University of Rhode Island

DigitalCommons@URI

Determining the Effects of Technology on Children

Kristina E. Hatch
Kristina.Elizabeth.dev@gmail.com

Determining the Effects of Technology on Children

Table of Contents

Introduction

Technology has become an integral part of the majority of Americans' daily lives. We get all different types of our news through various websites and digital newspapers. We pay bills, manage our love lives, send and receive mail, and find information all on the Internet. More than 500 million people communicate and keep in touch with friends through social networking. According to the semi-annual US wireless industry survey, 91% of Americans are mobile subscribers who, all together use 6.1 billion minutes of talk time a day. Our new technologically driven lives are thanks to the constantly developing and affordable technology available in the United States.

Author of Hamlet's Blackberry, William Powers, describes our new technology driven world as a giant room, in which everyone is standing within reach of their neighbors. In this room, people are constantly poking one another and then asking them questions, or telling them about their days. In this world, it becomes impossible to escape the constant connection with others, aside from completely disconnecting from it, and leaping out into the unknown, or what's outside the room. He stated, "…we live in a world where everyone is connected to everyone else all the time. We're not literally in a room that's floated away from the Earth, but we're definitely in a new place, and it's technology that has brought us here."

As we become increasingly more reliant and absorbed in technology, it is no surprise that today's children have become avid users as well. Laptops are being developed for children as young as five. Smart phones are now in the hands of children as young as ten. The Kaiser Family Foundation found in their 2010 survey on Media use in

8-18 year olds that this group spends an average of ten hours and forty-five minutes per day exposed to media. Even after multitasking is taken into consideration, the total still stands high at seven hours and thirty-eight minutes, more than an hour above the 2004 total.

As children continue to become more immersed in media, many adults have begun to wonder whether or not this exposure to such a high amount of electronic media is a good thing or not. On the pro side, there is an argument that technology is preparing children for the 'real world' that they will have to enter into. Sixty percent of jobs in the market are technology related, and children need the tech advantage to be successful in such an environment (US Department of Education). On the other hand, however, others argue that children using technology are becoming socially stunted, ungrateful, and ridden with health related issues.

So what *is* the right answer? Which side has the correct insight? While we may *not* have the immediate answer, we must look into both sides of the argument and determine what the correct path for today's children is. Technology has opened up a world of great opportunities, but these opportunities *have* come with great risks. According to Sherry Turkle, a PhD at Massachusettes Institute of Technology, naming technology as either good or bad will not solve the issue. "I've tried to get across that computers are not good or bad – they're powerful… I think we're getting ourselves in a lot of trouble thinking there's <u>an</u> Internet or <u>a</u> web that has an impact on children" (Amercian Physchological Association). In order to fully understand the argument surrounding technology and children, we must understand the pros and the cons, and how our decisions about technology use will affect today's children as they develop.

Pros: The Positive Side of Technology for Children

Updating the Classroom

There have been several studies on the positive educational impact that technology has on students as young as kindergarteners. In 1999, Cheryl Lemke, executive director of the Milken Exchange on Education technology, conducted an interview with Technology and Learning Magazine to outline specifically why technology in the classroom is truly a benefit for students (cosmopolisschool.com). In her interview, Lemke outlines these four distinct reasons as:

- Technology accelerates and enriches basic skills. Students who have access to technology become more quickly engrossed in the material, and as such are able to absorb the information more quickly. Electronic material can be more stimulating and interactive for children.

- Technology is incredibly motivational since it provides ease to students. In a study conducted by David Dwyer, vice president of advanced learning technology for Computer Curriculum Corporation, students were found to produce more writing because it was easier to type than write, which kept them more interested.

- Technology facilitates new fields through simulations and three-dimensional models that would not have been accessible beforehand.

- Technology prepares students for the workforce at a young age, which is becoming more and more of a vital skill as technology in our society becomes more relevant. According to the US Department of Commerce, sixty percent of jobs

today require technological skills, and this is expected to increase to ninety percent in the next fifty years.

The U.S. Department of Education has also released their own information on educational technology that mirrors Lemke's opinions and ideas. The point that echoes between both of these sources is that we are living in modern times with more options available to children, and educational models that would not have been accessible beforehand must be modernized to keep up. It cannot be expected for children to learn the same way as previous generations if they are expected to stay ahead in this fast paced world (U.S. Department of Education).

While putting technology in early education may seem alarming, it is shown that the presence of technology for kids has several benefits. Along with the preparation for the work force, technology allows children to learn in a whole new way. Children can view animations of the solar system, look at three-dimensional models of the human body, and learn through interactive games. Senior Research Scientist at the Center for Children and Media, Cornelia Brunner, has been an active participant in projects that bring educational technology to children. In project Ready to Learn, for example, Ms Brunner worked to develop educational videos and curricula for children between the ages of two and eight (Center for Children and Technology). She found that children used the technology well and seemed to work with it naturally. "They have no way to compare it with anything. But we did find that they liked it a lot and that it didn't stop them from being just as interested in playing with sand and water and dolls ad cars. So it provided them with another option and it did them no harm."

Children today can use technology as a supplement with traditional education, not as a replacement. The proper mix of these two elements can give children all the benefits of a modern education without requiring much training for children. When using modern technology, children pick it up at amazing speeds. A Cape Cod father of three said, "When my five year old daughter uses my computer, she doesn't even need me to help her. She just figures it out on her own, and can quickly use it just as well as the next person. That's not to say she suddenly understands all the content, but she knows how to make it function, and to navigate it. It's as if technology is becoming innate to today's children."

Assistive technology to help students with disabilities has also become vastly popular in the classroom. Assistive technology's purpose is to "augment abilities and bypass or compensate for a disability" (Lewis). Computers have been specifically useful, for they allow us to manipulate items such as text to meet the needs of individual students. For example, text can be made larger so it can be seen easier, and also read aloud for deaf students. More recently, specific devices have been engineered to cater to students with specific disabilities. DynaMyte, for instance, is a portable communication device that facilitates students with communicative disabilities to speak and converse with others through a keyboard composed of symbols. With these sorts of innovations, it has been estimated that approximately 95% of students with disabilities between the ages of six and eleven are able to receive their education in regular classrooms (ATTO).

Keeping Up with the Joneses

The introduction of technology into modern culture has drastically shifted social norms to include the technology into children's daily lives. Today, it is not uncommon to see children playing on their portable video game systems while at a restaurant with their family, or to see a child operating a computer better than some adults. While these trends seem appalling to some, according to author Lev Grossman, they are only the result of an evolving society, and might not be as much of a worry as we thought. While these norms seem outrageous now, within a few years, they will become commonplace (Time.com). When writing his Time Magazine article calling Mark Zuckerberg Person of the Year in 2010, he stated:

> "People hated Facebook's News Feed when it was introduced in 2006. They thought it was creepy and intrusive. Zuckerberg stood his ground, and now Facebook is unimaginable without it. He moved the chains, and we went with him, setting up our defense that much farther toward the end zone. "The world is changing," Cox says. "When my caller ID came out, people went psycho. You know, because, Oh my God, now people are going to know I'm calling them! This is terrible! I'm going to end up being tracked, and Big Brother and Orwell and all that! The reality is, now you won't pick up a call unless you know who's calling you."

Cornelia Brunner, has similar thoughts about today's societal norms. "The adults in the part of Europe where I grew up were alarmed in exactly the same way about the horrible effect comic books were going to have on the impressionable minds of young people!!! We were all going to turn into monsters because the comics made it seem as if you can do anything and survive anything (i.e., roadrunner falls off a cliff and survives). The arguments were exactly the same as the ones being used today when people (usually people who never play electronic games) carry on about how dangerous they are."

Technology will be part of our world for the rest of our foreseeable lives. Ms Brunner believes that children must become accustomed to technology because the digital world is here to stay, and will continue to offer its vast amount of benefits. The digital world "lets us communicate and share and compete and play and inform each other and plan together. All of that is good for everybody, including kids, within some boundaries. Just like there have to be rules of conduct in real life, there have to be smart rules of conduct in digital life." The presence of this technology will force children to have the skills to navigate it and keep up with it as they get older. Electronic media is becoming more and more integrated into our workforce and our classrooms as technology advances and becomes more easily accessible.

In the workforce, technology is becoming more of a necessity than a luxury for many higher paying jobs. iPads have begun to be used in cockpits of planes (Bloomberg.com), and companies such as CBS and Radio Disney have stated that they are dependent upon technology to function successfully. This is becoming more common in more companies, so much so that in the twenty-first century, sixty percent of jobs require technology skills, leaving children who don't have such abilities working at lower paying jobs (U.S Department of Education). According to Global Knowledge, the top ten skills demanded in 2010 included network administration, cloud computing, database management and web development. In order to be successful with these skills, children can be introduced to them as young as elementary school (globalknowledge.com).

Integrating technology into early education is going to help children prepare for the technology dominated work force, but this integration may not be as drastic as we may think. For many, the thought of putting computers in each classroom, and using

software to teach children lessons through multimedia may seem absurd. However, Ms Brunner believes that it will be much more 'invisible' than drastic. She stated that "it will just seem normal to have a smart phone or a tablet on a special school setting so you can use it to look things up and communicate files, and your teacher can see what you're doing… it will just seem natural that we are using a lot less paper, both in what we write on and what we read." Her statement reflects a theme that has been present in the evolution of technology. As it further develops, technology just seems more normal to have a place in our lives. Today it is acceptable for a person to have a smart phone, a laptop, and a tablet, where years ago that would cost thousands and the capabilities would be significantly lessened. Giving children these up-to-date technologies will allow them to become more skilled at keeping up with the ever-changing digital world early, and also keep them ahead in the skills they need to advance in the work place.

Widening Social Circles

A common concern for many parents is how technology will affect their children's social lives. With rumors of social networking and texting stunting children's social development, it is easy to see where concerns surrounding the topic have grown. However, new research has begun to see the other side of this argument. According to an article in the Los Angeles Times discussing social media in the lives of children, technology may act as a way for children to develop and sustain emotional bonds with peers, as well as carve their own identity. Social media, such as Facebook and Skype, have become a fixture in our society. Companies use Facebook to advertise to the masses, and celebrities fuel their fame through Twitter. Phrases such as "googling it," "tweeted

about it," and "I Facebooked you last night" have all made their way into this generation's jargon. Although they have become much more immersed in it than ever before, children today are not using these outlets in the way that now adults once did. Social media has become a way for people to connect and keep in touch with people they already know, instead of forming bonds with new people. Because of this new form of communication, children's online social lives appear to mirror their social lives outside digital media (LAtimes.com).

These trends in children's use of social media have been a result of the widespread of sites, such as Facebook, and their blossoming uses. Facebook is no longer just a site that people use to communicate. It has become a gaming center, a chat room, an event calendar, and an application store. As these technologies grow, so do their user bases. As of January 2011, over 600 million people use Facebook actively, and 34 million actively use Myspace (Wikipedia.com). Other specialized social sites, such as tumblr, and Flickr have also begun to rise in popularity. Pew Internet Research studies have found that children have begun to enter these numbers in a big way. Thirty-eight percent of twelve to fourteen years olds have some form of online account, while sixty-one percent of twelve to seventeen year olds use social media to send messages, forty-two percent of which do so every day (Kaiser Family Foundation).

The initial concerns surround these numbers has seemingly been quieted, thanks mainly to the new studies surrounding the topic. According to the psychologist Amori Yee Mikami, this is the new social life. Social media has become the norm in communication and thanks to its speed and ease is not likely to let down soon. It has also been said that social media has become a way for children to indirectly practice essential

technology skills, even in low-income households (LAtimes.com). Whether children realize it or not, communicating with and navigating through social media sites is exposing them to an array of skills, such as online communication, high speed typing, and searching. Social media allows for these children to be just as technology proficient as their more wealthy counterparts (thaindian.com).

Increasing Visual Reasoning

When we use the any form of today's technology, images are shown to us at speeds higher than ever before. We can watch high definition videos that make us feel like we're in the picture. We have intricate visualizers that allow us to see our music. Games have been developed to look more realistic than ever. Although older generations who are now just beginning to see this are not highly affected, children who have been developing along with these new high speed games are showing an increase in their visual reasoning skills. After examining over fifty studies on the effects of technology on children, UCLA Dr. Patricia Greenfield confirmed a correlation of higher visual reasoning skills in children in this generation (International Examiner). One particular study noted that children who were adept at video games were better at keyhole surgery (infopackets.com). These results have been facilitated by games that have been developed to become emotionally, socially, and visually stimulating to children. They have been created to foster attention to detail, hand eye coordination, as well as survival tactics.

Because of all the visual stimuli that result from modern gaming and electronics, children can comprehend complex visual images more than ever before. When looking at a modern gaming system, it can be seen how this is possible. Games today are made to

look like reality. Characters are crafted with such detail that they could be mistaken for real people. Think of the contrast to what games had to offer twenty years ago: pixilated images of characters no bigger than your thumb. Now, children are seeing complex structures, monsters, machines, and worlds that enter into their vision at an alarmingly quick pace. Because of this sort of exposure, children today are more used to these images and as such can react to and understand them quicker than previous generations could have.

Using Technology to Get Physical

With the introduction of systems such as the Wii and the Xbox Kinect, games have become much more than a sedentary activity. Exergaming, or playing games that require a physical movement or reaction, has grown in popularity since its introduction a few years ago. Game systems are now actively encouraging that children play more physical games that require motion in order to win (USAtoday). Some of the most well known of these games are Wii Sports, in which children and adults can play virtual games, such as tennis and baseball, and Just Dance! for the Kinnect. A game highly geared toward exercise is Wii Fit Plus, which includes activities for yoga, aerobics, and balance improvement, and also allows users to chart their progress and see how well they are improving.

According to a study presented to the American College of Sports Medicine, participating in exergaming requires at least twice the amount of energy as traditional video gaming, and can raise children's activity levels to meet guidelines for moderate-intensity activity level (USAToday). Although exergaming should not be used to replace

exercising, it is a great way to engage children with higher BMIs to take part in physical activity (MedicineNet). Heavier children who took part in a study in which they first did traditional exercise, such as running, and then exergamed seemed to enjoy exergaming much more than children of a normal weight, who were not as challenged.

Using interactive gaming, video game companies have managed to successfully push an active lifestyle on young gamers, as well as promote family time, which is crucial for childhood development (teenagerstoday), and this movement has been vastly successful. Children have been excited about these games since their introduction, and a few that I spoke to, even rank them as their favorite. One fourth grade girl said her favorite game was Wii Sports resort because "there's this thing called Speed Slice and you get to cut all these like acorns, and like all these foods and stuff, and it actually gives you really good exercise."

Keeping Track of Children

Safety has become a major concern for parents who are trying to keep control of their children in an increasingly busy and distracting world. As our lives get more chaotic and crowded, parents have been looking for more efficient and reliable ways of keeping an eye on where their children are at all times. Allowing children to have a cell phone fulfills this functionality for connectivity, and is now easier and more accessible than ever before. The development of cell phones made specifically for children helped to ease the concerns that come along with childhood connectivity. With smart phones having more capabilities than some computers, parents worry that putting them in the hands of

children is detrimental, but risk not knowing where their son or daughter is after school or on a Saturday afternoon.

Figure 1 : Firefly mobile phone for kids

In order to balance these two issues, a degree of parental control on the phone is necessary, and made easier through newer child friendly mobile devices. Child friendly cell phones, such as the Firefly use a fun, simple, and completely customizable interface, and features such as parental control and limited capabilities. Having these types of phones allow parents to keep track of their children without the risk of racking up a huge bill, or exposing their children to too much technology at such a young age (firefly.com).

More recently, more drastic developments have been made to ensure that parents always know the exact location of their children. According to FBI reports, a child goes missing every forty seconds in the United States (guard-a-kid). To keep children safe, technology has been developed to combat this statistic, and possibly save a child's life. One noninvasive and reliable development is a small transmitter that can fit within a child's pocket or shoe, which will send off high decibel noises once it's triggered by a concerned parent. These can be extremely useful in quickly locating a child within a crowded and hectic area, such as a mall, a carnival, or even busy city streets. Even less

noticeable but equally as effective are cell-phone based GPS trackers, such as Guardian Angel. Guardian Angel allows parents to login to a secure website and view where their children are using the GPS trackers within the phone (guardianangel.com).

Cons: The Negative Side of Technology for Children

"Our children's digital lives are turning them into much different creatures from us – and not necessarily for the better." – Dalton Conley, Time Magazine

Loss of Privacy: "We're always connected, because we're always connecting."

As society become more connected through the internet, cell phones, and social networking, privacy for children is becoming a major concern, and one that is difficult to find a solution to. Currently, the Children's Online Privacy Protection Act (COPPA) acts to protect children under thirteen from the distribution of their information. Sites can enforce this by releasing a privacy statement, or disallowing young children from using their site at all (coppa.org). However, it can be difficult to know for sure that the child using your website is being honest about their age or any of their information at all.

Facebook has been arguably the biggest web phenomena in recent memory, taking in millions of active users and allowing them to keep in touch with their friends and family, and also the entire world. Any user can constantly and publicly broadcast their photos, videos, opinions, personal information, and even exact location, to

whomever they so choose. While Facebook imposes and does its best to keep up with the thirteen-year-old age minimum, this can even be difficult to enforce. Children can easily claim to be thirteen when they're still a couple years younger, and sometimes, parents even allow this. A 47-year-old Cape Cod mother said, "You know, I feel like a hypocrite, because I'm saying I don't think children should have a Facebook before they're sixteen… but he's eleven, and he has one. And we had to lie about his age, and say he was thirteen."

While it is possible for children such as these to have private accounts on the site, it is often difficult to understand how to become as private as we might like to be. This can be difficult for even for some adults, especially when Facebook founder Mark Zuckerburg isn't all too concerned with privacy himself. He was quoted saying that privacy is no longer a 'social norm' and that "People have really gotten comfortable not only sharing more information and different kinds, but more openly and with more people" (theguardian.com). In this type of public online environment, adults and children can attempt to hide their information, but it may be more difficult than originally thought. Children can hide their information from those who they are not friends with, but at this point, this might not even prove to be enough.

Facebook has exploded into a widely used advertising agent, making it even more difficult to keep your information to yourself. Applications have become a popular feature of the site. They appeal to children because they serve so many functions, such as game systems, quizzes, horoscopes, and deal finders, however, they come with their own risks. Applications are able to take information from their subscribers, even if the person only used the application once. Also, buried in Facebook's privacy controls are settings

that allow third party companies to access much of your information if even a single one of your friends use their application. For example, if a child's friend uses Farmville, the company can also access the child's information including their bio, birthday, whether or not they're online, photos, status update, or hometown (facebook.com). With this being unknown to most adults, it is difficult to fathom that a thirteen-year-old child will be able to understand and keep track of these settings as well.

Facebook is not the only threat to a child's Internet security. Recently, Google Buzz has become a point of concern for many parents as well. Technology analyst Charlene Li spoke in an article from the Los Angeles Times about the issues rising from her nine-year-old daughter using the very public website. After she found her daughter publicly posting a conversation with her friends, she looked deeper into the site and found some alarming posts. "Fortunately, this was her only buzz posting. But what was most disturbing was looking at her friends' conversations and realizing that some of them were chatting with complete strangers, and in some cases, sharking personal information like e-mails. Absolutely terrifying as these are forth grades who have no clue." These children having 'no clue' is what is most alarming about children's Internet usage. Many children do not realize how public their information is becoming, and how many potentially threatening people can access it. As children publicly post their emails, schedules and locations, they are allowing strangers to know where they are at all times. It is more difficult to keep yourself private when our world suddenly became the entire World Wide Web.

Lessened ability to multitask

Although many avid technology users believe they have become more able to handle multitasking, scientific studies have shown that the effects of using technology may be opposite of these conceptions. Technology today has become more than just using a computer at work, or checking your email once you get home. It has become a constant stream of information flowing into our lives through mobile notifications, thousands of functional apps, and the easily accessible wireless Internet. These capabilities have been great, however as Powers states in <u>Hamlet's Blackberry</u> "We've been doing our best to ignore it, but it won't go away. It comes down to this: We're all busier. Much, much busier."

American society has become used to distractions and constant business thanks to the new needs to check our social media and receive instant email updates to our pockets. Powers writes "…in many ways they [digital technologies] do make things easier, reducing the time and trouble it takes to communicate and perform important tasks. But at the same time, they link us more tightly to all the sources of our busyness." According to an article in Time magazine, eight to eighteen year olds spend seven hours and thirty-eight minutes a day using entertainment media. As they have become so absorbed into it, that social and entertainment media become a constant distraction.

These distractions affect the way children's developing brains absorb new information, and can lead to continuous partial attention (CPA). Coined by former Microsoft executive, Linda Stone, CPA is the state we enter into when we are using technology and are forced to split our attention between several different tasks. We shift our priority to what is most important, and are constantly paying some attention to several things, and yet never giving our full attention to any one task (Time Magazine).

Children's high ability to do this leads many to believe that their multitasking skills have skyrocketed, however, this superficial reasoning is hiding other findings.

Constantly focusing on several tasks at once changes the way people think and behave. While children who use technology may be able to split their priority between many tasks, they have become unable to focus, due to constant bursts of new information. In an article in the New York Times, scientists discussed the negative effects of new multitaskers. According to their research, "multitaskers actually have more trouble focusing and shutting out irrelevant information... and they experience more stress."

To test these studies, subjects were divided into two groups, those who were heavy multitaskers and those who weren't. The groups were then shown two brief images of red and blue rectangles, and told to state whether or not the red rectangles had moved. They were told to completely disregard the blue rectangles. In this test, the multitaskers scored significantly lower than the non-multitaskers, showing that they had a more difficult time filtering out the irrelevant information in the test (NYTimes.com). Tests such as this show that children who heavily use technology and become accustomed to its constant reminders and multiple functionality will be better at multitasking, but will be far more sensitive to incoming information, and will not be as good at focusing entirely on tasks that may require it. While this multitasking has its place, it will not move children into higher status jobs. Multitaskers become more skilled in higher monotonous jobs, where less information will be incoming, such as factory lines. They will not be as well suited for deep thinking and higher paying jobs.

Health Related Issues

As video games and electronic entertainment continue to develop and work their way into more children's lives, a rising fear among parents is that children are becoming more prone to health related issues, such as obesity and developmental challenges. The obesity rate in children has tripled in the past 20 years (the-aps). According to livestrong.com, fifteen percent of children between six and nineteen years old can be considered overweight, with twice as many on the brink of becoming such. They link this 'epidemic' to not only the prevalence of high calorie food, but technology as well, as it leads to a sedentary lifestyle. "Teens manipulate a joystick instead of a baseball bat. The television has become a constant companion, replacing outside play" (Livestrong.com).

Furthermore, the potential for a sedentary lifestyle ranges beyond the traditional technology we automatically think of, such as video games and the television. Today children are riding in cars instead of walking, and using elevators instead of stairs (American Physiological Study). As with video games, pieces of life are becoming more automated, and as such require less activity out of the individual. However, there is a beacon of light for childhood obesity in relation to technology. Companies, such as the Kaiser Permanente are trying to use the technology for good. Kaiser Permanente is introducing a game that uses education to teach children what good eating habits consist of. For example, players determine that Emily is overweight because she eats good food, but too much of it (abcnews.com).

However, obesity is not the only health related issue directly related to children using technology. According to several studies, children's sensory skill development is being put at risk through overuse of technology. The American Academy of Pediatrics recommends that young children spend a maximum of one to two hours of screen time

per day, but this suggestion is not being adhered to. The Kaiser Family Foundation conducted a study in 2010 called Generation M^2, which discussed the way teenagers and children (between ages eight and eighteen) use media. It was reported that in 2010 children spend an average of six hours and nineteen minutes using electronic media per day. This included a forty-seven minute increase with music, a thirty-eight minute increase with the television, and a twenty-seven minute increase with computers since the study was previously conducted in 2004.

This heavy use of electronic media is having drastic negative effects on children's development according to British Columbia's Society of Occupational Therapists. In their 2009 newsletter they reported: "Children now rely on technology for the majority of their play, grossly limiting necessary challenges to their bodies in order to achieve optimal sensory and motor development… with subsequent impact on achieving basic foundation skills necessary for literacy" (OTLine). While it is okay to allow children to use technology for a limited amount of time, when it begins to become a substitution for personal interaction, issues begin to arise. Developing children require human interaction in order to properly develop. Young children require between three and four hours a day of physical activity and human 'touch.' According to Dr. Ashley Montagu, infants that are deprived of this amount of human touch and play exhibit more agitation and anxiety, and may become depressed in early childhood (OTLine).

Exposure to media violence has become a health risk in itself for many children. When concerned parents think of their children playing video games, their thoughts automatically stray to the threat of violent video games. Games today are more realistic than ever, and as such, as is the violence incurred to people, animals, and creatures within

the game. While not all games are violent such as the new Super Mario Bros games and Just Dance!, most of today's popular titles focus on violence and destruction in some form. Titles such as Call of Duty: Black Ops ($719M), Call of Duty: Modern Warfare, and Red Dead Redemption ($193M) have appealed to younger buyers since their introduction even with their inherent violence. The violence prevalent in these games and others like them, have been linked to more aggressive behavior in then children who play them. According to the American Academy of Child and Adult Psychiatry, children who consistently view this violence on the video game screen become more immune and numb to actual real life violence. They begin to believe that this violence is not a bad way to deal with problems, and see no issue with acting violently because of this. The more realistic the violence is on the screen, the more the child will be affected. The effect of media violence has been so strong that it has been classified as a public health risk due to causal links to childhood aggression (OTLine).

However, children cannot seem to get enough of these violent games, and their thoughts on them seem slightly unsettling. When speaking to a forth grade class at Wakefield elementary, the children were anxious to tell me how they felt about their favorite video games. In fact, no question stirred up as much response as "Now, how many of you kids play video games?" Hands flew into the air and everyone wanted to tell me what they played. Halo Reach, Black Ops, Mario Kart, and Wii Sports were the most popular options, reflecting sales figures for 2010. However, it was when I asked why these games were their favorites that their most interesting responses came out. One forth grade boy told me his favorite video game is Call of Duty Black Ops because "There's zombies in it and you get to kill them with guns and there's violence… so, I like blood

and violence." Another boy who told me he enjoyed Black Ops because "it's got a lot of shooting," while a Halo fan told me he liked it "because there's lots of blood, and you kill people." Their statements reflect the idea that violent video game usage allows children to believe that the game's violence is acceptable and 'cool.'

Changing Social Norms

While this generation may be the most connected generation ever, this ability to instantly contact anyone may pose a great risk to young children. When people interact with one another through the Internet or cell phones, it is a far different social experience than speaking with someone one-on-one. When we communicate in these ways, we are hidden behind the 'digital wall,' which can allow us to have conversations we might not have in person. For instance, users of dating websites will be more likely to ask someone to chat on the site than they would be if it were a face-to-face interaction. Hiding behind the digital veil for media based conversations has caused children to develop a disconnect from others, and even from themselves.

Technology has completely changed the way Americans communicate, including children. According to a recent study released by Pew, electronic media does not cause social isolation, however, it has completely changed the way Americans define their social circles and friends. Those who use social networking are 30% less likely to know their neighbors, and 26% less likely to provide them with companionship. As children have more of their communication through electronic media, and less of it face-to-face they begin to feel more lonely and depressed. According to a Cape Cod physician, this has stemmed further than just within the home. He said "You know, more physicians are

using computers and electronics to view records and patient information. I've heard from patients, that they're wondering 'is he talking to me, or is he talking to the screen?' They feel more isolated and feel like they're talking through a screen."

Children especially have been using technology to cope with situations that may be more emotionally stressful. Hiding behind the digital wall, such as texting or Internet communications, allows children to deal with situations that they wouldn't want to face-to-face, such as ending relationships or dealing with bullies (Campbell). Children who are more meek and shy will be able to have a conversation with someone without worrying about awkward silences and lack of conversational topics. However, it seems that using electronic media to hide from stressful situations may actually begin to "impact their capacity to interact with each other." Further confirming this, California State University found a connection between social anxiety and talking online or through text messaging.

Survey Results: Speaking with People of all Ages

Two separate surveys were conducted to get feedback from people of all demographics (transcripts can be seen in the Appendix). Survey I was given to adults ages eighteen and older, and Survey II was given to a selection of one hundred randomly selected high school students at Bourne High School, in Bourne, Massachusetts. Survey I focused on adults' opinions on what uses for technology are appropriate for children, and also on some of today's speculations and generalizations about technology and children. Survey II asked some of the same questions about technology uses and generalizations, but also asked about the students' personal consumption and communication.

Strictly Students: Results from Bourne High School

When surveying the students on their personal technology use and consumption, some trends came to light. When asked how old they were when they received cell phones, 72 percent of them stated that they received them when they were between the

8-10 years
11-13 years
14 or older

ages of eleven and thirteen (see figure 1). This age range correlates with being in sixth to eighth grade. Some of them even wrote in that the phone that they were first given was for emergency use only. In the follow up question, when asked what type of cellphone they were given, 87 percent of students stated that they were given a standard cell phone (such as a razor flip phone), which had capabilities such as texting and calling, while four percent said they were given cell phones made especially for children, and the remaining nine percent were given smartphones, such as an iPhone or a Blackberry.

When asked about their consumption, the students further showed that the trends of communicating are ever changing, and becoming more geared toward electronic communication, mainly texting and social networking. Fifty-eight percent of students said that they communicated with texting. Furthermore, when asked specifically about
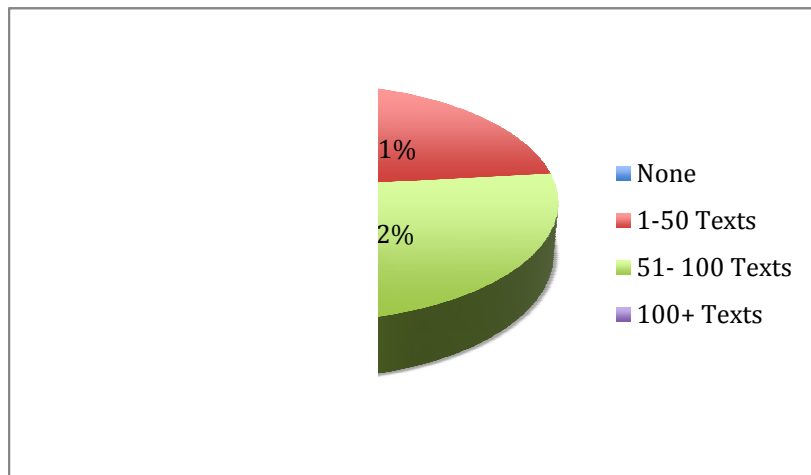
Figure 3: How many texts students send per day

their texting habits, results were astronomical (See figure 2). When asked how many texts they send per day, almost half of the students stated that they send at least one hundred per day, while thirty-two percent said that they send at least 51-100 texts. Only two percent of students did not send any at all. Since its introduction in 1992, texting has grown explosively as it has become cheaper and easier to do with the introduction of full keyboard cell phones. Even compared to just last year, texting has grown from being used

by 55% of teens to 62% (Neilson). BHS students further confirm this trend by not only beating, but also skyrocketing over the average found by Pew Research Center's Internet and American Life Project, conducted in 2010. According to this survey, only twenty-nine percent of teens sent over one-hundred texts per day.

What was more surprising about the way the students communicated is that social networking, such as Facebook beat calling by a slim margin of one percent. Because Facebook now allows users to communicate easily and in real-time not only via wall post and messages, but by the chat capability as well, it is becoming a preferred way to talk to friends. Children and teenagers can talk to several of their friends at once, and see when the friend is available, idle, gone, and even typing a response, mimicking the features of the once popular instant messaging. When asked how often they use Facebook, the majority of students (76%) said they used Facebook for under two hours a day. Only seven percent of students said they don't use Facebook at all, further displaying the dominance of the popular Social Networking machine.

Comparative Results: How Students and Adults Feel about Technology

Two series of questions were asked to both demographics. The first series of questions posed asked about ages when different social norms become appropriate. In all three of these questions, the students believed that all actions were appropriate at younger ages. The first question asked at what age does it become appropriate for children to play portable video games while out to dinner with their families. A resounding ninety-five percent of adults stated that it was never appropriate, some of them even laughing or scoffing at the question. The remaining five percent was distributed among the lower age

categories ranging in ages from 1 year old to 14 years old. When the students were asked the same question, only 76% said it was never appropriate and 15% said it becomes appropriate when the child is between the ages of one and six years old.

The student's leniency was displayed even further when asked at what age it becomes appropriate for children to text while out to dinner with their families, or during family time. Again, the majority of both adults and students said it was never appropriate, at 89% and 68% respectively. However, 25% of students felt it became appropriate when the child was fifteen years old, and 7% thought it was appropriate when the child is between the ages of 11 and 14, garnering a total of 32%. Comparitively, the adults were much more conservative about the topic, with only 7% saying it was okay
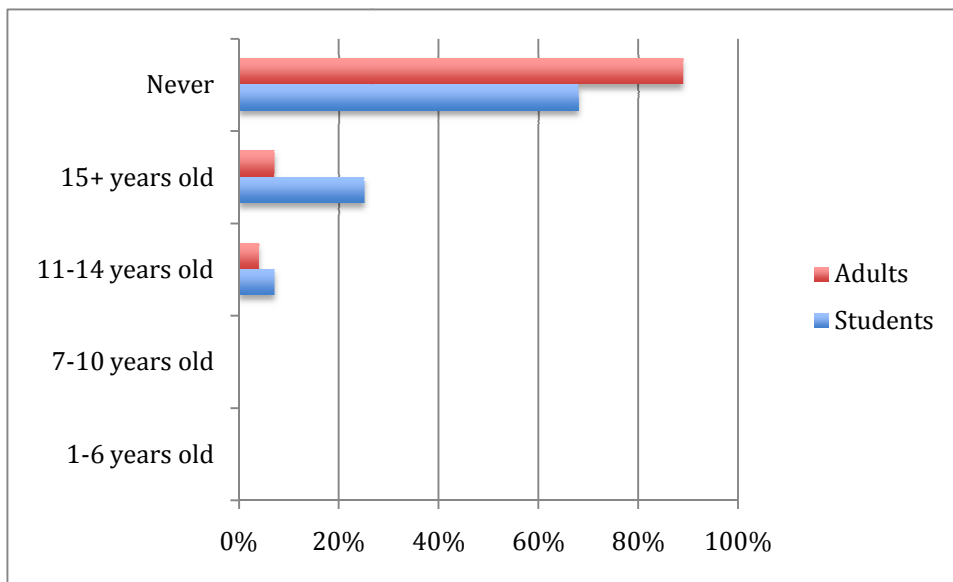
Figure 4: Age at which it is appropriate for children to text while out to dinner

at 15 years old, and only 4% saying it was appropriate at 11-14 (see figure 3). Overall, the students displayed in this first series of questions their willingness to allow

technology into their lives, and the lives of those around them sooner when it comes to social norms.

However, when asked about generalizations made about technology, it was surprising to see how similarly both demographics felt. A series of five questions was asked with four answer options: strongly agree, slightly agree, slightly disagree, or strongly disagree. Both demographics were divided on whether or not technology makes children more anti-social, both agreed that children who use technology are more prone to obesity and health related issues, and both also agreed that technology developed for children helps to improve their hand eye coordination. The main difference between these two groups is that more adults were prone to feel strongly either way, while the students would only agree or disagree slightly. While both demographics took sides on the questions, the adults had more passion behind all their answers.

Recommendations: Where can we go from Here?

After looking into both the pros and cons of technology in the lives of children, it is easy to see that it gives great benefits while also posing some great risks. It is equally as simple to defend why children should have technology, as it is to point out why they shouldn't. However, pointing the finger in either direction will never bring an end to this debate, and the reason for that it simple. When it comes down to it, technology will be here and an integral part of our society for the rest of our foreseeable lives. Technology is going to keep advancing, and we will find more ways to use and interact with it. Also, it is because of this fact that we cannot immediately state *how* technology is impacting this generation of children. This generation is the first to have capabilities such as social networking and instant connections with friends, and we have not seen the overall effects of this, because these children have not grown into adults yet. We are basing our opinions on preliminary studies that may not be conclusive yet. Dimitri Christakis, the director of the Child Health Institute at the University of Washington, explained this best. "We have completely changed the way children play. We are in the midst of a large, uncontrolled experiment on children, the effects of which we won't know for years."

For us to say that technology should be taken out of children's lives all together has become a slightly unrealistic notion, due to the vast amount of technology that is now available. To keep kids away from it entirely would require them to be shielded from the cell phone, the television, the computer, and iPods. This would require a vast change in lifestyle from adults, who are more than likely already immersed in technology

themselves. When it comes down to it, it is not the fact that children have this technology that is the problem. In order to allow children to have technologies in their lives to reap the benefits of its use, and also prevent them gaining the risks, two key practices must be followed: parental controls and moderation.

Parental control over how children interact with technology can be a great protection from the risks for children. A 21-year-old University of California stated that it "comes down to how the technology is being used, rather than the technology itself. For example, there is a big difference between Sesame Street and South Park." This sort of mentality echoes through all types of electronic media. There is a difference between allowing a child to have a computer, and allowing a child to have a computer that the adult monitors and has some sort of limitation over. There is a difference between letting child surf the Internet, and letting a child surf the Internet under some sort of filter and control system. Parents who understand the benefits of technology and want to prepare their children for the technology-driven world must also understand that there needs to be some responsibility shown to the child, and some sort of monitoring done while they are still young.

Parents can play active roles in engaging the children in technology, but also showing them that there is more to life than living behind a screen, and being good with a PC or Mac. When being asked about whether or not technology makes children anti-social, a lot of adults responded by saying it may not be the technology itself, but how it used. One woman stated "I allow my children to play video games, after they do their homework, and after they've played outside, etc. I think technology making children anti-social or obese is an excuse for a bigger issue that's behind everything else. And I think it

has to do with parenting." Many young adults agreed with this thought as well. A 20-year-old URI student said:

> "I grew up with video games in our household from the time that I was born and I think I turned out pretty okay. Yes, they may take away from kids making friends or going outside to play, but that is less about video games and more about parenting… I honestly think this whole "video game" problem has more to do with parental enforcement and how a kid is raised…"

There is no crime in allowing a child to play with video games when they're young, or giving a child access to a computer, or tablet, or mp3 player. However, it is when the child is given uncontrolled access to everything technology has to offer is when problems begin to arise.

The best analogy that can be given to giving children technology has to do with allowing a child to have an unrestricted social networking account. Children are taught at a young age not to talk to strangers. This phrase is drilled into their head as they are given the risks of talking to someone they don't know. However, that same parent allowing their child to have a Facebook account with which they can do whatever they want, is allowing their child to talk to anyone and everyone, and give their private information to whatever people and companies want it. With the ability to check in and tell everyone exactly where you are at all times, children can be put at even greater risk. This makes it impossible not to talk to strangers if some responsibility and restraint has not been previously instated.

Parents can begin early by explaining to children what the technology they are using is, and what the risks are that come along with it. When a child wants to have or use a computer, parents can allow them to do so, as long as parents monitor what their children are doing, and explain to them what the risks and benefits of the Internet are.

Having a toolbar or filter can also benefit on keeping children surfing safe on the web. For social networking, parents should respect the age limit and allow their child to be mature enough to have a Facebook or Myspace, and then keep an eye on how the child uses the site when they're old enough to have one. One of the best ways to keep an eye on kids on Facebook is for parents to friend their children on the site. For video game usage, parents can put a limit on how long the games can be played per day, and under what conditions.

While these practices are ideal, they are not yet being fully used. When I spoke to the fourth graders and asked them if they had their own computers, many said they did, and many said they used it unrestricted. One boy who said he was on the computer for more than seven hours a day anxiously raised his hand and told me "Yeah, I have a laptop so I hide it under my pillow, and then when my parents leave, I'm up until midnight typing." A couple of other children told me about their similar situations, and how they can get away with a lot while on their computers. This trend echoed in the high school as well. When asked if they had their own computer sixty-three percent of students replied that they did, and that they could do whatever they wanted with it, while only one percent said they had their own but their parents watch them with it. Continuing these practices and policy allows for children to overuse and abuse technology and become dependent upon it while dealing with its risks.

Many of the physical risks of technology, such as developmental problems and obesity, stem from children who overuse and abuse their technology of choice. For instance, children who are dealing with obesity related to playing video games are the children who play for extreme amounts of time per day and not playing outside. Putting a

limit on how much children use technology and how much they share with it will help to prevent the risks of health related issues, lack of privacy, and loss of social skills. This is especially important within the home. As of now, there is little research about the effects of technology on infants and toddlers (pediatrics). The electronic media market currently heavily targets these infants, ranging from one to eighteen months, with new emerging products that can be anything from television channels to handheld video game players.

Despite the lack of research, there are suggestions made by the American Academy of Pediatrics to restrict television watching entirely for children under the age of two, and limit this to two hours a day once children reach two years old. This research parallels that done by Occupational Therapists who believe that these young children require the proper amount of human interaction instead of technological interaction, in order to reach all the proper motor milestones. Older children should also be monitored when they begin to use the Internet, including social networks, online chats, and email, since there are several risks that come along with this technology alone. The unsupervised web opens up a risk of loss of privacy, exposure to adult content, and contact with predators. With a growing concern on children's privacy, it is also important to moderate the amount of information distributed can help to keep children safe. A URI student stated:

> "I understand teenagers are excited to share any fun plans with friends, but they easily forget how dangerous giving away too much information can be. For example, instead of posting a status like 'Walking around the Wrentham Outlets. Alone. Text me if you want to join me at xxx-xxx-xxxx,' they should learn to be more vague, such as 'Out shopping, text me if you want to join.'"

Keeping their information private helps ensure children's' privacy online and keeps them safer than allowing unrestricted and uncontrolled use. Parents can take several measures to protect their kids from any of these threats by applying Internet filters, monitoring the

children's use of the computer, or speaking to their children about the dangers of the internet.

Keeping moderation in technology can be done in several realms aside from just the home, such as in the classroom. In the classroom, technology has proven to be an aid in student learning, however as with most things, too much of a good thing can actually be detrimental. As such, the type of technology implemented in the classroom should be carefully chosen and the time it is used should be closely monitored. Computers and other media make great learning *assistants* but they cannot take the place of student-to-teacher or student-to-student interaction. Completely substituting technology for discussion in children's classrooms causes disjointedness in learning and deteriorates group-building abilities (Rohfeld et al). Teachers who do use computer technology are encouraged to frequently engage students in group work or partner to help build group identities and facilitate social interaction. Students who do not engage in group discussion lose the spontaneity that comes along with this sort of interaction and they do not have the chance to debate and discuss issues that may not have come up under strict rigid computer based curriculum.

One URI student summed up how technology should be restrained overall best. She said "If an adult actively engages the child in games, arts and crafts, and playing outside, the child will not rely on technology as their sole form of entertainment. However, if the adult relies on technology to engage the child, obviously the child will depend heavily on it." Like anything else in life, there needs to be a balance for how much technology children have access to. Keeping technology use in control and in moderation is the key for allowing children to use technology, and allowing them to do so in a healthy way.

This is the first generation of children to have the access they do, and it is still too soon to say that technology is definitively good or bad for them. To fully understand this topic and to really find true scientific and valid effects of technology on children, we must continue to observe how children who have this exposure develop, and if they develop differently than those who don't. We are only in the beginning of a new age of growing up, and the children of this age will be a valuable resource in determining the true effects of their use of technology.

Appendix A: Interview with Cornelia Brunner

- How old do you believe children should be before they are exposed to technology of all sorts?

I think the only reasons very young children should *not* be exposed to digital media have to do with matters of health – I'm not sure we know yet how much of what kind of exposure to electronic devices might have some kind of negative impact on the development of very young children. But other than that, I see no reason why babies should not be allowed to enjoy smacking their little hands on an iPad screen and enjoying the colorful splashes and silly sounds it might make when they do it. The problem is not technology, its doing any one thing to the exclusion of all others, a kid reading books every minute all day, every day, is not a good idea either... Kids need a balance of play with all their senses – and the more we can use our bodies while playing with digital devices, the better for kids. And kids also need a balance of the real (nature) and the invented (all arts, including computer and video).

-**What do you believe the future for technology in the classroom is?**

I think technology will become increasingly invisible because it will just seem normal to have a smartphone or tablet on a special school setting, so you can use it to look things up and communicate files, and your teacher can see what you're doing, and make sure you don't use it just to write messages to your friends... It will just seem natural that we are using a lot less paper, both in what we write on and what we read, and that the library is a database with lots of carefully selected, good and valid information in it that you access from your tablet - and the room where books used to be on shelves is now a place for people to sit, debate and discuss the texts and images they all see on their individual tablets and on the big screen at the front of the classroom.

- Do you believe that non-educational technology has any benefits for children? These technologies include cell-phones and the internet.

Yes, of course. That digital world is here to stay and it lets us communicate and share and compete and play and inform each other and plan together. All of that is good for everybody, including kids, within some boundaries. Just like there have to be rules of conduct in real life, there have to be smart rules of conduct in digital life. Telling a deliberate lie is the same, whether you do it to a person's face, in a book or on a computer screen. Rude is rude, anywhere you do it. And stealing other people's work without giving proper credit is bad behavior anywhere... Kids have to learn to behave appropriately in the digital world as well as in the real one.

- When working on Projects such as ready to learn, did you find that having the technology available motivated children to work harder?

We were working with very young children, and to them the digital stuff just seemed natural. They have no way to compare it with anything. But we did find that they liked it a lot and that it didn't stop them from being just as interested in playing with sand and water and dolls and cars. So it provided them with another option and it did them no harm. And as I see it, more options are almost always better than fewer options – as long kids can get some useful guidance on how to figure out which options work for them - that's what we need parents and teachers for, to help us reflect on our experience and learn from it.

-Are you a proponent for putting more technology in the hands of children? If so,what type at what age? And should this be moderated in any way?

I think I answered that.

-Do you believe there are any misconceptions about children's technology?

yes, mostly the idea that 1) games are addictive -- and that 2) kids who know how to operate digital devices ("digital natives") better than some adults do also understand what they meet up with on those devices.

In other words, just because a kid might be swifter at navigating through some intricate, new website, does not mean that the kid also understands what the website contains.

As for addiction, I think when I hear people talk about how addictive print is, how it sucks a helpless bookworm of a child into its nasty clutches and forces that kid into ruining her eyes by devouring word after word of that pernicious printed text --- then I'll agree that the word "addictive" is appropriate to use about electronic games. People talk as if playing a game is a passive thing that turns you into a zombie. Actually, that isn't even true for television, where you can really zone out, because even there, you are always actively interpreting and making sense of what you see — and it certainly is not true for interactives.

-What do you have to say to people who believe that all technology is negatively impacting children (i.e. making them antisocial and causing them to develop mental illnesses)?

I think that's the "addictive" argument and all I can tell you is that when I was a kid (very long ago) the adults in the part of Europe where I grew up were alarmed in exactly the same way about the horrible effect comic books were going to have on the impressionable minds of young people!!! We were all going to turn into monsters because the comics made it seem as if you can do anything and survive anything (i.e., roadrunner falls off a cliff and survives). The arguments were exactly the same as the ones being used today when people (usually people who never play electronic games) carry on about how dangerous they are. Long, long ago, people actually thought that women would get sick from reading books! Did you know that? It was assumed that the female brain was not designed for heavy thinking and that it would put such a strain on us to read, say, a science book, that we would fall ill and maybe not be able to have children...

-What is the most gratifying part about your work?

I get to design games that help kids become familiar with some interesting ideas by playing with them (not by being lectured at). I really enjoy the challenge of figuring out how to provide regular kids, not just the brightest and most curious, but the kind of kid who is a bit reluctant to sit down and actually study, but can think well enough when interested (i.e. "ordinary" kids), with ways to imagine how stuff works (stuff can be nature, in a science game, or language, in a literacy game, or the law, in a social studies game, etc.).

-Do you have any other comments about the future of children and technology?

Only that we are now at a point where technology is just the set of devices that allow us to connect to the digital medium and use it for all its many purposes, from shopping to intimate conversations, from medical information to lovely, silly games. The technology that delivers this service, this connection to the universal, digital network, is going to keep changing, but the kinds of things we do in that digital medium, whether we use it to connect with each other or to yell at each other, to help each other or to incite each other to hatred, are what really matters — and for that to work, we have to go back to the values our parents teach us and the values we develop for ourselves as we grow up – we have to be moral in the digital world, just as we do in the real world.
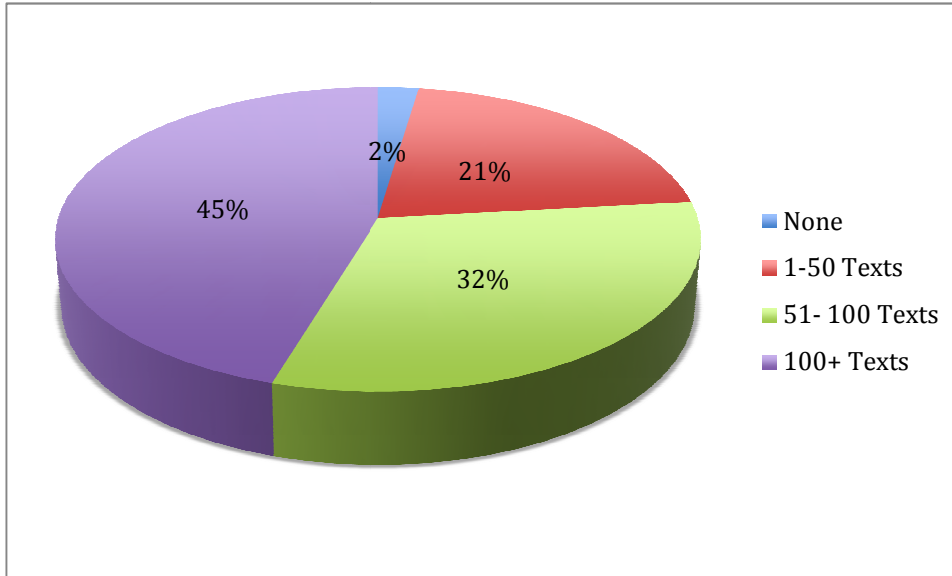
Appendix B: Charts from Survey Results

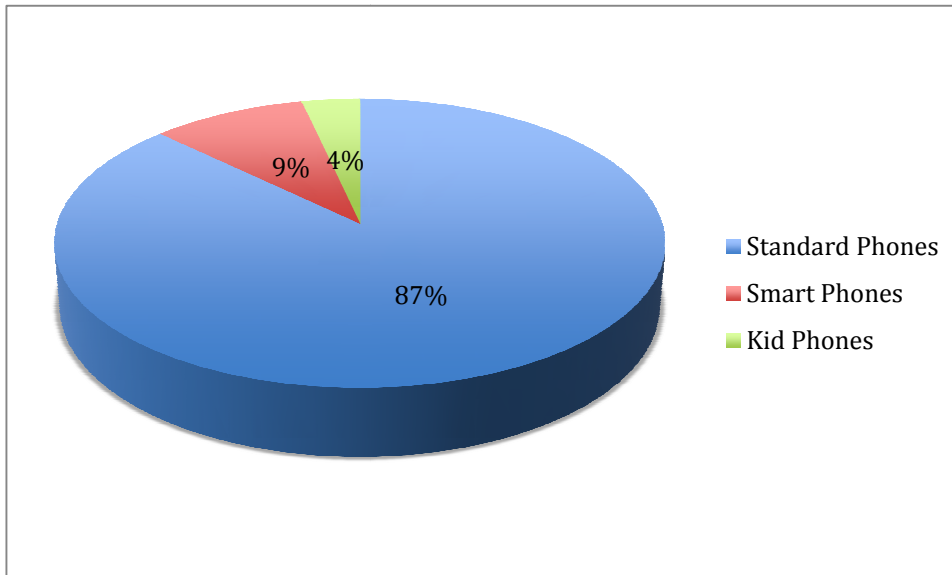Age When Students Received Cell Phones
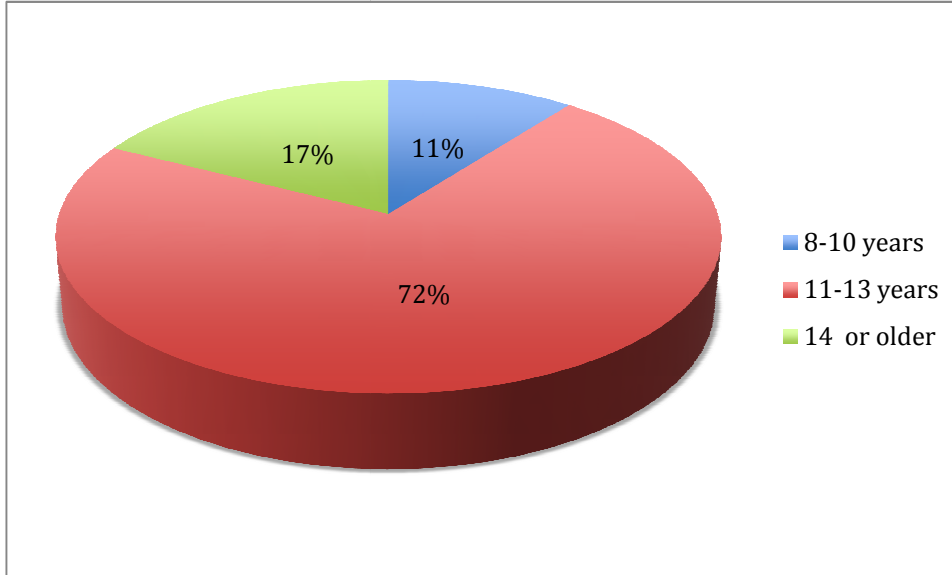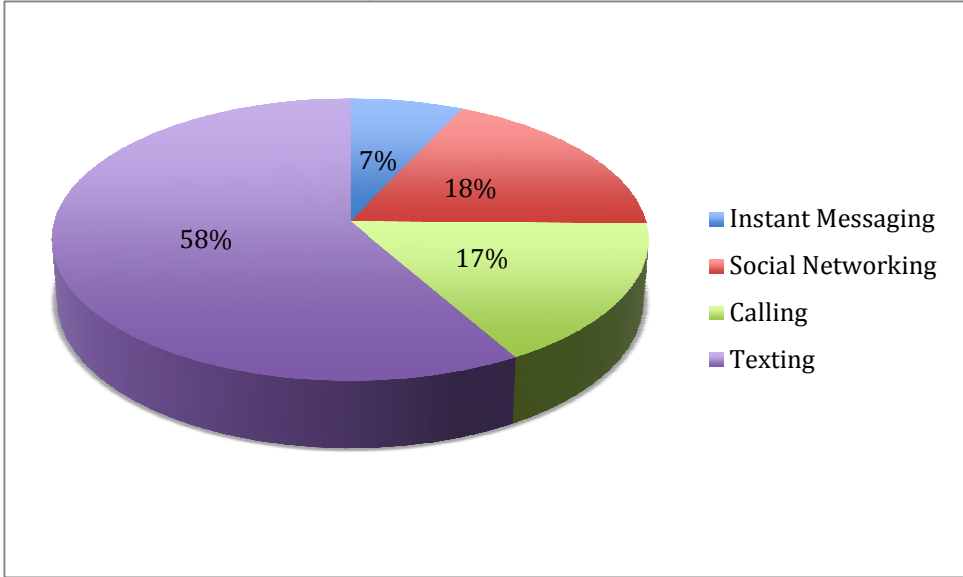

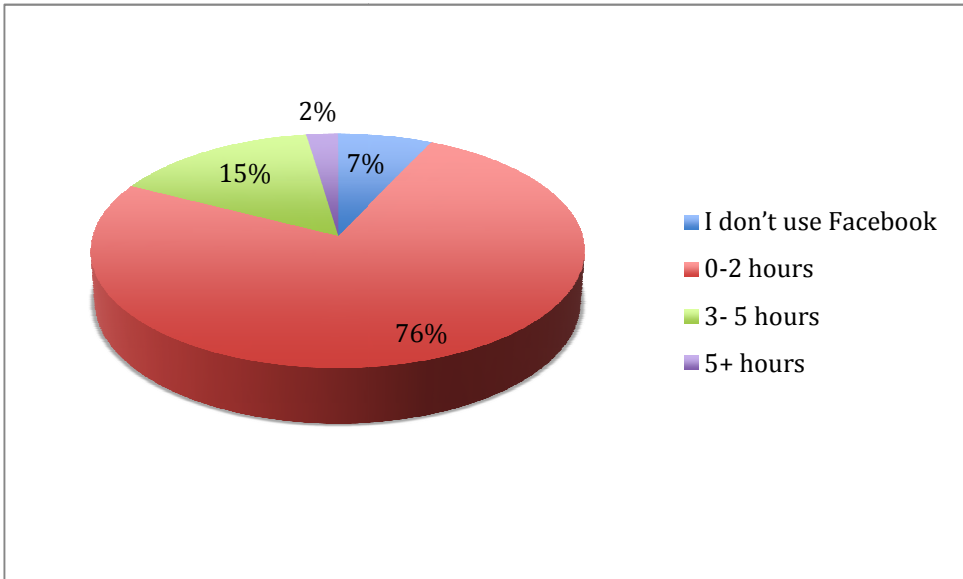Type of Phone Students Received:
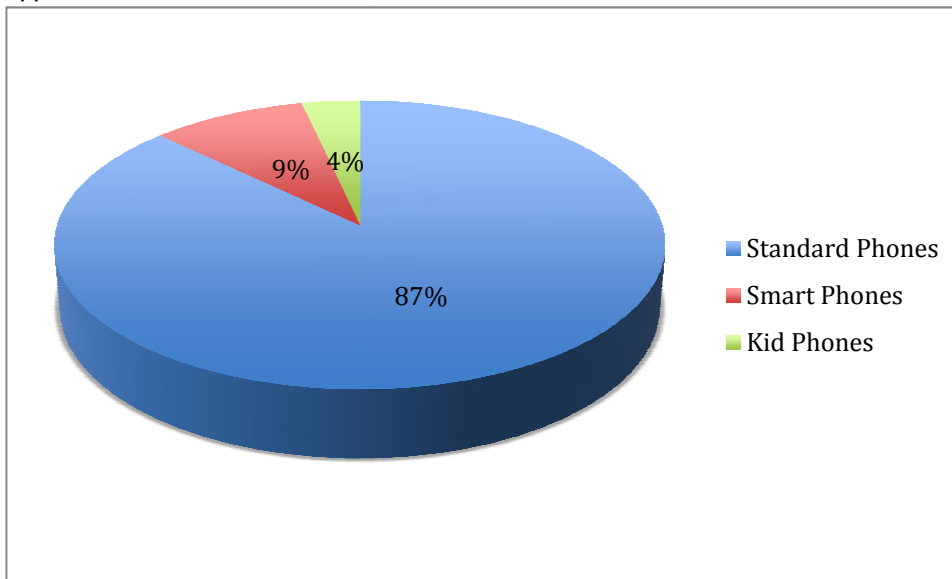
Amount of Texts Students Send Per Day:

Amount of Students who have their Own Computer:

How Students Communicate:
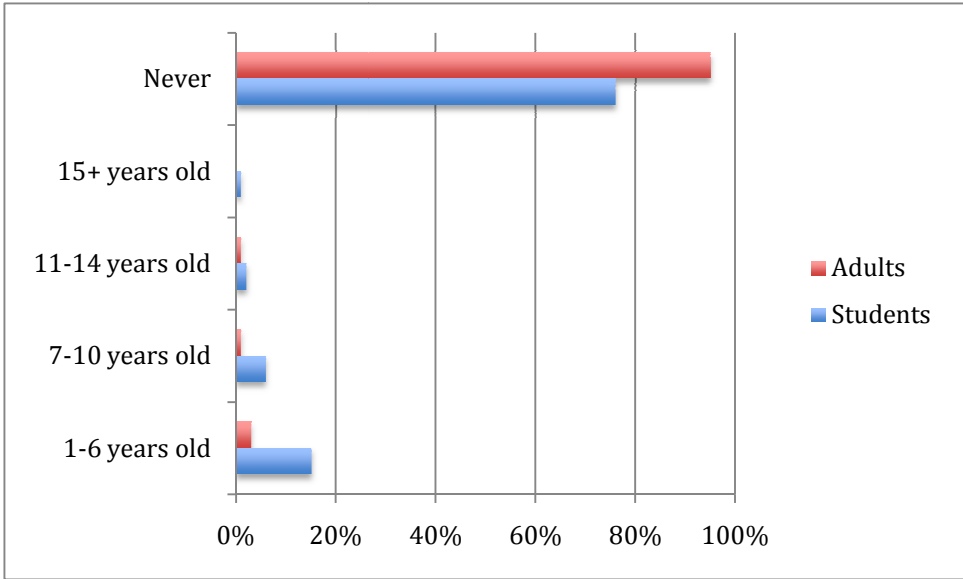
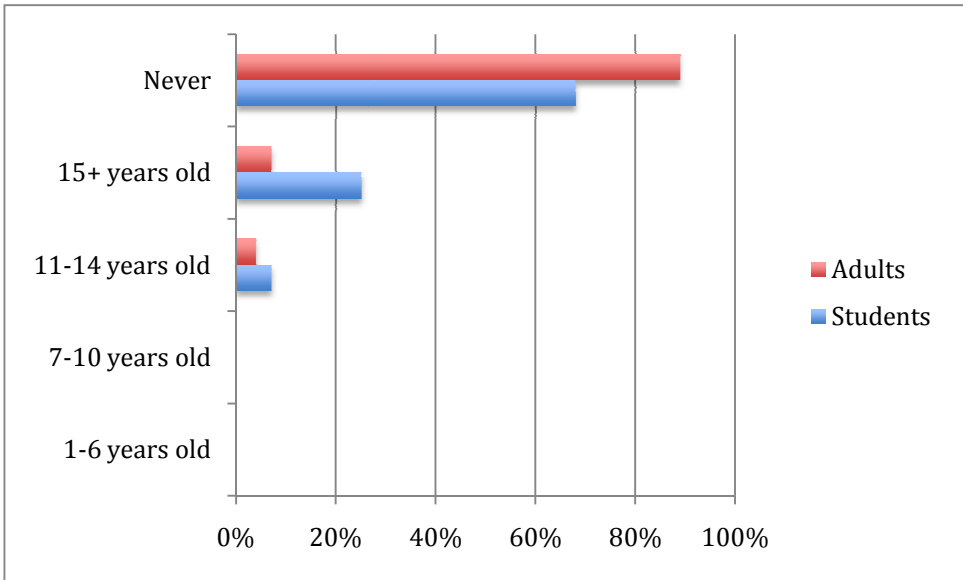|	
■	Instant Messaging
■	Social Networking
■	Calling
■	Texting

How Long Per day Students spend on Facebook:

■	I don't use Facebook
■	0-2 hours
■	3- 5 hours
■	5+ hours

When is it appropriate for children to play portable video games while out to dinner with family?

When is it appropriate for children to text while out to dinner with family?

When is it appropriate for children to have a detailed Facebook where they update their age and location?
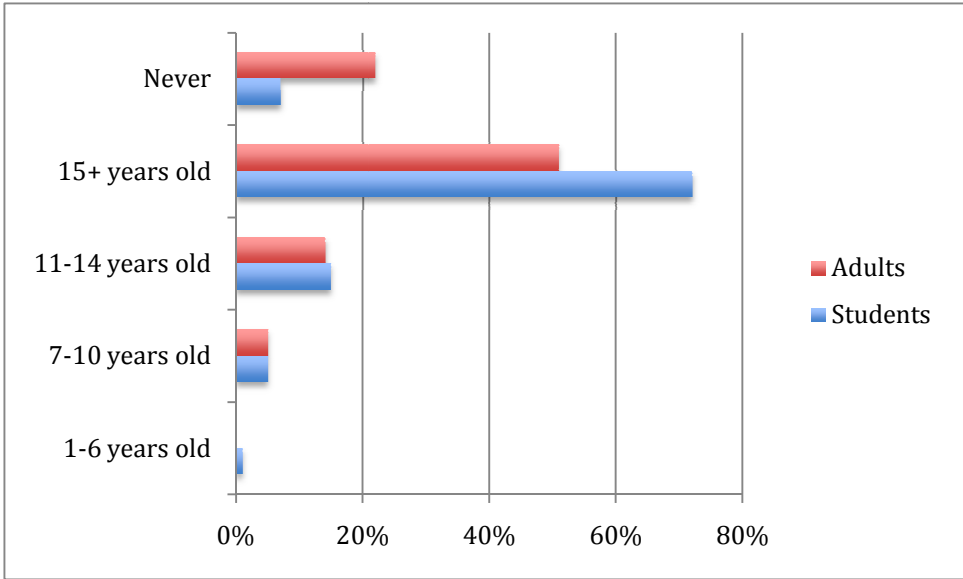
Do you believe children exposed to technology are more antisocial?
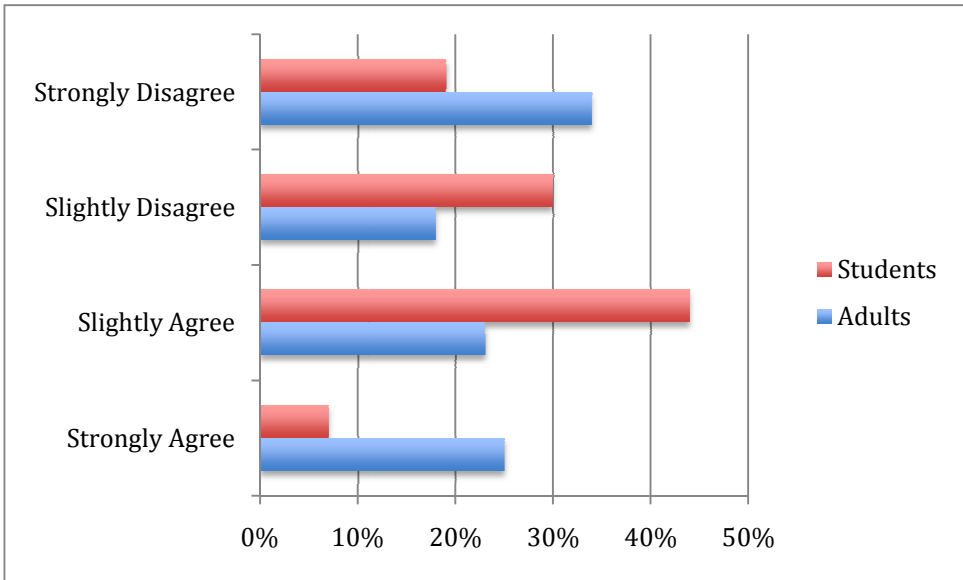
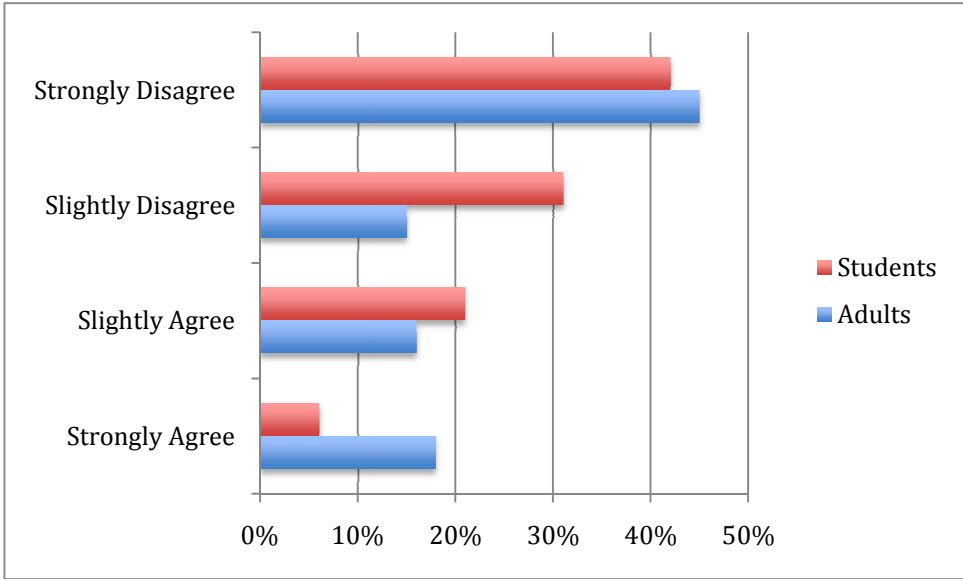Do you believe children exposed to technology are more prone to health related risks such as obesity?
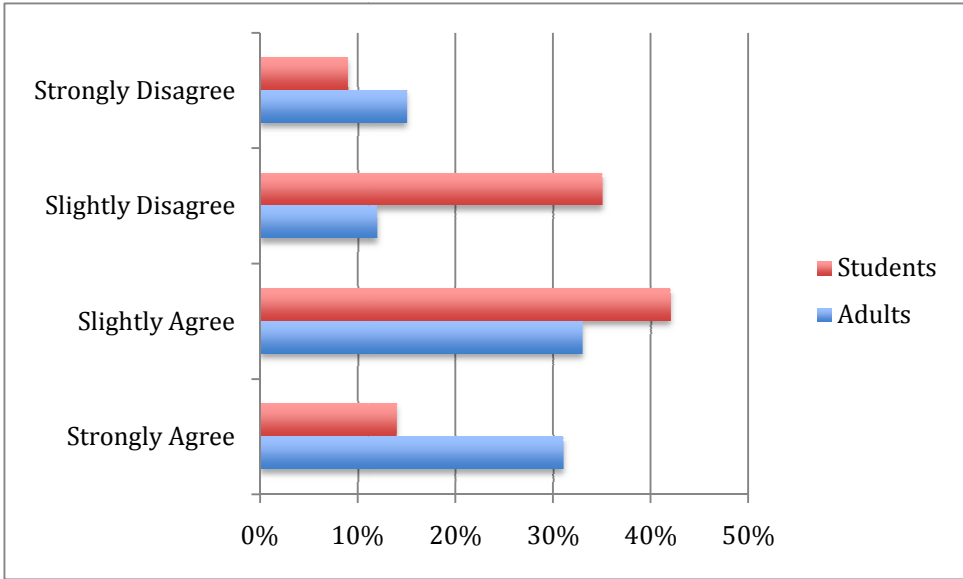
Do you believe technology developed for children increases their hand eye coordination?
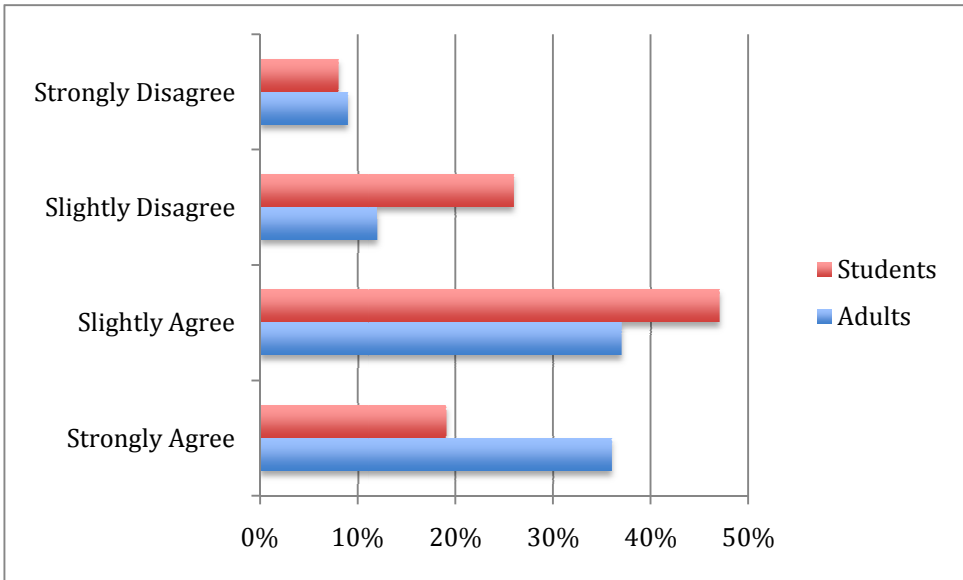
Do you believe more technology should be put into the hands of children sooner?

Do you believe technology in the hands of children as young as five is a practical and good idea?

References:

Blau, John. "Mobile Technology Keeps Track of Kids ." *PCWorld*. PCWorld Communications Inc, 31 Dec 2003. Web. 11 Mar 2011. <http://www.pcworld.com/article/114077/mobile_technology_keeps_track_of_kids.html>.

Brown, Teri. "Video Games Get Physical ." *Teenagers Today*. Disney, n.d. Web. 12 Mar 2011. <http://www.teenagerstoday.com/articles/kids-fitness/video-games-get-physical-4627/3/>.

Campbell, Marilyn. "The Impact og the Mobile Phone on Young People's Social Life." (2005): 2-10. Web. 15 Apr 2011. <http://eprints.qut.edu.au/3492/1/3492.pdf>.

Cespedes, Andrea. "Obesity in Children and Technology." *Livestrong*. Demand Media Inc, 14 Dec 2009. Web. 03 Feb 2011. <http://www.livestrong.com/article/46320-obesity-children-technology/>

"Children and Video Games: Playing with Violence ."*American Academy of Child and Adolescent Psychiatry* 91. (2006): 1. Web. 11 Mar 2011. <http://aacap.org/cs/root/facts_for_families/children_and_video_games_playing_with_violence>.

"Children, Video Games and Attention." *Brain Posts*. Blogger, 22 Sept 2009. Web. 25 Mar 2011. <http://brainposts.blogspot.com/2009/09/children-video-games-and-attention.html>.

"Continuous Partial Attention." *Word Spy*. Paul McFedries and Logophilia Limited, n.d. Web. 1 Mar 2011. <http://www.wordspy.com/words/continuouspartialattention.asp>.

"Defining Concepts." *Assistive Technology Training Online* . Assistive Technology Training Project, n.d. Web. 28 Mar 2011. <http://atto.buffalo.edu/registered/ATBasics/Foundation/intro/introdefine.php>.

Foresman, Chris. "Wireless survey: 91% of Americans use cell phones ." *ARS Technica*. ARS Technica, n.d. Web. 16 Feb 2011. <http://arstechnica.com/telecom/news/2010/03/wireless-survey-91-of-americans-have-cell-phones.ars>.

"Generation M^2." *Kaiser Family Foundation*. Henry J. Kaiser Family Foundatio, Jan 2010. Web. 20 Feb 2011. <http://www.kff.org/entmedia/upload/8010.pdf>.

Gross, Doug. "Social networks and kids: How young is too young?." *CNN Tech*. Cable News Network, 02 Nov 2009. Web. 15 Feb 2011. <http://articles.cnn.com/2009-11-02/tech/kids.social.networks_1_social-networking-sites-social-networking-facebook?_s=PM:TECH>.

Gudmundsen, Jinny. "Video Game Tackles Childhood Obesity ." *ABC News Technology*. ABC News Internet Ventures, 08 Oct 2007. Web. 20 Mar 2011. <http://abcnews.go.com/Technology/story?id=3695822&page=1>.

Guynn, Jessica. "Google Buzz poses a major privacy risk for kids, analyst (and parent) say." *Los Angeles Times*. Tribune, 22 Feb 2010. Web. 11 Mar 2011. <http://latimesblogs.latimes.com/technology/2010/02/google-buzz-privacy-kids.html>.

Hampton, Keith. "Social Isolation and New Technology." *Pew Internet*. Pew Internet and American Life Project, 4 Nov 2009. Web. 15 Mar 2011. <http://www.pewinternet.org/Reports/2009/18--Social-Isolation-and-New-Technology/Overview/Findings.aspx>.

Healy, Melissa. "Teenage social media butterflies may not be such a bad idea ." *Los Angeles Times*. Los Angeles Times, 18 May 2010. Web. 11 Feb 2011. <http://articles.latimes.com/2010/may/18/science/la-sci-socially-connected-kids-20100518>.

Hendry, Erica. "Exercise Video Games Get Kids Off the Couch." *USA Today*. Gannett Co., 30 July 2008. Web. 30 Mar 2011. http://www.usatoday.com/news/health/weightloss/2008-07-30-exercise-games_N.htm

Jackson, Evelyn. "Experts worry that video technology is influencing how children play ." *South Coast Today*. South Coast Media Group, 23 Jan 2010. Web. 15 Feb 2011.

<http://www.southcoasttoday.com/apps/pbcs.dll/article?AID=/20110123/LIFE/101230310>.

Johnson, Bobbie. "Privacy No Longer a Social Norm, Says Facebook Founder." *The Guardian*. Guardian News and Media, 11 Jan 2010. Web. 1 Mar 2011. <http://www.guardian.co.uk/technology/2010/jan/11/facebook-privacy>.

King, Rachael. "iPads Invade the Cockpit." *Bloomberg Business Week*. Bloomberg L.P., 7 Mar 2011. Web. 21 Mar 2011. <http://www.businessweek.com/technology/technology_at_work/archives/2011/03/ipads_invade _the_cockpit.html>.

Knorr, Caroline. "Have Kids Traded Life Skills for an Online Life?." *Common Sense Media*. Common Sense Media Inc, 15 Mar 2011. Web. 20 Mar 2011. <http://www.commonsensemedia.org/have-kids-traded-life-skills-online-life>.

Leung, Linda. "Top Ten Skills in Demand in 2010."*Global Knowledge*. Global Knowledge Training LCC, n.d. Web. 12 Mar 2011. <http://www.globalknowledge.com/training/generic.asp?pageid=2568&country=United+States>.

Lister, John. "Technology Has Mixed Effects On Child Development, Research Suggests ." *Infopackets*. Computer 411, 1 Jan 2010. Web. 11 Feb 2011. <http://www.infopackets.com/news/technology/it/2009/20090130_technology_has_mixed_effect s_on_child_development_research_suggests.htm>.

Mannino, Brynn. "Daily Buzz: New Study Reveals Effects of Media Usage on Happiness and More."*Woman's Day*. Hachette Filipacchi Media U.S, 22 Jan 2010. Web. 20 Feb 2011. <http://dailywd.womansday.com/blog/2010/01/daily-buzz-new-study-reveals-effects-of-media- usage-on-happiness-and-more.html>.

"New Child Safety Technology to Keep Track of Children." *Guard-a-Kid*. N.p., 11 Dec 2009. Web. 13 Mar 2011. <http://guard-a-kid.com/child-safety/?p=58>.

Ritchell, Matt. "Attached to Technology and Paying a Price." *New York Times*. New York Times, 6 Jun 2010. Web. 20 Feb 2011. <http://www.nytimes.com/2010/06/07/technology/07brain.html?_r=2&src=busln>.

Rowan, Cris. "Technology Overuse on Child Sensory Development." *OTLine*. British Columbia Society of Occupational Therapists, Jul 2009. Web. 11 Apr 2011. <http://docs.google.com/viewer?a=v&q=cache:gTGTMBlMoBgJ:www.zoneinworkshops.com/wp- content/uploads/2009/07/Summer2009-OTLine-Technology-overuse-on-child-sensory- development.pdf+%22Technology+Overuse+on+child+sensory+development%22&hl=en&gl=us& pid=bl&srcid=ADGEESiukZ5m3pFRHL_K5D5jR5ZcuNfYdl0BoanKX8P4RYHGWr4OoHBEqUo5B 0rF4Lf9cOUt-3ZOUpb0Wr_Yk6d3sabjoP6MJ9c_6J6ev8AfugE4vsRlLvGkqzpbDSp- aBwLgk8Tp5rm&sig=AHIEtbRegdoPMOT9L3xBvazFvT80aOd9eQ&pli=1>.

Salamon, Maureen. "Video Games that Make Kids Move Burn Calories." *MedicineNet* . MedicineNet Inc. , 2011. Web. 31 March 2011. <http://www.medicinenet.com/script/main/art.asp?articlekey=140495>.

Stout, Hilary. "Antisocial Networking?." *New York Times*. New York Times, 30 Apr 2010. Web. 27 Feb 2011. <http://www.nytimes.com/2010/05/02/fashion/02BEST.html>.

"Technology and Young Children - Ages 3 - 8."*National Association for the Education of Young Children*. N.p., Apr 1996. Web. 11 Apr 2011. <http://docs.google.com/viewer?a=v&q=cache:qhjqRUg2nyAJ:www.naeyc.org/files/naeyc/file/p ositions/PSTECH98.PDF+technology+children&hl=en&gl=us&pid=bl&srcid=ADGEESgZheVWB GyzxFBI7lM_wES2fu27X_3_BXfHTUzOYRQeEp5C2FwFqyGIZ7xgUczZvxAYljy2tkKooQThvI1l 8jnuGbV3JQmaTHyrxchaaBBSvnF6mratkhDBhyTLmtN9XxSJGcrh&sig=AHIEtbRtFBu2qDD_OLn m0FZUjGo3P64ftQ&pli=1>

"Technology overuse creating health hazards for youth and children." *Business and Health*. The International Business Times, n.d. Web. 11 Feb 2011. <http://www.ibtimes.com/articles/115227/20110223/technology-computers-musculoskeletal- damage-injury-back-neck-pain-exercise-stretching.htm>.