among students at all grade levels (Nation's Report Card.) Students are most comfortable reading short articles and snippets of information to get facts quickly. When presented with longer documents, students only read or retain parts and as a result are misinformed and make careless mistakes (Groff, 2012.) The students have problems putting the facts together to form main ideas and getting a higher level of understanding. Today, teachers find a greater need to teach people how to think as they read. Matt Lane is now teaching his students how to read longer documents and maximize information retention, because he realized almost none of his students read effectively. However, for most American students, this skill is never being taught and therefore not a skill most students have. Our fast-paced, information-flooded society is continuing to grow and teachers expect reading abilities to decrease in the next eight years.

Gathering reliable data and facts has been a challenge with the expansion of the internet and the sheer amount of information available (Maynard, 2009.) In the minds of students, search engines are all knowing and the first few links often serve the purpose they need. Turner, a science teacher at Fairview High School, has found it difficult to

convince students of the necessity to find more reliable sources. “It takes kids out of their comfort zone and takes significantly more time” (Turner, 2012.) This alone has had a significant effect on research. Even for everyday questions, children have become reliant on Google and other search engines. They no longer see a need to memorize information that is easily available to look up. Finding information is the same for them regardless of the purpose: look it up on Google. Obviously, this is not a reliable way to find information for all academic purposes. Students are struggling with determining good sources from bad ones and how to compile credible sources of information to get the answers they need.

This problem with using internet sources is seen in middle schools as well. Welsh’s fifth graders disregard any knowledge they have and turn to the internet for all of their answers. For example, Welsh had a student doing a report on horses and in the report she spelled horse as ‘whorse’. The girl knew how to properly spell horse, and when she was asked about the spelling, she said that it is what she found on the internet. Another example are students in her science class who are convinced that they spelled the vocabulary words wrong, because spell check doesn’t recognize them. They’ve seen the words before and know they are spelled right, and yet when the computer doesn’t know what it is, they think they have done something wrong. These fifth graders are losing confidence in themselves and turning to the computer as an all knowing source of information. “They think the computer is smarter than they are. Even when they know the answers, they turn to the computer to look it up instead of answering on their own” (Welsh, 2012.) This mentality is carrying over into high school and beyond.

Work ethic is also diminishing in today's students. There are an increasing number of students who only do the bare minimum required of them. There is a big pushback on homework causing many teachers to adjust and decrease the amount they give (Masterson, 2012.) The answers to a lot of homework questions can be found on the internet. If students don't want to learn the material, they don't have to anymore. Students have become used to this lazy approach to education, because so much of the information we need on a day-to-day basis is easily accessible on the internet. They do not have the drive to stick with difficult tasks particularly when they do not see the greater importance. Putting in a lot of time and hard work to gather information, study, or do homework does not resonate with students simply because that is not what they do for anything else in their lives. They live in a world that is constantly connected, and the students are accustomed to instantaneous results.

Mental math has taken a turn for the worse in the past several years. Technology is a culprit in decreasing the mental math abilities of students because calculators are everywhere, easy to use, and cheap. Masterson, Turner, Welsh, and Groff all noted that students don't do anything without a calculator. The idea of doing math without a calculator scares students and has created a dependence on devices to do any calculations.

Social skills are decreasing partly due to a reliance on technology, but also because students' preference to communicate in other ways does not help improve traditional social skills. Students don't need to have face-to-face interaction with people to communicate. As a result, when interacting with others, particularly adults, communication is hindered. Simple acts of respect and courtesy such as using people's names, making eye contact, not interrupting, and compromise are lost on many of today's

students (Welsh, 2012.) This can have serious implications in the future as children grow up and are unable to interact appropriately with others. The cause of this is likely to be technology and education, but also parents and families that aren't teaching children how to interact with adults.

The hovering parent is a serious problem for today's child and is likely to cause serious consequences in the future. Parents are very connected to the schools and are more aware of exactly what is going on in the classroom and the grading system. Teachers need to maintain order and keep their classrooms organized. This requires giving direction and specific instructions. However, because of the constant direction, when given the opportunity to act independently, many children do not know what to do. The ability to self direct is lost on today's youth (Welsh, 2012.) They need constant instruction and are not able to step "outside the box" and get creative. Children have lost the confidence to do things on their own, because everything is done for them. Whether it is a parent fixing a child's problem in school or teachers who are unwilling to relinquish any control to the students, children are simply not as creative or independent as they have been in the past. Teachers are noticing this difference in students and expect it to get worse as we move into the next decade.

Students are also getting lazier. This spans from the rising childhood obesity epidemic to not wanting to look up the correct answer when they think a teacher is wrong. Turner said her students challenge authority and are much more willing to speak out than students of the past. They want to know why things are the way they are, but do not want to look up the information and find out for themselves. Groff also talked about the argumentative nature students have today stating that they want justification for why

they should learn. Students want to know why they need to know the information in the real world. More often than not, they don't, which does not provide students with an incentive to learn.

e. Students' Increasing Abilities

There are several areas in which students today are stronger than those of the past. Multitasking has become second nature to children today. When it comes to performing simple tasks, today's student can do more in a faster amount of time than those of every other generation. This can be attributed to technology making tasks easier to complete, and the mastery of this technology to get answers and results quickly and efficiently is evidenced only through this new generation. For this generation of students, efficiency is not just something to strive for, it is expected. When faced with multiple tasks, students can balance the demands and get it done (Meeting the Challenge, 2011.)

Time management skills, although always something that can be improved upon, are increasing. Children do more today in all respects than those of the past. Technology has added a socialization component to pretty much everything children do, which is another task to be completed on top of everything else. A big part of today's student is sharing information via social media, texting, and cell phones. Middle schoolers have no problem texting several friends, chatting on Facebook, reading about their friends on Twitter, playing Words with Friends, while doing their homework. This way of getting things done and communication may not be ideal for the older generations, but it certainly is the preferred method for these children.

The constant connectivity has benefited students making collaboration an engrained skill. Students expect to collaborate and are more comfortable seeking out others' help and working together than previous generations (Taylor, 2011.) Children are willing to share a lot more, are more comfortable working in groups, and helping each other learn. They recognize the perspectives of others and can truly maximize the benefit of working together (Lane, 2012.) The internet has provided a platform for them to work together for anything they do. Most of the time a partner to help them or an answer is only a few clicks away, and students have become experts at navigating areas of the internet that help them on a day to day basis.

The tools for collaboration are available via technology. Google docs, Facebook, Linked In, Twitter, blogs, and online forums and discussions all serve a purpose for today's student. Society in general is becoming more collaborative. For the rest of society it may be a slow change as we get used to new processes and ways of doing things. For these middle and high school students, it's all they know. They take advantage of these tools, because it's how things get done. This generation is leading society on the technology front through their constant socialization, need for getting things done quickly, and the high value they place on multitasking.

Although socialization has shifted from person to person contact to social networking websites and texting, one can argue that the social skills of this generation are improving, especially in respect to communicating with peers. As previously discussed, social skills are decreasing but communication arguably has become more direct and effective. The constant connectivity allows children today to be aware of what their peers are doing and where they are at all times within seconds. Based on Rebecca Turner's

observations in her ninth grade classes, she believes that the increase in online and phone communication has translated to more interaction in the classroom and in school. She has noticed that cliques are less defined than they were even five years ago.

f. 2012 to 2020

Education will change between 2012 and 2020. There is a well-known problem with current education and the government is trying to decrease the gap. The Common Core Standards, adopted by forty-five states, aims to provide a clear set of requirements for students to be successful in the future (Common Core, 2012.) No Child Left Behind (NCLB) has provided legislation guiding what teachers need to do in the classroom. Right now the future of education legislation is up in the air. All teachers are skeptical about any new legislation being signed before the fall. Most likely any reform will not be signed until after the November election and at that point there will be a much better idea of where education is headed in the immediate future.

However, educators recognize the need for reform. No Child Left Behind is controversial and will likely be amended. The National Education Association has issued a 170-page document aimed to improve the current Elementary and Secondary Education Act (ESEA). Current NCLB tests are multiple choice questions focused on facts and memorization. The new proposal wants to assess high school students in several different ways such as projects, exams following each course, and high school exit exams (NEA, 2012.)

Pennsylvania is taking an initiative to improve the current national testing system by implementing Keystone Exams. Starting with the class of 2015 (today's ninth

graders), students will be required to take examinations after completing particular courses to demonstrate proficiency in the subject (Keystone Exams Power of a Great Education, 2012.) Teachers feel this is a step in the right direction for testing. Particularly for the sciences, these exams will better evaluate student's knowledge and abilities.

Overall, the Keystone exams are one step toward education reform in Pennsylvania. New York has the Regents exams, which are similar, but not all states are taking this initiative. Changing education regulations will be a long, slow-moving process as controversial legislative processes normally are. Giving teachers more flexibility will let them teach for the benefit of the future student.

It is difficult to change education to match today's world, because the workforce and work environment are changing so rapidly. New technologies, new jobs, and new employer requirements all impact what should be taught to students in schools. However, legislation and testing, two things which impact education nationally, cannot easily adapt to change (Robinson, 2006.) Soft skills will increasingly become the center of education, because they can translate to any job and are a marker for success in the workforce.

High school graduates are not ready to enter the workforce and the future of teaching is likely to evolve to better match workforce requirements. According to a 2006 survey and report from The Conference Board, some of the most important skills cited by companies for employees to be successful include: work ethic, oral and written communication, collaboration and teamwork, and problem solving. Critical thinking, self-direction, and high personal expectations are also cited as being indicators of success (Meeting the Challenge, 2011.) Based on the analysis, employees with a high school degree are deficient in all of these areas except for collaboration and teamwork (Casner-

Lotto, 2006.) The interviews from the teachers corroborate this information showing collaboration as an emerging strength among students, but professional communication, problem solving, and work ethic are all decreasing.

Therefore, high schools need to educate students to exemplify these skills upon graduation. High school graduates are unable to apply the skills they are learning and are not performing to the expectations of the workforce (Rich, 2010.) Candidates at Ben Venue must pass a basic skills test showing ninth grade competency in reading and math and a large number of applicants are failing. Because of this skills shortage, they cannot fill open positions (Rich, 2010.) This knowledge is widely available and people are working to come up with ways to change education to correct the problem. Many educators know what needs to be improved and the rest of the country is well aware of the skills gap between high school students and productive employees as well. In the next eight years, education is very likely to see a shift toward emphasizing these skills employers are deeming necessary.

Regardless of what happens with legislation, education will change in the next eight years and beyond. Eighty-two percent of kids are gamers, seventy-six percent have iPods, sixty-six percent own cell phones, and twenty-nine percent have laptops (Taylor, 2011.) E-learning has already made strides and will continue to expand in the next eight years. E-learning will become more consumer driven and individualized for students to gain the maximum amount of utility they can (Technology in Education, 2010.) It will also provide options for students whose schools don't offer certain classes or curriculums. It will be used to decrease the education gap between different demographic

areas. Access to quality education will be available universally online for anyone to utilize.

Education has yet to fully embrace the gaming world and take advantage of the interest children have in computer and video games. Matt Lane talked about education lagging behind what is happening in the workplace and educational gaming is an area that schools can utilize to bridge the gap and engage students in both old and new concepts. Games have been shown to improve communication, collaboration, problem solving, and math skills (Klopfer, 2009.) These are 21st century skills that are valued in the workplace today. These gamers make decisions faster and can process information faster than non-gamers. Gamers make up a majority of this generation. Encouraging students to learn and achieve through games, speed, and technology- all of which they do everyday after school- is likely to increase motivation and understanding of the importance of the skills they are learning (Klopfer, 2009.)

Future teachers will see an increase in e-learning, bring your own technology initiatives, and corporate involvement in the schools. The e-learning initiative is only beginning to grow. YouTube channels for education, high school and college courses available online, and the sheer capabilities of standard computers are leading the way for the explosion of e-learning. Flexibility and autonomy are going to drive education into the next decade and beyond (Newby, 2006.) YouTube is starting to find its niche in the classroom and by the year 2020, YouTube will become much more habituated into education. Utilizing videos that students can watch on their own time, and control the pace of, will increase understanding. It will provide individualized learning without the pressure on the teacher to make thirty different lesson plans unique to each child. Instead,

children can watch the videos, learn the material, and use the teacher for questions and to show examples once they have reached a certain level of mastery. It is known that a lack of academic understanding and boredom leads to high school dropouts (Meeting the Challenge, 2011.) Giving students control over their own education will help decrease this number and form a new type of classroom.

For example Salman Kahn has used YouTube for exactly this purpose and has been very successful. He has now created a series of YouTube videos for educational purposes. He got started by using the videos to help tutor his cousins when he was out of town. His video tutorials quickly became a teaching tool for students who needed extra help, advanced students who wanted to learn extra information, and for teachers to use as a teaching supplement in the classroom. In Khan's Ted talk he says that teachers have been assigning his videos for homework and doing what was traditionally homework in the classroom (Khan, 2011.) This gives students an opportunity to ask questions, get individual attention, and work together with peers to really understand the concepts.

It is interesting that his talks really aren't that exciting and yet have really resonated with students. This drives home the point that today's students do not need to be entertained constantly, and they still have motivation to learn without making everything fun. Student's can fast forward, rewind, pause and think, and move entirely at a speed of their choice. These videos are much more in tune with how students' lives actually are, and they are comfortable with this method of learning. The traditional classroom is obsolete and the more the classroom can evolve, the better off students will be.

Another benefit will be for students with interests outside of what their high school offers. They will be able to take courses that interest them over the computer. This capability exists today, but has not broadly reached the high school level yet. Education needs to catch up to the rest of the world in terms of its technological abilities to properly engage students and show them the value of what they are learning and its transferability to the real world. Simply adding real world technologies and processes that they are familiar with will help schools to increase engagement and interest.

Teachers are also likely to implement Bring-Your-Own-Technology into classrooms by the year 2020. No school has the funding to get the newest technology each year and keep up with how rapidly technology changes. But more often than not, students have some high tech "gadget" at home (that they love to use) that can be useful in an educational setting (Freedman, 2012.) This will pose a challenge to teachers to adapt to new technologies that will vary from student to student, but will help engage students on their own level in a way with which they are familiar with (Casner-Lotto, 2006.)

Ultimately those paying the price for these under-educated high school graduates are the corporations they work for when they graduate. If they can pass the state tests, the teachers are labeled as competent. If the students land the job, they have reached their goal. Corporations are the ones left with employees whose skill sets are not up to par with current workforce demands. Unfortunately, in many circumstances, there are no better options for employers. Because of the large impact under educated students have for corporations, they are likely to play a larger role in the classroom.

Project Red is an education program sponsored by private corporations that will be talked about later, but is just the beginning of corporate involvement in education. Real case studies are likely to be used at the high school level emphasizing math and science and how it can be applied in the real world. Corporate sponsored learning factories could provide another facet to education and a hands-on experience students don't get now (Europe, 2004.) One way to bridge the disconnect in education is to get corporations directly involved by sponsoring local schools to bring change to traditional learning methods.

By 2020 teachers will be on the road to change, provided legislation and standardized testing are not overtaking education. National initiatives need to be focused on developing the student as an overall person with skills such as the ability to solve problems, take initiative, and be creative. In 2020 changes will be enacted, implementing technology where possible and bridging the gap between the real world and the education system. Students will be better prepared and recognize the necessity of soft skills, but on the job training will still be invaluable.

2. Technology

a. Technology Overview

Technology is a common word in today's society often referring to computer technology. In general the term is used to describe equipment developed from scientific knowledge applied in practical purposes. It can be used to improve current processes or develop new functions and devices. There is a reason that technology continues to grow and expand daily and reaches across all barriers to link the world together. Not only has technology made current jobs and processes easier and provided an expanse of tools that help in almost all situations, but also has created economic growth, new jobs, and a new approach to problem solving. The value of technological skills should not be overlooked and will continue to be necessary to compete in the workforce.

Not enough technology is being used for children's education and companies are now stepping in to develop this future workforce and strive to change what students are learning in school. What students are doing outside of the classroom is driving education, but developing student's understanding of the value of technology is falling short (Student Shortcomings, 2008.) For technology to be properly utilized and taken advantage of, education is required and plays an integral role in the skill set they will take into their occupations in the future. Education needs to collaborate between utilizing and teaching technology to effectively teach students how to succeed in the future. Technology is exponentially expanding and more and more industries are using it in everyday tasks.

In the next several years, technology will see significant changes and developments. The industry is very fact paced and in the next eight years developments

in mobility, data gathering and utilization, three-dimensional technology, and data sharing will all see significant improvements. Areas including education, business applications, and other industries will continue to undergo vast changes and see considerable process improvements by incorporating this new technology. For these students to be prepared to meet these technological challenges of the future, education needs to incorporate technology into the learning atmosphere. Schools will always have to catch up to the marketplace as new innovations develop because of limited funding and the need to build new programs that take a lot of time.

However, education does not end at high school graduation and no matter what students' immediate plans are after graduating, at some point these students will enter the workforce. Companies, that have the labor supply and funding, will ultimately be the ones implementing the latest and greatest technological innovations and will need to supply the education for its employees to be successful.

b. Classroom Technologies

The classroom is slowly integrating more technology and becoming more technologically focused. In 2010, ninety seven percent of schools had Internet connectibility (Technology in Education, 2010.) Today the focus is on expanding technological infrastructure. Some schools still need computers and physical technology, but for many districts the initiative now lies in expanding bandwidth. With the growing capabilities and complex video and audio that is presently available to supplement teaching in the classroom, bandwidth expansion is integral (Technology in Education,

2010.) Students need access to the technologies that have the potential to resurrect learning.

Websites, prezzies (elaborate multimedia presentations), and online activities are all helping with expanding the breadth of learning in the classroom. Some teachers use technology because they think it enhances the presentation: websites are better than showing powerpoints, which are better than writing on a chalkboard. This is not necessarily correct and not truly how education should be focusing on bringing technology into the classroom. Instead, focus should be on accuracy of information, interactive learning, project based learning, and effective instruction through the use of technology. Technology is something to be brought into the education system to teach students how to properly use it and to show how it can be beneficial to accomplish tasks in the real world. Current use of technology is not necessarily creating a deeper understanding of the material, but utilizing technologies that students use helps creates value in the material (Masterson, 2012.)

Maximizing the benefit of technology starts with getting the youngest generation familiar with and comfortable using it. There is a strong link between technology and education, each enhancing the other for the betterment of society. Technological innovations have strongly enhanced globalization, supply chain processes, record keeping, and a wide array of processes throughout companies and organizations. Schools are the natural place to make new technology commonplace and ensure that as more innovative solutions become available, workers will be able to adapt. Technology is making its way into the schools in several different ways.

E-learning is expanding and with more capabilities than ever before, it will continue to increase as people find it efficient and able to provide quality education. By 2019, it is projected that fifty percent of all high school courses will be in an online format (Horn, 2011.) This isn't to say that schools as we know it will cease to exist, but online learning will gradually change the structure and delivery of education in public schooling. Currently online learning is being used by students where there isn't another alternative such as by certain advanced, remedial, or homeschooled students and very minimally as a sole source of instruction. The push for e-learning is to transform education and bring all schools up to excellent standards. The future for exclusive e-learners is not likely to rise above ten percent of the student population, but blended learning has the potential to effect many more students across the country (Horn, 2011.)

"Blended learning is any time a student learns at least in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, and/ or pace," (Horn, 2011.) This is already occurring in several select schools across the country, but has the potential to greatly reduce cost and improve the quality of the current system. There are several different models that have been developed for blended learning as shown in Appendix 2. Using the models as a guideline, districts can personalize programs that would suit the needs of their specific population. Many methods of blended learning use programs that allow students to work at their own pace, receive frequent feedback, have options to get teacher help, and utilize preferential learning modes. The opportunity to cut costs in terms of space and staffing can transform the cost of education. Teachers in this type of environment said they have more opportunities for critical thinking, writing, and project

based learning, which are all areas that teachers in traditional schools feel they don't have time to develop (Horn, 2011.)

Application of blended learning is not far off in many of today's schools. Some have already taken the leap and have had significant improvements. Carpe Diem is a high school in Arizona that fully embraced blended learning when it had to dramatically cut its budget. Sixty-percent of Carpe Diem students are eligible for free or reduced-price lunch, and they are now ranked first in the county in math and reading. The district was able to cut costs with its implementation and hire high quality teachers with higher wages and benefits (Horn, 2011.)

Today there are still significant barriers for blended learning to grow. First, there is still controversy about how much technology should be implemented into the classroom and at what cost- both financial and human resources. Another issue is that the functionality needed from online products is still not up to par. Systems, courses, and online tools are not easily linked together or able to form an entire learning program with high quality and dynamic content for students (Horn, 2011.) One of the obstacles for blended learning growth is lack of teacher and policy support.

Teachers realize that with an expansion of technology in the classrooms, their role is becoming smaller and smaller (Buchen, 27.) It is very unlikely that the role of a teacher will become obsolete, but the role of today's average teachers will diminish and demand for high quality, specialized teachers will be very high. Teachers do see technology as a potential job threat and the growth of technology in the classroom also makes them uncomfortable. Teachers are typically not very technologically literate and are unfortunately threatened by the power of this machinery. We need technology and

education to work together, and frankly, if they do not technology will take over, but the effects will not be as positive (Buchen, 26-28.) Technology expansion can't be stopped, and we need to embrace the potential technology has to change the way we learn and teach for the better.

This transformation obviously still has a long way to go. If the regulatory structure of education does not change, there is a large risk of technology blending into education's current structure as an added benefit and not at all something to be considered revolutionary (Horn, 2011.) These total school transformations are happening in charter schools where they have more autonomy. As more schools adopt new formats and are as successful as current schools that have implemented blended learning, it can highlight the potential to the rest of the nation (Horn, 2011.) Currently, there is not much room for schools to change too radically because of policies and regulations in place. The area of blended learning will be a major issue for education reform and classroom reform. The transformation of schools through this student and productivity-centered approach to education could prove to change the future of our country.

Another focus of technology in classrooms is with cell phones. Traditionally in K-12 schools, cell phones have been banned, and there is punishment for having cell phones out during class. However, there is a growing initiative for cell phones to be used for educational purposes in schools to not only to keep the students engaged in the material, but also to show students how useful their phone can really be.

By 2015, the internet will be accessed from mobile devices by eighty-percent of people (Johnson, 2011.) The number of mobile devices in schools with internet capabilities is likely larger than the number of computers. The power and practicality of

mobile devices continue to increase and more capabilities and faster speed is built into every new phone. Utilizing this widespread and existing technology has a strong presence in higher education, but has yet to take off in secondary education. Mobile devices allow simple tools to be integrated into the classroom without the infrastructure or investment, particularly if students are using personal cell phones. Different polling applications and websites allow teachers to do instantaneous polls in the classroom (Johnson, 2011.) This is something David Masterson mentioned using in his classroom, but it is important to recognize that it is just the start of what can be accomplished in terms of cellular technology and education.

There are currently mobile applications in practice for many academic disciplines. For science related fields, mobile devices can provide reference information (Taylor, 2011) and formulas, help visualization by actually showing 3D structures, and help students to see different laws and reactions at work (Johnson, 2011.) Applications like this can organize information and provide a thorough and comprehensive learning tool accessible anywhere. Mobile technology can provide a platform for personalized learning, collaboration and individual work, and game-based learning. Combined, these can transform the way students learn and how they look at education's importance for their future.

c. Technology as a Tool

Most people assume that the generation of 2020 will be very comfortable with technology, because they have never seen a world without it. Students today are so used to a world infused with technology that it has become second nature to use technology in daily processes. This generation is considered to be experts in the field of technology and

most easily able to adapt to the rapidly changing technological tools. However, for many students, this idea is far from accurate (Student Shortcomings, 2008.)

Starting from a young age, students believe computers to be all knowing. In school, students are quick to re-evaluate their own knowledge if it doesn't match what the "computer" is telling them (Welsh, 2012.) Teachers know that "computers" don't give you information, but that it is one tool to extract information and use as a resource. Computers are not perfect, websites contradict each other, and not all sources are in any way created equal. Young students looking at computers as an all-knowing source of information are not seeing this technology as a tool, but rather as fact. Part of this stems from the inability to do research effectively on the Internet and from not discriminating source material (Groff, 2012.)

Social media and games seem to be second nature to students, because it is what they spend a lot of their free time doing. A lot of people are uncomfortable with using technology as a tool and for seeking out accurate information, but are comfortable using it for social purposes.

The same basic technology underlies "computer hobbies" as basic research and communication tools, but students are not properly educated on using technology effectively. Fifteen of Turner's class of forty high school freshmen did not know how to send an e-mail to themselves and attach a file to it. For school they are required to create an e-mail account, but a significant number of them had no idea how to use it. Turner also found that Excel was very foreign to the students, and that many didn't know how to use the program.

Students like technology and the interactive capabilities that come with using hi-tech as opposed to traditional systems. But, children have trouble coming up with search terms, which is a necessary requirement to extract information from any search engine. Plagiarism has also become a huge problem. Evaluating material is not a strength of this generation. Speed is valued much more and therefore very little time is spent looking at information for accuracy or even relevance. As discussed earlier, students really struggle when reading text for informational purposes. It has been found that students show a strong preference for visual information, because of the difficulty of processing large amounts of textual information (Student Shortcomings, 2008.)

Developing skill sets with existing technologies is not where the focus of education is currently, but there are programs with that focus. Project Red is a program, founded by Intel, attempting to revolutionize education and determine how technology can be effectively incorporated into classrooms. They are doing a lot of research and conducting a national survey to see how technology has changed schools thus far, the impact the internet has made on classrooms, and they are looking to find proof of cost savings due to technology implementation in primary and secondary schools (Project Red, 2009.) It is interesting to note that Project Red is funded by many corporate sponsors, primarily Intel but also HP, SMART, and the Pearson Foundation. Education is on the road to change, but it needs outside help and will take time for implementation.

Project Tomorrow is a national non-profit organization "dedicated to empowering student voices in education." They seek to find out how technology is used, benefits of technology for learning, and student attitudes on different academic subjects. The program primarily aims to help individual districts and participation is strictly voluntary.

The schools facilitate the surveys and Project Tomorrow analyzes the results. This agency seeks to evaluate and help schools personally giving them feedback that standardized testing could never accomplish (About Us, 2012.)

The previous section discussed education, some of the shortfalls, and the problems with student's skill sets. However, the main problem with education is its integration, or lack thereof, of technology into the classroom and effective teaching on how to use these tools. Students and technology are the future and with the world increasingly becoming digitally oriented, more processes becoming automated, and exponential growth just seconds away, these kids need to be ready to embrace this new world and be ready to teach the older generation how to be a part of it as well.

d. 2012 to 2020

Technology will continue to grow exponentially and redefine our daily lives as we move into the next decade. The future of technology is in two categories: networks and interfaces. Networks will connect technology devices, enable collaboration, and sharing of information. Interfaces will connect devices with humans allowing people to maximize the benefit they get from new technology by becoming intuitive and user friendly. Technology will be valued on usability and human characteristics contrary to today's feature driven approach. Technology companies will try to evoke certain emotions from consumers and adapt specifically to consumers needs (Future of Technology, 2005.)

With our world becoming increasingly technology oriented, the way people behave will also change. Technology will bring transparency and accountability into the workplace and ultimately produce more honest workers. People won't be able to hide

their actions or escape from inevitable responsibility (Future of Technology, 2005.) Inability to use technology will become more transparent as technology becomes a part of many occupations. Technology will inherently change the way all employees work, as it becomes integrated into the workplace of the future.

Technology is going to become more and more apart of life. An unwillingness to use technology or an inability to learn and adapt to new methods with technology-oriented processes will not be possible in 2020. Almost all jobs will require a familiarity with technology and using computers and electronics on some level. Technology will continue to expand and adaptability will be a skill required by all employees. Moore's Law is based on technology growing rapidly and becoming increasingly cheaper. Companies will continue to find added value from implementing new technologies in terms of cost and efficiency, provided employees are able to keep up.

By 2020, some common technologies will include high-level 3D, gesture based computers, flexible computers and electronic paper, and expansion of RFID. Three-dimensional technologies are just beginning to come into the marketplace today. The barrier for entry into the 3D market is decreasing, setting it up to be a strong force in the year 2020. Smart phones will be capable of projecting data and keyboards onto surfaces and will have the ability to turn any flat surface into a touch screen (Blum, 2010.) The abilities of smart phones will advance having capabilities of today's full functioning computer, but with more potential for projecting, transporting, and sharing. Smart phones will take on a new form. Instead of screens for people to touch and see, glasses will be used to project a high-resolution virtual display (Roy, 2011.) These glasses will

not just be a phone, but will also have many of the expansive capabilities of today's smart phone applications.

3D immersion in a virtual reality world will not just be used for gaming and movies, but will serve a more practical purpose as well. It will become a common way for people to interact personally and for business meetings making distance really a problem of the past. Displays and people will be able to be projected in 3D, making meetings, prototypes, displays, and long distance communication much easier and realistic. Pop-ups in the visual field about who is presenting or about what you are looking for are not out of the realm of possibilities (Roy, 2011.)

As in the way touch screen has become the norm today, computers and other technologies will start to utilize gesture control (GestPoint, 2012.) Computers will be controlled through a wave of the hand, as the way the current Kinect video game consol operates. Hand movements will be able to manipulate 3D objects in the air and current MIT researchers are developing ways to interact with gestures over the internet uniting the Kinect and Google Chrome. Others are looking at how to track the entire hand and how to interact with the iPad by using gestures. Three dimensional visualizations naturally will be used in gaming and use of computers, but has a lot of potential for simulation based training and learning (Johnson, 2011.) Research in this field is expanding quickly and the possibilities that will be capable are unbelievable. Touch screen kiosks will increase in popularity with gesture based kiosks becoming an emerging trend (Blum, 2010.)

In 2020, it is likely we will be able to fold up our e-reader or computer and put it in our pocket. Flexible screens are already available today, but they will be much more

common with higher capabilities. They will be lightweight and very thin making them ideal for curved surface, large displays, and easy transport for personal use. The technology will allow for more creativity in the look of screens and where they can be displayed (Blum, 2010.) This technology will expand beyond just screens to computers as well essentially making a rollup, foldup computer. Electronic paper and a new generation of electronic books will emerge (Layperson's View, 2012.)

Radio Frequency Identification (RFID) although used today, will become much more common and track almost everything we do. Currently being tested in retail, RFID will continue to expand in the retail industry aiding in the Lean supply chain and maximizing company profitability. RFID technologies and data will expand beyond the retailer to the consumer offering digital receipts and a database of knowledge on personal spending (Blum, 2010.) This data is fairly collectable today with online banking, electronic receipts, and credit card statements, but in 2020 all of this will be combined. It will be extremely simple to track spending, pay bills, and even locate something you can't find. RFID technology could very well be available for consumers to purchase for their own products and monitor electronically. People could put RFID stickers on their keys, cell phone, and shoes and use the computer to find their location when they have misplaced them.

The year 2020 will bring major improvements across a variety of disciplines. Cloud computing and Enterprise Resource Planning (ERP) systems are going to expand and become much more powerful. Cloud computing glitches will be worked out and become much more secure. ERP systems will become much more user friendly and intuitive as well as have increased capabilities. Communication among different business

sectors as well as communication in general will be simpler and easier and expand collaboration capabilities. Renewable energy sources will be utilized more frequently with a strong push toward factories and large commercial buildings switching to greener sources. Cars will be much more intelligent with some self driving capabilities making accidents much less frequent (Kurzweil, 2012.)

There is essentially no area where technology will not be driving change and innovation in the next decade. As a society, we are constantly innovating to find more efficient and cost effective ways to do things. The next eight years will bring predictable as well as unpredictable growth and changes to all aspects of society with technology being a fundamental driver of future progress.

e. 2020 and Beyond- Emerging Technologies

Technology has infinite possibilities when we look beyond the next ten years. Growth is occurring so fast that it is impossible to predict what will be everyday technology in 2030, 2050, 2070 and beyond. However, there are several areas in which technology is very likely to explode in the next several decades. Energy, healthcare, and artificial intelligence are three major categories predicted to be major areas of growth in the future.

The way we function as a society and the technological direction we are headed will increase our need for energy. With technology development comes the development of technology using less energy, but nonetheless, everything we do will be electronic in some way. Renewable energy sources will continue to be a major focus until an idea is found that is practical long term and has the ability to reach a lot of people inexpensively.

Once this happens, major infrastructure change will need to occur. The energy field will continue to grow and advance and cleaner technologies will be developed (Easton, 2012.)

Changes in healthcare are fairly unpredictable, but there will definitely be significant changes. The ability to change and program genes and eliminate certain diseases will occur. Gene programming at all levels will become possible, essentially eliminating obesity, heart disease, diabetes, and major illnesses that cause death. Life expectancy will dramatically increase and overall healthcare will be much better (Kurzweil, 2012.)

Artificial intelligence will greatly expand. As the cost of artificial intelligence decreases, humans will be replaced wherever possible to eliminate human error and maximize efficiency. The potential is limitless, but the future will definitely be a world filled with intelligent computers and many human assisting devices.

3.Workforce Application

a. Overview

The previous two sections on education and technology can be used to draw some conclusions about the future workforce. Technology is changing the world we live in, how we interact with people, and how we perform our jobs. Children today are particularly affected, because the only world they know is one immersed in new technologies and innovation. These children have grown up in a world of collaboration, speed, multitasking, and technology. They are social and when it comes to work or schoolwork, and they are very purposeful in whatever they do.

Education today is similar to the way it was fifty to a hundred years ago, which is radically different than what we can say about technology. Education and technology changes and innovations are moving at entirely different speeds making combining the two effectively very difficult. National laws and regulations place restrictions and standards on education making it difficult to implement change. Education is a large part of the federal budget and a hot topic for politicians and taxpayers alike, and because of that, change requires accordance across many different groups of people. Technology implementation in schools is severely lagging behind current technology in the marketplace. Computers and multimedia presentations are currently used in classrooms across America, but there is so much potential to accomplish more with technology in schools than simply supplementing what is already taught.

Students are bored in school and are not gaining, from high school, the necessary skills to be productive members of the workforce. The gaps from the education system to student to workforce are well known, and no easy solution exists to fix the problem. Education is likely to improve over the next decade, but technology, and therefore skills required in the workplace to accommodate, will increase at a much faster rate. Many are calling for large-scale education reform to incorporate more technology and make high schools more productive and beneficial for students. Although arguably students will be doomed without these massive changes, reform is difficult and impractical for today's society. Changes will happen and education will move in a direction that will increase student learning, but we still have a long way to go before education matches what is happening in technology and in the workplace.

Fortunately, if there is anything we've learned from the current issues with education it's that students learn a lot from what they are doing outside of the classroom. The speed, flexibility, and technological requirements of this generation stem from the world they live in and not the education they have received. Technology will continue to improve and expand and the youngest generation will continue to adopt this new technology easily and seamlessly. Technology will be incorporated into education slowly, but in the workplace at a much faster rate. The workplace will be much more in tune to the "new era" of technology and innovation.

By adapting training methods and processes that reflect the mentality of the 2020 worker, companies will be able to retain high quality workers. Education will become a focus in the workplace, not only bringing new workers up to speed with company goals and job processes but also developing the worker as an overall person. Improving the 21st

century skills and cross functional skills of workers will be very important as they are not being developed in high school classrooms.

Overall, the worker and workplace are going to change in the year 2020, but having a firm foundation, a strong company strategy, and human resource initiatives in place to handle this new workforce and its integration with the older workforce will be fundamental for success.

b. Training Employees

Although the actual work of many hourly workers is typically more hands on and less intellectual skill is need to complete the tasks, the next generation of workers, regardless of skill level, will have some of the same basic expectations. They expect freedom, customization, corporate social responsibility, enjoyment, speed, and collaboration (Meister, 38.) These principles must transfer to training to show these employees that the company values these aspects and are working to incorporate them into the current workplace. They should be used to better educate and prepare them for their role in the company.

In the near future, thirty-six percent of available jobs will be for people with just a high school degree, which is half the amount of jobs than in the 1970s (Meeting the Challenge, 2011.) There obviously has been a big push for higher education and a college degree, but there will continue to be jobs where a college degree is not required and often not wanted. As more people go to college, the applicant pool for low skill level jobs decreases making it even more important that these children are ready for the workforce coming out of high school so they can secure a job and companies can get the capable

labor they need. Where the schools fall short, companies need to step in with proper training and a work environment that will attract tomorrow's youth.

Training in the future will need to be more thorough and comprehensive. There are major gaps between education and the workplace making training an essential component for any job. As previously discussed, there are many areas where education is getting worse and more areas still where it isn't getting any better. With time, this will hopefully improve and bridge the gap, but it won't be in time for the workforce of 2020. To be effective, training needs to teach not only the specific task they will be completing day to day, but also designate where creativity is valued and where the worker will need to make independent decisions, because this will no longer be intuitive. More direction will be needed in training and more explanation will be required.

Future employees will expect more from training programs in terms of intractability and effectiveness as well. Training in the workplace will have to match learning in real life and be socially oriented. Social aspects will need to be incorporated into training in an intriguing and personalized manner. This type of learning will incorporate social media, gaming, immediate feedback, and detailed examples that employees are likely to encounter in the workplace (Meister, 155.)

Serious games for training purposes incorporate this generation's gaming and need for entertainment in all aspects of life. Particularly if education starts to incorporate these gaming tools, implementing them into the workplace as well will provide consistency and have a greater chance of success. Aspects of games including working toward a goal, problem solving, collaboration and socialization, and an exciting story line are areas that research has shown to engage and appeal to a variety of players (Johnson,

2011.) These aspects are all characteristic of a workplace, but the "story line" is the business that needs to be shown in an interesting light. Game based training is a more creative way to instill passion in workers from the beginning. Feeling engaged, understanding the problems, and wanting to devote time and energy to solving them are ideal characteristics to have in new employees, and games have a strong potential to bring out this enthusiasm.

As with education, there is no doubt that we will see a rise in e-learning and web based learning for training purposes in the future. Training will include a variety of different methods and different ways to apply learning. Application, by working with other people on real life examples, is the way training will be in the future. The use of video, audio, pictures, and quizzes are currently used in electronic training today, but need to be adapted for the future workforce.

Today's e-learning is not up to par with what will be required in 2020. The limitations on today's e-learning makes it unappealing for young workers (Meister, 162), but it must be adapted for the people it's intended for. E-learning is typically economical, decreases the amount of resources needed, and has the potential to be very effective.

Today e-training focuses on knowledge and not understanding. Along with that, testing is focused on measuring gains and not on continuous improvement for that employee. As a result, employees aren't able to get as much out of training than if there was a person teaching them the material, giving them feedback, and measuring individualized results on a personal level. E-learning typically translates into passive learning, because employees are not engaged as an active learning partner (Buchen, 275.)

One way to incorporate technology into e-learning is to create smart phone applications that facilitate training. These can be used on the floor to serve as an instructional guideline and reference and provide workers with the opportunity to ask questions if needed. They can store training modules and quizzes requiring workers to use their phones to complete different training tasks. Smart phone business applications for other purposes other than training will become more developed as we move into the year 2020 (Blum, 2012.)

Nearly seventy-percent of companies had plans to launch mobile training in 2011 to be used for product knowledge and performance support (Meister, 28.) Projected use of mobile phones in 2020 is likely to emulate computer usage in the recent past. Mobile technology allows personalization of the internet and the opportunity for more personalized training. Orientation, mentoring, and feedback can all be given digitally through mobile phones.

For future e-learning, the focus needs to be on understanding the material. The format of online learning is essentially the "instructor" and needs to be able to adapt to the participant. Personality profiles and intelligence tests may be used to get a good idea of the employee before beginning the training process. Performance expectations should also be raised, but targeted to what the worker will be doing on a daily basis at work (Buchen, 277.) Online training will prove to be flexible, cost effective, and easy to deliver and monitor progress once its problems can be addressed. However, in 2020 the capability for complete e-learning in a training perspective will probably not be possible. Hands on learning will still be required and will be able to take many forms.

Product awareness training is essential for whatever the business may be. There has to be hands on instruction with the product the employee will be dealing with, machines that will be used, or processes they will perform regularly. Training needs to be updated and target the needs for the present and the near future to keep workers' skills up to date and able to meet requirements for new program launches (Dauch, 2006.) Although typically used in education settings, teaching laboratories could help workers get familiar with processes going on throughout the company (Europe, 2004.)

Training Within Industry (TWI) is a method for supervisors to drive productivity and get results from employees (TWI, 2012.) TWI teaches supervisors how to break down a job into key points to be taught to employees. It includes doing trial runs, coaching (but with a decreasing emphasis over time), and follow-up. The idea behind TWI is to provide a standard method of teaching that can improve the efficiency and decrease the waste in manufacturing. Although this method standardizes training, the need for individualization is still recognized and as we move into the year 2020, will definitely need to be incorporated. A primary focus of TWI is to develop good managers that can reach out to and effectively train quality employees (TWI, 2012.)

Manufacturing needs a well skilled labor force as we move into the year 2020. This doesn't necessarily mean everyone needs to be college educated, but employees need to be able to learn effectively, be coachable and qualified, and generally have an aptitude toward technology (Rich, 2010.) The manufacturing industry has outpaced the overall growth of the economy and productivity has increased at a rapid rate. However, contrary to expectation, employment in the manufacturing sector has decreased compared with the overall economy (Raju, 2012.) As a nation, we need to produce highly

productive workers capable of working with technology and who value learning (Raju, 2012)

The need for skilled workers increases as processes become more technology oriented and technology gets more and advanced (O'Sullivan, 2008.) Seemingly contradictory, but actually quite complimentary is the idea that as technology increases, so does the need for human interdependence and hands on aid. Technology is best implemented when there are adequate people to help if problems arise. Technology is used for collaboration and the 2020 workforce will expect collaboration and group work in training specifically. Every job is different and therefore requires different types of training, but keeping in mind the workforce of tomorrow, their technological inclination, and values, the workforce can better match employee needs and produce higher quality workers.

c. Aging Workforce

Although not the focus of this paper, age diversity in the workforce is an issue that will be in the forefront for many corporations in the future. One of the challenges of 2020 is going to be creating effective methods of training, collaboration, and processes for the multiple generations that will be in the workforce together. The downturn of the economy forced many people to remain in the workforce and delay retirement. In 2020 there will be five generations of people in the workforce (Meister, 44.) Older workers are staying in the workforce longer, and the number of young people entering the workforce directly out of high school into low skill level positions is greatly decreasing (Toossi, 2009.) For the work environment to be effective, it will require balancing the

technological necessity of moving forward, the demands of the 2020 worker, while keeping older workers happy and comfortable in their positions.

The U.S. workforce is getting older as life expectancies increase (Toossi, 2009.) It will be challenging integrating five generations of people together with new technologies and differing ideas of what the workplace and worker should look like. As discussed primarily in the education section, this generation is different than even one or two generations previous because of how fast the world is changing due to internet and technology. To compare the millennial generation to people five generations before them presents radical differences as we have seen through the changing abilities of workers. Despite these differences, all five of these generations will need to work together in 2020. To do that effectively, business need to focus on the similarities, using them advantageously, and through that develop a firm understanding of the generational differences (Meister 63.)

Everyone wants to feel valued and empowered at work and have a dedication to the job regardless of generation. People want to feel trusted to do their job correctly and have the tools to do it efficiently. In 2020 this will mean allowing technology into the workplace including social media. Older generations might not be as comfortable with technology, but in 2020 these workers will need to know how to use technology to a certain degree to do their job effectively. To create a communication path between older and younger generations, corporations are starting to utilize blogs, message boards, and community builders through social media. Management will become increasingly important in managing this diverse age range and helping people to work together (Meister, 66.)

d. 2020 Worker

Workers in the year 2020 will fundamentally be different than workers of previous generations. For many company leaders, who are not of the millennial generation, this change in ability and behavior is a downfall of today's youth. These students coming out of high school are afraid to be independent and take risks, but are excellent at collaborating and generally quick learners of technology. There are positives and negatives to this generation of workers, but either way companies must adapt to the youth mentality to attract and retain the best workers.

The 2020 worker wants to see the value of the work they are doing. They want to be valued by the company and see how personally they are making a difference. They want to use technology in some way, but not necessarily have their entire job be technology focused. This generation will be one that can handle a technology oriented job, but even simple additions of technology such as having an e-mail and the ability to communicate with other workers, access to online forums or postings where they can ask questions or meet workers, or using their cell phone pull up instructions and information for the day improve the work environment. Because of the current technological oriented world we live in, technology, in any of its many forms, must be implemented into the workplace to remain a competitive company for 2020 workers.

With the addition of technology comes the ease of collaboration. Workers in 2020 will be most comfortable with collaborative work environments or environments where they can easily get feedback and input from others. Tomorrow's average worker will want the option of collaboration for feedback and to ensure proper completion of their

tasks. Relationships are what keep these workers happy and by increasing collaboration through technology and a team environment, companies can help foster successful relationships. Strong work relationships decrease the amount of turnover and increase the amount of satisfaction people have in their job particularly with low skilled occupations.

Mentors should be utilized throughout companies giving everyone a partner from the first day. This helps with building relationships and collaboration and also with providing immediate feedback. Feedback is an important aspect for learning particularly while getting accustomed to a new job and will help personalize the training process. Workers in 2020 need personalized training to effectively learn and perform their job and mentors will help to accomplish that.

In 2020, workers will have a lower work ethic and have less social skills in a formal setting. Lower work ethic can be made up for if the worker sees value in the company and in their job. For repetitive tasks or low skill labor, value may need to be created externally through human resource initiatives including social events, contests, and team building activities. Laziness has been seen in the educational system and isn't going away once students get to the workplace. Investment in the company and the position may help compensate for this as well as having direct and regular feedback. Formal social skills can be learned and taught and may need to become a part of training if that is a necessary component for the job. However, most interaction on a day-to-day basis for low skilled workers doesn't consist of formal interaction. Workshops, simulations, and company-wide initiatives can help to improve social skills in a fun and creative way.

Mental math skills and reading skills will also be worse. Technology can help bridge the gap with mental math skills by having calculators available where needed or computer tools that do math for you. Reading needs to be limited to short information segments preferably with charts or pictures accompanying the text to make the document more understandable. Although all of these aspects on the surface seem detrimental, many minor issues can be fixed through training initiatives and larger issues can be mitigated through technology and other creative solutions.

Jobs will need to have some flexibility whether that includes cross training workers to work in different areas or allowing people flexibility in their schedules. Jobs must be personalized and adaptable to the individual worker, because in 2020 personalization will be possible in every aspect of life. The workplace must take this approach as well.

The multitasking abilities of the 2020 worker will be much greater than workers of the past. Additional responsibilities requiring time management and performing tasks simultaneously will be expected from this generation. If utilized effectively, companies can increase productivity and save resources by using people for multiple tasks while workers feel more fulfilled and engaged in their job. The need to be efficient and perform only tasks that are relevant are prevalent in students today and will be common in the workplace as well. Therefore, companies who adopt lean strategies and incorporate them into company culture can leverage this efficiency and focus on eliminating waste to relate to this generation and their values.

Workers in 2020 will be able to use technology. In previous sections, the problems students have with technology were highlighted, but they are still very

advanced compared to previous generations. The key takeaway is not to expect millennial workers to have an expansive history with the technology and how to use it, but instead look at these workers as being coachable and able to learn. They have grown up with technology and even where they have knowledge gaps, they can learn very quickly when they understand the importance.

e. 2020 Workplace

The workplace of 2020 will begin to see an influx of new technologies, a new type of worker, and as a result new training and education throughout companies. Hierarchies will flatten giving relatively low skilled labor a voice in the company and the ability to be innovative and suggest ideas. Innovation and collaboration will be valued no matter what a worker's role is in the company. Corporate offices will be transformed as more people work from alternate locations, and the office becomes a place for advanced planning and design. New technologies will be utilized to create hologram models, technological presentations using gesture based technology, and vast amounts of information about other's projects and partners will be available for everyone to use (Easton, 2012.)

Companies will increasingly become a presence in schools providing industry based workshops to show students the importance of particular skills and highlight the particular business (Tarman, 2010.) The importance of investing in people through unique personal improvement training will be integral to develop effective workers (Dauch, 2006.)

Companies will continue to utilize online systems and technology oriented programming making hacking and cybercrime a major concern. In general, cyberterrorism will increase as the sheer amount of information available digitally multiplies. Security risks will increase as more information becomes available digitally (Easton, 2012.)

V. Conclusion

Education, technology, and the future of work are intertwined all leading into each other. Each area is driving the others, working together, although not always well, to fit the needs of people today and in the future. People and corporations are changing as a result of technology and the developing world we live in. New strategies have to be developed in education to teach students skills that are now needed in the workforce, and workforce training programs need new strategies to teach these students the skills they need them to have for the job.

Personalization and collaboration are the words of the future providing a broad framework for how students will think and act. Tomorrow's worker will be able to multitask, but will require technology and teamwork to do so. Work ethic, creativity, and self-direction will decrease and reading, and math skills will be worse. However, the future workforce also has a lot of potential and will contribute to innovation and expansion in 2020 and beyond.

Technology will help bridge the gap between high school education and the workplace. These workers have been exposed to technology for their entire lives and can catch on quickly to new processes and new technology. When these people see the value and purpose in what they are doing, they are willing to work hard and with the help of technology, are more productive than any other generation.

Companies will be expected to develop all employees regardless of position into all around more effective workers. This will include timely consistent feedback, job skill development, plastic skill development, and setting up workplace relationships such as mentorships. These initiatives will help diminish the skills gap, make intergenerational

work easier, and aid in employee retention. Human resources have a large role to play in the year 2020 to ensure technology, the new workforce, the old workforce, and upper management are working together effectively and guarantee the company is performing at its best.

In summary, the 2020 worker will be more social and more collaborative than ever before. Employees will value relationship building and a company culture that values working together while providing them with the tools to do so. The underlying value of the company and the task at hand are integral to conquer intrinsic laziness and effective training and technology implementation can help as well. The downfall of reading and math abilities need to be compensated for by requiring only simplistic reading and more tools to help with math. Employees will be less inclined to take risks and think creatively and will need to be empowered by managers and mentors to bring out these skills.

Tomorrow's worker will need to be shaped by tomorrow's employer. The education system is not teaching what needs to be taught and not effectively utilizing technology. Because of this, the role of personal development is shifting to the employer. Employers must use current technologies, develop the skills of its workers, and create relationships between employees. Ultimately this will attract the best workers and help with retention in a low skill environment.

The rapid growth of technology and millenials entering the workforce will cause companies to change processes including training programs and overall work environment. However, companies aware of the changes that will be occurring will be ready to take on the challenges and thrive in the year 2020.

VI. Works Cited

"About Us." *Project Tomorrow*. Project Tomorrow, 2012. Web. 07 Mar. 2012. <http://www.tomorrow.org/about/about.html>.

Blum, Jonathan. "The Future-Proof Entrepreneur: 25 New Tech Trends." *Business Insider*. 14 Nov. 2010. Web. 27 Feb. 2012. <http://www.businessinsider.com/the-future-proof-entrepreneur-25-new-tech-trends-2010-11>.

Buchen, Irving H. "Robotic and Human Development." *The Future Workforce: The 21st-century Transformation of Leaders, Managers, and Employees*. Lanham, Md: Rowman & Littlefield Education, 2005. Print.

Casner-Lotto, Jill. "Are They Really Ready to Work?" *Partnership for 21st Century Skills*. 2006. Web. 06 Mar. 2012. <http://www.p21.org/storage/documents/FINAL_REPORT_PDF09-29-06.pdf>.

"Class Size Reduction." *Pennsylvania State Education Association*. Web. 05 Mar. 2012. <http://www.psea.org/uploadedFiles/TeachingandLearning/high%20school%20reform.pdf>.

"Common Core State Standards Initiative | Home." *Common Core State Standards Initiative*. Web. 3 Mar. 2012. <http://www.corestandards.org/>.

"Computer and Internet Use." *US Census Bureau*. Web. 02 Mar. 2012. <http://www.census.gov/hhes/computer/publications/2009.html>.

Dauch, Richard E. "Preparing Tomorrows Manufacturing Workforce." Manufacturing Engineering 136.6 (2006): 18-9. ABI/INFORM Complete. 3 Apr. 2012 .

Easton, Nina. "Fortune's Guide to the Future." *Fortune* 16 Jan. 2012: 45-66. Print.

Edwards, N. T. "The Historical and Social Foundations of Standardized Testing" *JALT*

Testing and Evaluation. Web. 08 Mar. 2012. <http://jalt.org/test/edw_1.htm>.

Europe. European Comission. *Manufuture*. Nov. 2004. Web. 07 Dec. 2011.

Freedman, Terry. "Bring Your Own Technology." *The Educational Technology Site*. 8 Mar. 2012. Web. 12 Mar. 2012. <http://www.ictineducation.org/home-page/2012/3/8/bring-your-own-technology.html>.

"The Future of Technology and Its Impact on Our Lives." *WPP*. Businessworld, 11 Apr. 2005. Web. 06 Mar. 2012. <http://www.wpp.com/wpp/marketing/digital/the-future-of-technology.htm>.

"GestPoint." *GestureTek*. Web. Mar. 2012. <http://www.gesturetek.com/gestpoint/introduction.php>.

Groff, Christine. Personal interview. 6 Mar. 2012.

Horn, Michael B., and Heather Staker. "The Rise of K-12 Blended Learning." *Innosight Institute*. Innosight Institute, Jan. 2011. Web. Feb. 2012.

"Independent Test Results Show NCLB Failing." *The National Center for Fair & Open Testing*. Web. 03 Mar. 2012. <http://fairtest.org/independent-test-results-show-nclb-failing>.

Johnson, L., R. Smith, H. Willis, A. Levine, and K. Haywood. "The 2011 Horizon Report." *The New Media Consortium*. The New Media Consortium, 2011. Web. Jan. 2012.

"Keystone Exams." *The Power of a Great Education*. Pennsylvania State Education Association. Web. 06 Mar. 2012. <http://www.psea.org/general.aspx?id=4684>.

Khan, Salman. "Salman Khan: Let's Use Video to Reinvent Education." *TED: Ideas worth Spreading*. Mar. 2011. Web. 01 Dec. 2011.

Klopfer, Eric, Scot Osterweil, Jennifer Groff, and Jason Haas. "The Instruction Value of Digital Games, Social Netowrking, and Simulations." *The Education Arcade*. Massachusetts Institute of Technology, 2009. Web. 06 Mar. 2012.

Kurzweil, Ray. "Top Futurist, Ray Kurzweil, Predicts How Technology Will Change Humanity by 2020." *New York Daily News*. Web. 25 Feb. 2012.

Lane, Matthew. Personal interview. 6 Mar. 2012.

"A Layperson's View of Future Technology and Society." *Future Technology Predictions*. Future For All. Web. 27 Feb. 2012. <http://www.futureforall.org/future-technology-predictions.html>.

Lewis, A. C. (2006). Redefining what high school students learn. *Phi Delta Kappan, 87*(8), 564-565. http://search.proquest.com/docview/218482922?accountid=13158

Masterson, David. Personal interview. 5 Mar. 2012.

Maynard, Andrew. "Ten Emerging Technology Trends to Watch over the next Decade." *2020 Science*. 25 Dec. 2009. Web. 18 Oct. 2011. <http://2020science.org/2009/12/25/ten-emerging-technology-trends-to-watch/>.

"Meeting the Challenge of Preparing Young Workers for the 21st Century." *Pathways to Prosperity Project*. Harvard Graduate School of Education, Feb. 2011. Web. Mar. 7.

Meister, Jeanne C., and Karie Willyerd. *The 2020 Workplace: How Innovative Companies Attract, Develop, and Keep Tomorrow's Employees Today*. New York: Harper Business, 2010. Print.

Nash, Emily. Personal interview. 3 Mar. 2012.

"The Nation's Report Card - National Assessment of Educational Progress." *National Center for Education Statistics (NCES) Home Page, a Part of the U.S. Department of Education*. Web. Jan. 2012.

"NEA To Congress: Less Standardized Testing, More Help, Please." *National Education Assocation*. National Education Assocation. Web. 27 Feb. 2012. <http://www.nea.org/home/38711.htm>.

Newby, Mike. "Technology 2020." *Jornal of Education for Technology* 31.4 (2006): 265-67. 15 Aug. 2006. Web. 07 Dec. 2011.

"No Child Left Behind." *Education Week*. Education Week, 19 Sept. 2011. Web. 06 Mar. 2012. <http://www.edweek.org/ew/issues/no-child-left-behind/>.

O'Sullivan, David, Asbjorn Rolstadas, and Erastos Filos. "Global Eduation in Manufacturing Strategy." *Journal of Intelligent Manufacturing* 22.5 (2008): 663-74. *SpringerLink*. 14 Apr. 2008. Web.

"Project Red Overview." *Project RED*. 2009. Web. 7 Mar. 2012. <http://www.projectred.org/about_the_project.php>.

Raju, V. "Role of Education in the Future of Manufacturing." *Manufacturing & Engineering Technologies Education Clearinghouse*. Web. Jan. 2012.

Rich, Motoko. "Factory Jobs Return, Buy Employers Find Skills Shortage." *The New York Times*. 1 July 2010. Web. Dec. 2011.

Robinson, Kevin. "Schools Kill Creativity." *TED: Ideas worth Spreading*. TED, June 2006. Web. 05 Mar. 2012.

Roy, Rick, and Rick Davidson. "Technology Trends to Watch: 2011-2020." *WTN News*. 18 Jan. 2011. Web. Jan. 2012. <http://wtnnews.com/articles/8210/>.

"Student Shortcomings Anything but Masters of Technology." *Open Education*. Web. 8 Mar. 2012. <http://www.openeducation.net/2008/01/19/student-shortcomings-anything-but-masters-of-technology/>.

Taraman, Khalil. "Preparing the Next American Manufacturing Workforce." *Education Resources Information Center*. Mar. 2010. Web. Oct. 2011.

Taylor, Kathy. "From Chalkboards to IPads: How Do Kids Learn Today?" *YouTube*. TedxTulsa, 02 Feb. 2011. Web. Nov. 2011. <http://www.youtube.com/watch?v=81kIbxm5MgQ>.

"Teachers' Use of Educational Technology in U.S. Public Schools: 2009." *National Center for Education Statistics (NCES) Home Page, a Part of the U.S. Department of Education*. 2009. Web. 01 Mar. 2012.

"Technology in Education." *Education Week*. Education Week, 16 June 2010. Web. 04 Mar. 2012.

Toossi, Mitra. "Labor Force Projections to 2018: Older Workers Staying More Active." *US Bureau of Labor Statistics*. Nov. 2009. Web. Nov. 2011.

Turner, Rebecca. Personal interview. 5 Mar. 2012.

"TWI." *IMEC Manufacturing Improvement Specialists*. 2012. Web. 03 Jan. 2012. <http://www.imec.org/Supervisor-Effectiveness-TWI.cfm>.

Wallis, Claudia, and Sonja Steptoe. "How to Fix No Child Left Behind." *Time* 24 May 2007: 1-7. *Time*. Web. 04 Mar. 2012. <www.time.com>.

"Welcome to Route 21." *Welcome to Route 21*. Web. 04 Mar. 2012. <http://route21.p21.org/>.

Welsh, Gina. Personal interview. 5 Mar. 2012

VII. Appendices

Appendix 1
Interview Questions

1. How do the reading levels of current students compare to students in the past?

2. How do the math skills of current students compare to students in the past?

3. What do you think the impact of this is?

4. What do you notice as being different between students today and students of the past? How do you think these students will differ from students of the future?

5. How do you think technology has impacted education and the way students learn?

6. How do you think education has changed in the past 10 years?

7. How do you see education changing in the next 10 years?

8. How can we make children more prepared to enter the workforce after graduating from high school?

Comments / Other

Appendix 2- Six Models of Blended Learning
Horn, 2011

Model	Example of a program that typifies this model	Other examples from among those profiled
Face-to-Face Driver	**Leadership Public Schools** allows Hispanic students who are struggling to learn English to sit at computers in the back of the classroom and catch up with the traditional class at their own pace by using an online textbook that provides Spanish-English translations.	• Big Picture Learning • High Tech High
Rotation	Class periods at **Carpe Diem Collegiate High School** are 55-minutes long. For each course, students spend one period in an online-learning room for concept introduction and one period in a traditional classroom for application and reinforcement. They complete two to three rotations per day.	• Rocketship Education • KIPP LA (Empower Academy) • K12 (2-day hybrid)
Flex	Each of **AdvancePath Academics'** dropout-recovery academies features a computer lab, where students spend most of their time learning online. But face-to-face, certified teachers also call the students into an offline reading and writing zone or small-group instruction area for flexible, as-needed help.	• San Francisco Flex Academy • Miami-Dade County Public Schools (iPrep Academy)
Online Lab	Faced with a teacher shortage, Miami-Dade County Public Schools turned to **Florida Virtual School's Virtual Learning Labs** for help. Students complete courses online at their traditional school under adult supervision, but with no face-to-face instruction.	• Metropolitan Nashville Public Schools (Virtual Learning) • Riverside Unified School District (Riverside Virtual School)
Self-Blend	Alison Johnson, an eleventh grader in Detroit, Mich., self blends by completing a **Michigan Virtual School** AP Computer Science course in the evenings after she gets home from her traditional high school, which does not offer this course.	• Florida Virtual School • Jesuit Virtual Learning Academy • All online schools that offer a la carte courses that can be taken remotely
Online Driver	Students at **Albuquerque Public Schools' eCADEMY** meet with a face-to-face teacher at the beginning of the course. If they maintain at least a C grade, they are free to complete the rest of the course online and remotely, although some choose to use the onsite computer labs.	• EPGY Online High School • Northern Humboldt Union High School (Learning Centers)

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The Pennsylvania State University *Smeal College of Business* — University Park, PA
Schreyer Honors College — Expected Graduation: May 2012
Bachelor of Science in Supply Chain and Information Systems
Minors in Economics and Information Systems Management
Dean's List 7 out of 7 semesters
President's Freshman Award Recipient — Fall 2008

EXPERIENCE

Target — **Erie, PA**
Executive Intern — *June – August 2011*
- Acted as assistant manager of a $40 million business while serving as the leader on duty
- Conducted interviews for hourly employees as part of the hiring process
- Learned retail practices and how to run a store from different management perspectives and completed leadership workshops
- Developed a plan for a new environmental safety rollout (ESIM)
- Partnered with Target team members to execute ESIM in all areas of the store specifically guest service and reverse logistics
- Presented ESIM rollout to sixty Target executives focusing on implementation and challenges

DTZ (International Real Estate Firm) — **London, England**
Finance Intern — *May – June 2010*
- Completed comparative market research that was presented to the CEO enhancing the firm's ability to compete with competitors
- Analyzed employee feedback and satisfaction and presented it to the CFO resulting in greater employee contentment
- Organized a conference for the annual meeting of the finance department
- Prepared financial documents for annual auditing by Deloitte
- Researched and compiled information of 300 DTZ finance employees for a company-wide database

Lakeshore Country Club — **Erie, PA**
Swim Coach and Lifeguard — *2006-2010*
- Supervised and trained 15 new employees and responsible for the scheduling of 25 employees
- Developed the abilities and sportsmanship of swimmers by coaching a 165 person swim team of kids aged three to seventeen
- Coordinated and motivated swimmers during meets and created line ups for a strict deadline
- Organized the team banquet by planning the events, coordinating the Chinese auction, selecting and presenting awards, lifeguard recognition, and managing the speakers at the event for three consecutive years for 300 people

Research Assistant – Marketing Lab — **University Park, PA**
- Administer marketing studies for graduate students and professors — *Fall 2011 - Present*

LEADERSHIP

Phi Chi Theta, Professional Business Fraternity — **University Park, PA**
Corporate Relations Chair Fall 2010 – Fall 2011 — *2009- present*
- Planning events and contacting businesses to bring liaisons to Penn State to speak with the fraternity about their companies

Gift Chair Fall 2010
- Led a pledge class of 17 on establishing and purchasing a gift for the fraternity as well as collaborating and planning a philanthropic, professional and social event

Distinguished Speaker Series Committee
Chair of 2011-2012 Series — **University Park, PA**
- Facilitate meetings for the committee to coordinate 4 to 5 speakers for over 2,000 people per lecture — *Fall 2010- Present*
- Communicate with an agent, advisor, and contacts to ensure that the speaker's evening runs smoothly
- Partner with other campus organizations for lecture co-sponsorship and marketing support
- Assist in the planning and production of all Student Programming Association events

Schreyer Honors College Student Council — **University Park, PA**
Homecoming Chair — *Fall 2009*
- Elected to manage the float and the participation of the college throughout Homecoming week and weekend
- Managed a committee of twenty in float planning, design, and construction and coordinated logistics of preparation and implementation

SAP/SIG Student Interest Group — **University Park, PA**
Public Relations Chair — *Fall 2011 - Present*
- Coordinate with companies that use SAP for information and training sessions
- Work with SC&IS Recruitment Coordinator and Industrial Engineering contact to reach out to other majors and clubs

GE Leadership Conference — **University Park, PA**
- Worked in small group of students to develop leadership skills with GE employees — *March 2011*
- Facilitated group discussion and collaboration to complete strategic and analytical tasks
- Learned how to implement change in an organization and developed the necessary skills

Ernst and Young Case Study Competition — *Fall 2010*
- Worked with team to develop a project plan to implement a composting program in a local high school to improve the environment
- Winner of the Penn State competition and competed in the national competition