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Senior Thesis
Department of Sociology and Anthropology
Lehigh University
Spring 2001
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Introduction

Technology has become an accepted and pervasive element of society. Today, we are confronted with drastic changes caused by the on-going development of computers and the Internet. These innovations have revolutionized communication, education, business and research. Society has reaped the benefits of the Internet, but its impact upon the “Net Generation” has yet to be understood.

The “Net Generation” is comprised of those who, “were the first to grow up surrounded by digital media...to them, digital technology is no more intimidating than a VCR or a toaster,” (Tapscott, 1998, p. 1). Because the “N-Gen” ranges in age from infancy to early twenties, there will be a focus on adolescents only. The effects of the digital immersion could be extremely influential during adolescence, since this is when teenagers are trying to develop their identities, morals and values. If digital media does influence adolescents, then there could be long-term effects as they carry these views into adulthood.

The “N-Gen” is not only exposed to computers and the Internet, but they must also deal with other media, such as television and video games. It is for this reason, the “N-Gen” is forced to confront the compounding effects of modern technology. Young children must socialize themselves with the “culture of simulation,” in addition to the real-time, American culture (Turkle, 1995, p. 68). Children need to understand that the simulations seen on the Internet, television, and video games are not accurate depictions of reality. It is important that the “N-Gen” be able to keep a realistic perspective of the social context.
Digital media has invaded and altered modern living. This is very apparent in television’s impact upon community and family. Before television, neighbors would interact with one another on a regular basis. Once television was introduced, however, people began to face the beginnings of “social atomization,” (Turkle, 1995, p. 235). According to Sherry Turkle, “increasingly we want entertainment that commutes right into our homes...the neighborhood is bypassed...we seem to be in the process of retreating further into our homes, shopping for merchandise in catalogues or on television channels, shopping for companionship via personal ads,” (Turkle, 1995, p. 235). Not only have community and neighborhood ties weakened, but also family ties have suffered. Kenneth J. Gergen states, “differing television needs often thrust various family members into different trajectories even when they are at home together,” (Gergen, 1991, p. 65).

Clearly, television has offered great benefits to society, but it has definitely weakened the social ties between individuals.

Through the perspective of the “N-Gen,” television is considered old technology and it is not interactive, as is the Internet. Because they find the Internet to be more enjoyable and satisfying, younger people are spending less time watching television and more time on-line. According to a study by Teenage Research Unlimited, “the percentage of teens who say that it is “in” to be online has jumped from 50% in 1994 to 74% in 1996 to 88% in 1997,” (Tapscott, 1998, p. 3). Whether the “N-Gen” is sitting on the couch, or surfing the Internet, the threat of “social atomization” still exists. Some technological optimists believe that the interactivity of the Internet would alleviate “social atomization.” However Turkle is skeptical of this argument. “Is it really sensible to suggest that the way to revitalize community is to sit alone in our rooms, typing at our
networked computers and filling our lives with virtual friends?" (Turkle, 1995, p. 235).

Because the Internet does not promote social interaction in real-time, it is difficult to imagine that computers and the Internet are alleviating "social atomization" in any significant way.

Whether seen as harmful or beneficial, computers and the Internet have become so integrated into society that they have become a necessity. It is difficult to imagine life without them, even though they have been user-friendly for less than ten years. Because computers, the Internet, and other digital media play such a large role in our society, it is pertinent that we look into their possible effects upon the "N-Gen." This generation will begin to lead society within a few years, and the influence of computers and the Internet could have a compounding effect upon all generations.
History of Computers

The concept of the computer has been in existence since the late 1800’s. The idea originated with Charles Babbage, who is now known as “the father of the computer,” (Rosenberg, 1992, p. 55). However, it wasn’t until 1945 when the first computer was built. It was named the ENIAC (Electronic Numerical Integrator and Computer) and built by John Mauchly and John Presper Eckert, Jr., at the Moore School in Iowa State University. Unlike the computers today, the ENIAC was electromechanical and required electricity and mechanical parts, in order to function. It was also much larger than today’s computers and consisted of 18,000 tubes, 70,000 resistors, and 10,000 capacitators.

The computer began to take a new shape, however, once Bell Lab developed the transistor in 1951. The development of the transistor led to the rise of the integrated circuit, which enabled an increase of memory functions for the computer (Rosenberg, 1992). By 1971, the computer began to take its modern configuration, with Intel’s development of the 4004, the first microprocessor chip. The 4004 then led to the development of the 8080 microprocessor chip, in 1973. The 8080 was twenty times faster than the 4004 and it formed the foundation for today’s personal computer (Rosenberg, 1992). From this point on, the evolution of the computer continued rapidly over the next thirty years. As computer technology was refined, computers became user-friendly and became an integral part of modern society.
The History of the Internet

Unlike the computer, the Internet has undergone a rapid development, since its conception during the late 1960’s. The origin of the Internet dates back to 1969, with the establishment of ARPANET. Even though ARPANET only served a select group of individuals, its concept became the foundation for the World Wide Web. With the development of packet-switching communication, users were able to exchange information between ARPA research centers. ARPANET also allowed users to share sparse computer resources (Slevin, 2000). Due to the success of ARPANET, the image of computers changed. Computers were no longer just mathematical problem solvers, since they offered a new method of communication. Once the personal computer became a reality during the 1970’s, ARPANET expanded worldwide and evolved into the Internet.

ARPANET offered the foundation for electronic communication and some of the first communication resources were made available through ARPANET. In 1969, Telnet was created and enabled users to “log on and operate remote computers,” (Slevin, 2000, p. 35). In 1972, FTP, the first network mail program and TALK were developed. FTP or file transfer application allowed users to upload and download files from one computer to another. The first network mail program, developed by Ray Tomlinson, Beranek, and Newman, enabled users to send electronic messages to one another. And finally, TALK was an innovative resource for electronic communication, since it was the first program that allowed users to have a real-time conversation over the network. All three resources are still used in some form on the Internet today (Slevin, 2000). For example, since the introduction of TALK, real-time discussion has been developed further. In 1979, Roy Trubshaw and Richard Bartle created the first MUDs or multi-user dungeons, which was
for entertainment purposes only. MUDs allowed users to play a multi-player adventure game and chat with other users. Today, users are now able to construct their own “text-based personalities and build and furnish their own text-based virtual spaces, inviting other participants to enter into them,” (Slevin, 2000, p. 36). Since the 1990’s, the Internet has become user friendly.

The Internet is not only used for communication purposes, but also for the exchange of information and services. According to James Slevin, the World Wide Web allows users to “both receive information and to make it available to others,” (Slevin, 2000, p. 37). Users can present information through web pages or homepages and then others can access them through an interface, otherwise known as a browser. In order to gain the most information possible, web pages can be linked or hyper-linked up to other web pages. Users also have the opportunity to offer feedback to web pages through e-mail, guest books, or questionnaires. Like information, users can also access services on the Internet. This has been extremely beneficial for consumers and the marketplace.

Today, consumers can “bypass local (stores) and take greater control of...commercial transactions,” (Shapiro, 1999, p. 142). This concept has been described by Bill Gates as a "shopper’s Heaven." It has become evident, however, that this is now a great threat to all small business owners. Despite the negative impacts of the Internet, it continues to grow at a rapid pace and the number of users continues to grow.
Timeline

1822: Charles Babbage developed the Difference Engine.

1945: The ENIAC (Electronic Numerical Integrator and Computer) was built by John Mauchly and John Presper Eckert Jr. at the Moore School in Iowa State University.

1951: Bell Lab developed the transistor and it became a part of the integrated circuit.

1969: ARPANET was developed during the Cold War and marks the origin of the Internet. Telnet was developed and it enabled users to “log on and operate remote computers,” (Slevin, 2000, p. 35).

1971: Intel developed the first microprocessor chip (4004).

1972: FTP (file transfer application) was developed and allows uploading and downloading from one computer to another. Ray Tomlinson, Beranek and Newman developed the first network mail program, that enabled users to send electronic mail to one another. TALK was developed and enabled users to have a real-time conversation over the network.

1973: Intel developed the 8080 microprocessor chip, which was the foundation for the development of the personal computer.

1978: The modem was developed and allowed information to travel through a regular telephone line.

1979: Roy Trubshaw and Richard Bartle first developed MUD’s or multiuser dungeons for entertainment purposes.


1990: Tim Berners-Lee and Robert Caillau developed the software for HTML, HTTP, and URL, which made the World Wide Web possible. The World Wide Web "can be used both to receive information and to make it available to others," (Slevin, 2000, p. 37). Communication becomes user friendly through the Internet.

1994: The number of users rapidly grows, as the Internet increases in popularity.
The Internet and the Effects Upon its Users

The number of Internet users continues to grow, since there is an increased prevalence of personal computers, due to continually falling prices. Today, the average person has become an active user of the Internet because of electronic communication. According to a study by D'Amico, "fully 94% reported that the Internet made it easier for them to communicate with friends and family, and 87% regularly use it for that purpose," (McKenna and Bargh., 2000, p. 57). The Net Generation, however, utilizes the Internet for a variety of purposes. According to Don Tapscott, the "N-Gen" looks to the Internet for entertainment, learning, communication, and shopping. (Tapscott, 2000). Whether people are looking for communication or other purposes, the Internet does not have a universal effect upon its users. It has become evident that the social effects of the Internet are not necessarily good or bad (McKenna and Bargh., 2000).

Electronic communication has become a great asset of the Internet. Even though anonymity was an inevitable factor of the Internet, it has become more of a conscious choice for users (Slevin, 2000). The consequences of anonymity, however, are still apparent to all users. According to a study conducted by McKenna and Bargh, "anonymity, feelings of close group unity, a high level of physiological arousal, and a focus on external events or goals are conditions that have been shown to encourage, and often produce, deindividuation," (McKenna and Bargh, 2000, p. 61). If deindividuation occurs, then users have a tendency to communicate more bluntly on the Internet, and become more hostile. "The safety of anonymous expression of hostilities and obscenities that would usually incur social sanctions...in a face-to-face encounter encourages some people to use the Net as a forum for airing their resentments in a blatantly uninhibited
manner," (Reid, 1998, p. 31). This concept was exemplified on JennyMUSH, a virtual help center for those who have been sexually assaulted and/or abused. In one instance, an outsider entered the site and began verbally harassing other users. This type of behavior is due to the “lessening of internal regulations or guides to behavior and increases the power of external cues,” caused by deindividuation (McKenna and Bargh, 2000, p. 62).

There have been efforts however, to curb behaviors similar to what occurred in JennyMUSH. Those who exhibit disruptive behaviors can be subjected to chivari, which is on-line punishment through public humiliation. “Virtual charvari attempts to act on the psyche via the on-line representation of the body, but often fails because the link between that virtual manifestation and the psyche is tenuous at best,” (Reid, 1998, p. 35). Despite the efforts made by system administrators, it is clear that the punishment for disruptive behavior is not strong enough. Shapiro points out, “but without any real-world consequences, there is a lack of individual accountability,” which is essential in the real world (Shapiro, 1999, p. 121).

Despite the negatives of anonymity, McKenna and Bargh also point out the positive aspects of anonymity on the Internet. Because anonymity shields a user’s identity, individuals have a tendency to become more open with others and they then take more risks with personal disclosures. This could be especially beneficial to those who are trying to maintain relationships over the Internet. In addition to increased openness, users also have more opportunity to play with their identities over the Internet, rather than in face-to-face interactions. “Considerable research has shown that those individuals who claim multiple roles or aspects of self enjoy many more benefits than do those who have only a few defining identities,” (McKenna and Bargh, 2000, p. 62). Not only is this
beneficial to adults, but also to children. With multiple selves on the Internet, children are able to break down internal walls and test personality and identity aspects. According to Tapscott, "children can enhance and create images of themselves and their worlds that are more satisfying than the real life images...they can also develop the confidence and knowledge to prepare for better realities," (Tapscott, 2000, p. 96). In the end, children are able to establish better relationships and communication skills with others. The Internet enables children to learn to be more accepting of others and in turn, creates harmony between individuals (Turkle, 1995).

Unlike face-to-face interactions, the Internet provides the opportunity for interaction without the influence of physical appearance. Research has shown that physical appearance and attraction is a strong determinant of a potential relationship. If there is an attraction, then there is a higher potential for a relationship (intimate or friendship) to develop (McKenna and Bargh, 2000). Because users are not swayed by physical appearance, "relationships formed at these deeper levels (on the Internet) may be more durable and important to the individual than those that form based on more superficial features," (McKenna and Bargh, 2000, p. 64). When two individuals meet, they will probably like each other more if they met in an Internet chat room, rather than a face-to-face encounter. This is exhibited by an experience of an 11-year-old named Victoria, "the first time I went into KidsCom everyone was so nice...they're much nicer than in class...people don't judge you based on what you look like," (Tapscott, 2000, p. 91). If Victoria met another user from KidsCom face-to-face, then they would probably like each other less.
Not only are users able to enter more meaningful relationships, but they are also able to seek out others with the same interests. According to Berscheid and Ried, familiarity is the most basic determinant of attraction (McKenna and Bargh, 2000). Because the influence of physical appearance is eliminated on the Internet, then perhaps the main force of attraction is familiarity. Users can seek out others who have the same interests through chat rooms. Chat rooms are focused on a single topic and users are able to enter knowing that they will interact with others with the same interest. Because there is a foundation of commonality, users are then able to immediately move forward in their interactions with others and look for similar interests between them. Once a relationship has been established on the Internet, an interaction can take place without both users online at the same time. Users can e-mail one another at their convenience and they have the freedom to say as much as they want without interruptions. (McKenna and Bargh, 2000).

Even though the Internet has created a unique situation for relationships, there is a weakness to online relationships. It is evident that there is potential for strong relationships to develop through the Internet, but online relationships could be extremely weak if the potential is not met. This is partially due to the factors of anonymity, and lack of face-to-face interaction. According to Shapiro, it is the “fluidity of online relationships that makes them weak,” (Shapiro, 1999, p. 121). Even though users congregate into sites and develop communities, there is a chance that the same individuals will not return. This will cause constant change within the community and it is difficult for strong relationships to develop in this type of situation. Because they are anonymous, users may not return to a site on a consistent basis, since they do not feel a strong tie to another user
or the online community. Even if an individual does become involved with an online community and its members, the user is only familiar with the community members' user names. Howard Rheingold refers to a real-time experience he had with fellow online community members. When he "walked into a room filled with people, who were very familiar with his personal information and history, he only saw a room full of strangers," (Shapiro, 1999, p. 91). Even though the Internet eliminates the influence of physical appearance, it is clear that the lack of face-to-face interaction could be detrimental to online relationships that enter real-time.

The Internet has revolutionized social behavior. It can be beneficial to both adults and children. Even though there are weaknesses to online interaction, some users have reaped great benefits from online relationships. A strong example is seen through socially anxious individuals. Because the distress of face-to-face interaction is eliminated, socially anxious people are able to become more open and relaxed with others. They are then able to establish meaningful relationships over the Internet and satisfy their need for social interaction. "Computer networks extend and transform existing social networks, becoming integral parts of them rather than replacing them...(computer networks) bring people together by extending the already diverse and complex ties that people have among themselves," (Agre, 1997, p. 245). Online relationships are no longer based solely upon physical attraction and/or proximity. It is evident that there are positives and negatives of online communication, but the Internet has provided an innovative way to meet and interact with others. The long-term results of online communication, however, have yet to be seen.
Adolescence

The impact of the Internet is purely speculative at this point, and perhaps its greatest impression will be left upon the adolescent population. In American society, adolescence has the reputation of being a difficult time for individuals, since it is a "time of metamorphosis from childhood to adulthood," (Kipke, 1999, p. 7). This period lasts approximately ten years and it is divided into three stages. During the first stage, early adolescence (10-14 years old), individuals face great physiological changes of puberty, in addition to sexual and psychological changes. During this time, the body experiences hormonal changes, which are stimulated by the hypothalamus. The second stage, middle adolescence (15-17 years old), has been described as a period of "autonomy and experimentation," (Kipke, p. 8). This period is marked by the adolescent’s attempt to become independent from his/her parents. Late adolescence, the final stage (18 -20’s years old) is experienced by those who delay fully entering into adult life. This is usually due to the continuance of education.

Because adolescence is such a critical time, adolescents rely on their social context in order to have a healthy development. According to a study by the National Research Council in 1993, "adolescents depend not only on their families, but also on the neighborhoods in which they live, the schools they attend, the health care system, and the workplace from which they learn a wide range of important skills," (Kipke, 1999, p. 12). Unfortunately society’s institutions do not always fulfill their roles and fail to benefit adolescents. This could be extremely detrimental for the development of adolescents. Nielsen proposes that 60% of temperament is determined by environmental factors and
only 40% of personality is determined by genetics. If this statement is true, then adolescents are at the mercy of their social institutions.

Even though adolescents are vulnerable to their social context, they are sensitive to their parents and home life. Despite their attempts to achieve independence, adolescents still need someone to listen and offer feedback. Parents can directly participate with their adolescents by offering assistance and advice with ethical behavior, evolvement of goals, and conflict. This responsibility has become difficult to achieve, since families are constantly changing shape today. The two-parent household is no longer a standard of society and adolescents do not have a typical family setting. Much of this flux is due to an increase in divorce, single-parent households, employment of mothers, and poverty stricken families. Since society is demanding and rapidly changing, adolescents are still in need of parental support and advice. Parents should do their best and fulfill their role, despite the stresses and challenges (Nielsen, 1996).

Parental support is equally important to adolescent males and females, but gender differences exist within family relationships. Because males are exposed to more stress from their parents, they have a tendency to react to stress with hostility and aggression. “Boys are harder to influence, harder to control, and harder to communicate with - especially for mothers and stepmothers,” (Nielsen, 1999, p. 223). Since males are more vulnerable to the stress, they are unable to cope and their psychological well-being and peer relationships are negatively affected. For males, the exposure to stress becomes an overwhelming problem that permeates their lives. Females, on the other hand, are not exposed to as much stress from their parents, so they exhibit less hostility and aggression. Unlike males, females are not forced to cope with parental stressors that can become a
devastating problem. It is for this reason, females tend to maintain their social relationships better (Kipke, 1999). Even though both males and females thrive with parental attention, males tend to be burdened by their parents and in turn, their development is hindered.

Like the parent-child relationship, adolescents also need peer relationships in order to benefit from a healthy development. During adolescence, however, peer relationships begin to take a new form. Friendships are no longer based upon proximity. Adolescent friendships are focused on loyalty and intimacy, with an emphasis on openness between one another. There is an expectation for both individuals to freely discuss problems, feelings, and provide emotional support. The relationship is also based upon altruism and reciprocity. Rather than a focus upon selfishness, adolescent friendships function by working towards one another. The adolescent friendship becomes more adult-like and it is not solely based upon proximity and personal gains (Nielsen, 1999).

Unlike earlier friendships, the adolescent friendship is sparked by psychological and demographic similarities, such as age, race, values, goals, religion, and family background. It is for this reason, that very few male-female friendships develop. Opposite-sex friendships only account for 5% of all adolescent friendships. According to Nielsen, “it seems that both male and female adolescents get more self-confirmation and feel freer to explore the ‘who-am-I’ issues with friends of their own sex,” (Nielsen, 1999, p. 149). During adolescence, individuals want to be with the same sex in order to fulfill the need for self-exploration. Clearly, peer relationships make a great contribution to adolescent development.
Because peer relationships play such an integral role, adolescents tend to spend little time at home and more time studying, working part-time jobs, and spending time with friends. On average, adolescents spend only 20 minutes interacting with family each day, but spend about 20 hours each week with friends. Since adolescents tend to make great personal investments into their friendships, these relationships tend to be long-lasting and stable. In the end, adolescents are establishing meaningful connections with others and furthering their development into adulthood (Kipke, 1999).

As adolescents develop, they begin to see themselves from a psychological perspective. There are two aspects of the self that are realized during adolescent ego development. First, adolescents begin to incorporate a selfless attitude towards others, so they begin to behave and reason in a new manner. Secondly, adolescents realize that they are individuals who must be responsible for themselves. These developmental accomplishments are achieved through peer interactions. Because peers act as mirrors, adolescents are able to learn from others. Adolescents are able to learn from feedback or social interaction, the motives of others, and shortcomings of social and moral reasoning. Through interactions, adolescents are able to learn from one another and develop their self-esteem and self-confidence (Nielsen, 1999).

Adolescence is a critical and sensitive time for individuals, as they make the transition from childhood to adulthood. Not only is it physiological, but it is also psychological. It is a tumultuous time that establishes the foundation for adulthood and can be influenced by numerous factors.
Television and Video Games

Unlike the Internet, adolescents have been exposed to television and video games for an extended period of time. Both television and video games have made a societal impact, upon the family and the individual. Perhaps some of the possible consequences of the Internet are evident through the impact of television and video games.

Television has become an accepted element of the "culture of simulation," (Turkle, 1984). It was a great innovation for the baby boom generation and it "has transformed marketing, commerce, education, leisure and culture," (Tapscott, p. 2, 1998). The television, however, has become an isolating factor for Americans. Rather than unifying communities, the television caused neighbors to isolate themselves from one another. With the television, there was more entertainment inside the home and neighbors no longer needed each other's company (Tapscott, 1998). It has also pervaded the average American family, since the television is turned on more than six hours a day or 55 hours a week (Turkle, 1984; Stivers, 1994). Not only are American families isolated from one another, but family members have also become secluded. The "microwave relationship" points out that "differing television needs often thrust various family members into different trajectories even when they are at home together," (Gergen, 1991, p. 65). Americans have become needy for entertainment within their homes and this has created the dilemma of "social atomization," (Turkle, 1995, p. 235).

Not only has television caused the problem of "social atomization," but it has also offered a skewed perception of reality. The television offers an unrealistic view of reality. "The visual images of television...represent reality as pleasurable...by contrast, reality...is experienced as tragic: life involves suffering occasionally punctuated by
periods of happiness, and eventually leads to death,” (Stivers, p. 146). Because of the television’s presence within society, the senses of individuals are clearly affected. Since the scenes on television are “someone else’s version of reality,” the images have already been interpreted and easily understood. In reality, however, “direct experiences are messy,” and its meanings are not always clear (Turkle, 1995, p. 238).

Because the television only portrays information to its audience, the “Net Generation” has come to consider the television as old technology. With the presence of the Internet, the young believe that the television should become interactive. “It should do what the consumer asks...It should enable a dialogue and allow for citizens to speak with one another,” (Tapscott, 1998, p. 3). It is for this reason, the level of television viewing is decreasing among the young individuals. According to Teenage Research Unlimited, “the percentage of teens who say that it is ‘in’ to be online has jumped from 50% in 1994 to 74% in 1996 to 88% in 1997,” (Tapscott, 1998, p. 3). With more of the younger population online, then they will probably spend less time in front of the television. Since the Internet is becoming more prevalent, it is now beginning to be used like the television has been used for the past fifty years. It is now acting like a backdrop to the American household, since the Internet is typically left on all day (Tapscott, 1998).

The television and the Internet offer contrasting benefits to their users. Unlike the Internet, the television represents a passive form of digital media that uses “push-technology” or “web-casting” (Tapscott, 1998, p. 27). Unlike the Internet, television’s content is pushed onto its users and users do not have to seek out information. Even though this is not satisfying to the “N-Gen,” the experience of passivity can be relaxing to individuals who had a hard day at work. It is evident that the television and the Internet
are contrasting forms of digital media. According to Tapscott, "because the Net is the antithesis of the TV, the Net-Generation is in many ways the antithesis of the TV-Generation," (Tapscott, 1998, p. 26). Rather than seeking satisfaction through a passive role, the "N-Gen" seeks out an interactive role through the Internet and determines its own online experience.

Even though video games offer users an opportunity to actively participate, users are unable to create their own experience. Like the television, video games lack realistic depictions and offer a skewed view of reality. Turkle points out that "objects fly, spin, accelerate, change shape and color, disappear and reappear," (Turkle, 1984, p. 68). In order to keep a level perspective, children must become familiar with the "culture of simulation," and realize "that the game is always the same, unaffected by its particular surroundings," (Turkle, 1995, p. 67). Children are also encouraged to identify with the video game characters and immerse themselves into the game, yet they are unable to play with the roles. They must comprehend that they are limited by the video game and cannot play with various identities (Turkle, 1995). Unlike the Internet, video game users face limitations and they are unable to take a fully active role with the game.

Despite the advantages and disadvantages of television and video games, the consequences have become clear. The Internet is definitely a new form of digital media, yet it could have similar effects, as the television and video games. In the end, however, the Internet is making its own societal impact that is altering the way society functions.
Introduction

After reviewing the available literature on the development of adolescents, it is evident that adolescents tend to rely heavily on their social relationships in order to establish a healthy development. As Nielsen pointed out, adolescents value and need both parental and peer support. Through these relationships, adolescents are able to establish morals and values, personal goals, selflessness, and reciprocity. If these lessons are learned and internalized, adolescents in turn are able to look beyond themselves, behave more maturely, develop into responsible individuals and establish a strong self-concept.

Because adolescents are rely on parental and peer relationships for their development, they could be hindered if they did not invest the proper amount of time into those relationships. Since digital media is becoming more prevalent, it is possible that computers, television and video games act as distractions to adolescents. In turn, adolescents could invest a great amount of time into digital media rather than the necessary social relationships. As a result, their development through adolescence could be hindered. Through this reasoning, the following three hypotheses have been developed.
Hypotheses

Assuming socioeconomic status and gender are exogenous variables then:

1. With a high use of digital media, the parent-child relationship is weak. The child will spend most of his/her free time using digital media, rather than spending it with family.

2. With a high use of digital media, the child does not think it's important to spend time with peers.

3. With a high use of digital media, the child does not feel good about him/herself.

The base year was conducted in the spring of 1988 and consisted of 24,599 eighth graders from 1,035 schools (815 public schools and 237 private schools) across the country. The 1,035 schools, who agreed to participate in the study, were chosen from approximately 40,000 public and private eighth-grade schools. Rosters were then created from each school and then 24 students were randomly selected. Two or three additional students were chosen from each school on the basis of race and ethnicity. These students were usually Asian and Hispanic (Ingalis et al., 1994).

The second follow-up was conducted in the spring of 1992 and consisted of high school senior students. There were a total of 21,188 students within the second follow-up. Of that amount, 20,623 students were located (97.3%). According to Ingalis et al., "of the 21,188 sample members, 63.3 percent were enrolled in high school, 8.2 percent were verified dropouts, 0.5 percent were identified by school officials as dropouts but were not
Methods

Participants
In order to examine the development of adolescents, the data from the National Education Longitudinal Study of 1988 – 1994 (Nels: 88) will be used. The data was collected by the United States Department of Education. This study was chosen, since the sample looked at a large number of adolescents over a six year period. The study followed students from their eighth grade year through their senior year of high school. If there were any influences from digital media use, then they would have most likely been illustrated through the adolescent sample. For this study, the base year and second follow-up will be used.

The base year was conducted in the spring of 1988 and consisted of 24,599 eighth graders from 1,035 schools (815 public schools and 237 private schools) across the country. The 1,035 schools, who agreed to participate in the study, were chosen from approximately 40,000 public and private eighth grade schools. Rosters were then created from each school and then 24 students were randomly selected. Two or three additional students were chosen from each school on the basis of race and ethnicity. These students were usually Asian and Hispanic (Ingels et al, 1994).

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confirmed as such, 4.1 percent were sample members who had already completed an alternative program, 1.3 percent were deemed ineligible to participate in the second follow-up study (e.g., deceased or moved out of the country), and 2.7 percent could not be located, " (Ingels et al, p. 95, 1994). This longitudinal study had a high retention rate of respondents. There were approximately 93 percent of respondents who completed the base year questionnaire in addition to the second follow-up questionnaire (Ingels et al, 1994).

Procedure

The data from Nels: 88 were collected from a longitudinal study that examined the long-term changes experienced by young people and the influences of school, teachers, family, and community. The data were collected through the survey methodology. Each survey was similar to earlier longitudinal education surveys and addressed current issues that were appropriate at the time of each survey (Ingels et al, 1994).

In order to examine the adolescent population and digital media in this study, the second follow-up was compared with relevant data from the earlier surveys. Because the term digital media encompasses numerous components, the variables related to computer usage, video game usage and television/videotape usage were summed together as the independent variable. Despite the drastic differences between television and interactive media (i.e. computers and video games), the digital media variables were combined in order to compensate for the respondents' low usage of computers and video games. From this point on, the term digital media will refer to the culmination of computer, video game and television/videotape usage.
The base year and second follow-up each had a digital media variable. In terms of the base year, the first question addressed whether or not the respondent had a computer within his/her home. The respondent could reply with either have (1) or do not have (2). This variable was recoded, in order to provide more meaningful analyses (0 - do not have and 1 - have). The second and third question addressed the number of hours the respondent usually watches television on the weekdays and weekends. The survey offered a range from never to more than 5 hours a day. (See table 1 for questions and descriptive statistics). The responses were coded within a range created by the National Center of Education. The responses do not represent the actual hours the respondents spent watching television, but a digital media variable for the base year looked at the relevant use of digital media in the year 1988.

The digital media variable for the second follow-up offered a more extensive look at digital media use. There was a summation of six questions and they reflected the use of digital media by respondents in 1994. The first question (same as the base year) looked at whether or not the respondent's family has a computer in the home. Once again, the respondent could answer with have or do not have and this variable was also recoded, as in the base year. The second question addressed the amount of personal computer use that was not school-related or video/computer games. The respondents could answer within a range of never/rarely to almost everyday. The third and fourth questions, which addressed typical television use on the weekdays and weekends, were the same used in the base year survey. The fifth and sixth questions are similar to television use, only they address the typical video game use on the weekdays and weekends. The respondents were given a range from never to more than five hours a day.
In addition to the digital media variables, there were three other variables utilized from the second follow-up. There were two created variables and looked at self-concept and friends. Both variables consisted of a summation of between two to four variables. The self-concept variable was a summation of variables created by the National Center for Education Statistics. These variables addressed self-concept and control issues. In order to address friendship, two variables were summed together. The first question looked at the importance of getting together with friends, within the respondent's group of close friends. The survey provided a range from not important to very important. The second question addressed the amount of time that is spent on talking and/or participating in activities with friends outside of school. The respondents were offered a range from never/rarely to almost everyday (See table 2 for questions and descriptive statistics). The third variable addressed the parent-child relationship. It looked at the frequency of the respondent talking or participating in activities with his/her parents. The survey offered a range from never/rarely to almost everyday. (See table 2 for question and descriptive statistics)

After the variables were selected and created, the three hypotheses were tested with a series of multiple linear regressions. In all three regressions, gender and socioeconomic status were included as exogenous variables. An alpha level of .05 was utilized in all statistical tests. It is important to note that statistical significance was prevalent due to the large sample size and does not necessarily reflect the importance of the findings. In order to test the first hypothesis, the influence of digital media from the base year and second follow-up upon the frequency of activities between parents and child was examined. The second hypothesis looked at digital media and its influence
upon one's self-concept. By comparing the digital media variables, from the base year and second follow-up, with the self-concept variable, the second hypothesis was tested. The third hypothesis looked at the possible relationship between digital media and friends. In this case, the digital media variables from the base year and second follow-up were compared with the friendship variable in a multiple linear regression.
Table 1
1988 Base Year (Survey Questions and Descriptive Statistics)

<table>
<thead>
<tr>
<th>Question</th>
<th>Response/Range</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Which of the following does your family have in your home?</td>
<td>0 - do not have</td>
<td>[SD = .49, M = .4177]</td>
</tr>
<tr>
<td>- Computer</td>
<td>1 - have</td>
<td></td>
</tr>
<tr>
<td>[recoded]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. During the school year, how many hours a day do you USUALLY watch TV</td>
<td>00 - don't</td>
<td>[SD = 1.60, M = 3.32]</td>
</tr>
<tr>
<td>on weekdays?</td>
<td>watch TV</td>
<td></td>
</tr>
<tr>
<td>01 - less than 1 hour a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02 - 1-2 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03 - 2-3 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04 - 3-4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05 - 4-5 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. During the school year, how many hours a day do you USUALLY watch TV</td>
<td>00 - don't</td>
<td>[SD = 1.75, M = 3.92]</td>
</tr>
<tr>
<td>on weekends?</td>
<td>watch TV</td>
<td></td>
</tr>
<tr>
<td>01 - less than 1 hour a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02 - 1-2 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03 - 2-3 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04 - 3-4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05 - 4-5 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. During the school year, how many hours do you play video games on the</td>
<td>0 - don't play</td>
<td>[SD = 1.41, M = 3.09]</td>
</tr>
<tr>
<td>weekends?</td>
<td>video games</td>
<td></td>
</tr>
<tr>
<td>1 - less than 1 hour a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 1-2 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - 2-3 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - 3-4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 - 5 hours or more a day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Table 2

1994 Second Follow-up (Survey Questions and Descriptive Statistics)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Response/Range</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Which of the following does your family have in your home?</td>
<td>0 - do not have 1 - have (recoded)</td>
<td>[SD = .49, M = .4134]</td>
</tr>
<tr>
<td>- Computer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. How often do you spend time on the following activities not sponsored by your school?</td>
<td>1 - never/ rarely 2 - less than once a week 3 - once/twice a week 4 - almost every day</td>
<td>[SD = .98, M = 1.72]</td>
</tr>
<tr>
<td>- Using personal computers, not including school-related work or video-computer games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. During the school year, how many hours a day do you USUALLY watch TV on weekdays?</td>
<td>00 - don't watch TV 01 - less than 1 hour a day 02 - 1-2 hours 03 - 3-4 hours 04 - 4-5 hours 05 - over 5 hours a day</td>
<td>[SD = 1.33, M = 2.60]</td>
</tr>
<tr>
<td>4. During the school year, how many hours do you USUALLY watch TV on the weekends?</td>
<td>00 - don't watch TV 01 - less than 1 hour a day 02 - 1-2 hours 03 - 3-4 hours 04 - 4-5 hours 05 - over 5 hours a day</td>
<td>[SD = 1.41, M = 3.09]</td>
</tr>
<tr>
<td>5. During the school year, how many hours a day on the weekdays do you USUALLY play video games or computer games, such as Nintendo?</td>
<td>0 - don't play video games 1 - less than 1 hour a day 2 - 1-2 hours a day 3 - 2-3 hours a day 4 - 3-5 hours a day 5 - 5 hours or more a day</td>
<td>[SD = .96, M = .58]</td>
</tr>
<tr>
<td>Questions</td>
<td>Response/Range</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>6. During the school year, how many hours a day on the weekends do you</td>
<td>0 - don't play video games</td>
<td>[SD = 1.19, M = .82]</td>
</tr>
<tr>
<td>USUALLY play video games or computer games, such as Nintendo?</td>
<td>1 - less than 1 hour a day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - 1-2 hours a day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 - 2-3 hours a day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - 3-5 hours a day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 - 5 hours or more a day</td>
<td></td>
</tr>
<tr>
<td>7. Among your close friends, how important is it to them that they...</td>
<td>1 - not important</td>
<td>[SD = .56, M = 2.56]</td>
</tr>
<tr>
<td>- get together with friends</td>
<td>2 - some importance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 - very important</td>
<td></td>
</tr>
<tr>
<td>8. How often do you spend time on the following activities not sponsored</td>
<td>1 - never/ rarely</td>
<td>[SD = .82, M = 3.42]</td>
</tr>
<tr>
<td>by your school?</td>
<td>2 - less than once a week</td>
<td></td>
</tr>
<tr>
<td>- talking or doing things with your friends</td>
<td>3 - once/twice a week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - almost every day</td>
<td></td>
</tr>
<tr>
<td>9. How often do you spend time on the following activities not sponsored</td>
<td>1 - never/ rarely</td>
<td>[SD = 1.01, M = 2.85]</td>
</tr>
<tr>
<td>by your school?</td>
<td>2 - less than once a week</td>
<td></td>
</tr>
<tr>
<td>- talking or doing things with your mother and father</td>
<td>3 - once/twice a week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 - almost every day</td>
<td></td>
</tr>
</tbody>
</table>
When looking over the descriptive statistics of the data, there are a few generalizations that can be made. It is evident that the respondents received exposure to computers at home and had integrated the television into their lifestyles. With regards to the base year survey (1988), less than half of the respondents had a computer in their home (median = .00). In terms of television viewing, the respondents on average tended to watch about 2-3 hours on the weekdays (median = 3.00) and about 3-4 hours on the weekends (median = 4.00). With regards to the second follow-up (1994), the respondents received about the same amount of exposure to computers at home (median = .00). On average, respondents tended to never or rarely use computers outside of school (median = 1.00). The use of video games was also very low. On average, the respondents tended to not play video games on the weekdays (median = .00) or on the weekends (median = .00). Television usage, however, remained fairly stable since the base year survey. Respondents tended to watch television about 1-2 hours on the weekdays (median = 3.00) and about 3-5 hours on the weekends (median = 3.00). It is evident that the respondents did not utilize computers and video games, but they remained consistent with their television usage. In terms of social relationships, the respondents tended to value shared time with friends and interacted with friends outside of school almost everyday (median = 4.00). The respondents also interacted with parents, however, almost once or twice a week (median = 3.00). Clearly, social relationships with parents and friends were still of importance to the respondents, but respondents found peer interactions to be more significant.
The first hypothesis, which addressed the affects of digital media upon the parent-child relationship, produced insignificant results. When comparing both the base year \((\beta = -.031)\) and the second follow-up \((\beta = .081)\) with the parent-child relationship, both coefficients were statistically significant, but very weak. There was an increase from the base year to the second follow up and this could have been due to more parent-child interactions. The first hypothesis, however, was not supported by the results (see Table 3).

The second hypothesis, which looked at the affects of digital media upon the respondent's self-concept, was also not supported by the statistical test. In this case, the relationship between the digital media of the base year and the respondents' self-concepts \((\beta = -.030)\) was statistically significant. The coefficient, however, was extremely weak and was of little importance. The coefficient for the second follow-up \((\beta = .016)\) was statistically insignificant and did not reflect any important findings. The data for the second hypothesis was not conclusive and it was not supported (see Table 3).

The third hypothesis, which addressed the affects of digital media upon the respondent's relationship with friends, also lacked support from the statistical results. Like the second hypothesis, only one coefficient was statistically significant. In this case, the coefficient that represented the relationship between digital media of the second follow-up and friendships was significant \((\beta = .030)\), but it represented an extremely weak correlation. In the end, the data did not support the third hypothesis (see Table 3).
Table 3

The Results of Multiple Linear Regressions That Illustrates the Influence of Digital Media Upon Adolescents

Dependent Variables

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Parent-Child Relationship</th>
<th>Self-Concept</th>
<th>Friendship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Media (Base Year)</td>
<td>-.031*</td>
<td>-.030**</td>
<td>-.001</td>
</tr>
<tr>
<td>Digital Media (Second Follow-up)</td>
<td>.081***</td>
<td>.016</td>
<td>.030*</td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td>.111***</td>
<td>.108***</td>
<td>.163***</td>
</tr>
<tr>
<td>Gender</td>
<td>.159***</td>
<td>-.032**</td>
<td>.044***</td>
</tr>
<tr>
<td>R squared</td>
<td>.035</td>
<td>.016</td>
<td>.027</td>
</tr>
<tr>
<td>Constant</td>
<td>2.330***</td>
<td>.797***</td>
<td>5.851***</td>
</tr>
</tbody>
</table>

* < .05  
** < .01  
*** < .001
Discussion

Based on the results of the multiple linear regressions, the cohort of Nels: 88 did not reflect any influences from digital media. This could be due to the fact that adolescents did not reflect a high usage of digital media. Despite the television usage from 1988-1994, the respondents did not utilize any other forms of digital media on a regular basis. Computers and video games were only used on a minimal basis or never used at all. With respect to computers, there are a few possibilities that could have influenced these results.

In 1988, computers were available, but they were not nearly as prevalent as they are today. In 1994, computers were becoming more available but they were not used in the same manner as they are today. During that time period, computers were used in a more solitary manner, which included word processing and educational purposes. Because computers were not essential during this time period, perhaps the use of computers was related to socioeconomic status. Since computers were expensive, it would have been more likely that families of higher socioeconomic status would be able to purchase computers for their homes. According to the results of a bivariate correlation, socioeconomic status and computers in the home were moderately correlated during the base year (r = .378) and the second follow-up (r = .375).

In addition to the influence of cost, the effects of computers could have been minimized from 1988-1994 since the Internet was only beginning to become prevalent in 1990. It is even possible that the respondents did not have access to computers and the Internet in 1994. If research were continued in the future, then perhaps it would be beneficial to study present day adolescents. Another possible cohort to examine is college students.
students. Not only has their development been influenced by digital media or more specifically the Internet, but college students are also presently facing the consequences of exposure to digital media.

It is very possible that the adolescent population is not influenced as much as is expected. As Kipke pointed out, "adolescents depend not only on their families, but also on the neighborhoods in which they live, the schools they attend, the health care system, and the workplace from which they learn a wide range of important skills," (Kipke, 1999, p. 12). Perhaps social relationships are inherently more satisfying to adolescents than cyber-relationships, since adolescents tend to desire social contact through relationships in real time. It could be that they reject computers as a vehicle of social interaction, since computers are inherently isolating. This could also be possible with video games. Even though adolescents can play video games with friends, perhaps this type of interaction is not as satisfying as a conversation or an afternoon at the mall.

With regards to future research, the influence of digital media should be examined using a present day adolescent cohort. Unlike the cohort of Nels: 88, adolescents are exposed to the Internet, chat rooms, electronic mail, television, video games, and cellular phones. Because the hypotheses address a variety of issues (i.e. Internet use, television use, parent-child relationship etc.), a survey format would still be most appropriate. The survey would be designed in the same manner and the respondents would be given ranges for their responses. In this case, however, only the issues relevant to the hypotheses would be addressed. Since the influence of digital media has not been heavily researched, another longitudinal study would be appropriate. With a longitudinal study, the results could illustrate the influence of digital media throughout adolescence. Because
adolescence spans between the ages of 10-early 20's, it would be appropriate to administer three surveys during this period. The first survey could be given at the age of 12, the second at the age of 16, and the third survey at 20. With a four-year span between each survey, the results could reflect developmental differences between each survey and perhaps the influences of digital media might become more (or less) apparent from one survey to the next. In terms of the sample, it should consist of adolescents from a variety of socioeconomic backgrounds and ethnicity. There should also be a fair representation of males and females. By addressing digital media in this manner, perhaps the study would produce results that could lead to a more definitive answer.

During the past ten years, technology has experienced a rapid development. It has become an integrated element of society. Not only has it enhanced communication abilities, but it has also provided an opportunity for people to have access to a wealth of information. It has altered every day living for technology savvy individuals. Because younger generations have been exposed to a technological lifestyle since an early age, their development has been shaped around the influence of technology. As the younger generations mature into adulthood, there could be greater consequences from a childhood that is greatly influenced by technology. In order to prepare for the future, it is pertinent that the influences and consequences of technology be determined.
Bibliography


