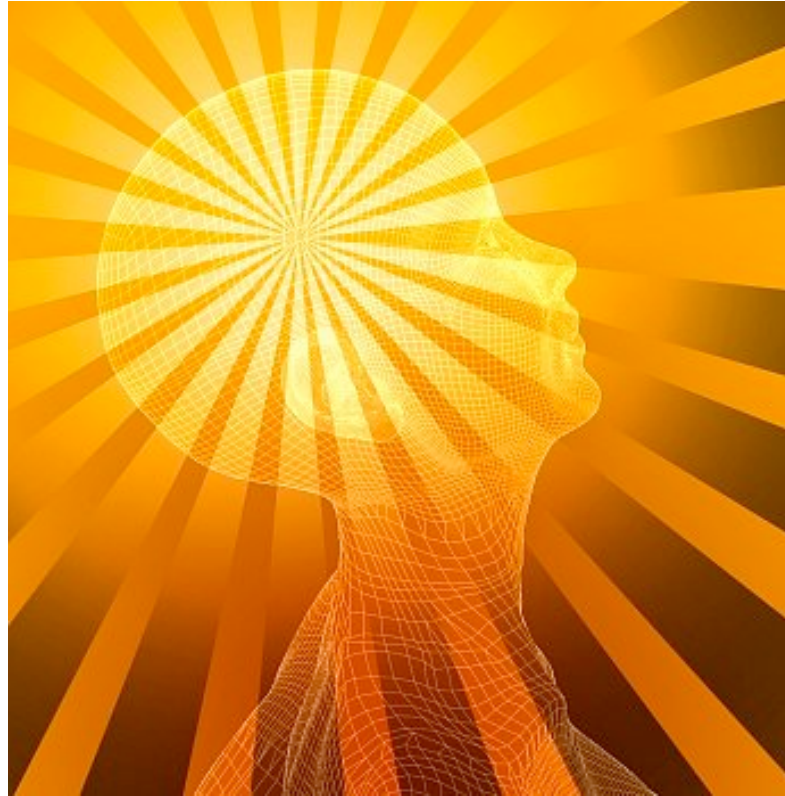


**Is Growing Up in the Digital Age Preparing Elementary School
Children for Successful Futures or Rewiring Their Brains
And Altering Their Attention Spans?**



**A thesis submitted to the School of Communications of
Webster University in partial fulfillment of the requirements for the
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ABSTRACT

Is Growing Up in the Digital Age Preparing Elementary School Children for Successful 21st Century Futures, or is it Rewiring Their Brains and Forever Altering Their Attention Spans?

This study examined self-regulating disorders, including ADHD, in elementary school children, media usage in this population, and teachers' perceptions regarding changes in students' classroom attention over time.

Relevant literature was reviewed, and an anonymous survey instrument was constructed and distributed to and returned by 47 experienced elementary school teachers. Essential findings included: teachers underestimate their students' favorite medium and hours of media usage; experienced teachers, especially those with greater than 10 years experience, believe that there has been a significant decline or change in their students' attentional abilities; these teachers attribute this change to a variety of factors, but most particularly their students' media habits.

In addition to suggesting more comprehensive research in this area, including expanding research into the realm of "new media," this study offers suggestions to help bridge the gap between *digital immigrant* teachers and their *digital native* students.

ACKNOWLEDGEMENTS

This paper's direction has taken many twists and turns since its inception. What began with a single question, "Why are more of my students *than ever before* being medicated for ADHD?" transformed into a complex quest to better understand *why* there currently exist so many *restless learners* in 21st century classrooms. This paper became much more than an exploration of ADHD, and more of an investigation into how elementary school children are surviving, thriving, and actually evolving in the digital age. It became clearly apparent mid-way into my research that information about *restless learners* was needed from those individuals who spent the largest portion of their time with children, the children's teachers. But how could I reach the teachers?

To Annie Erker, Mary Collins, Tony Arnold, Theresa Watson, Nancy and Katie Allen, Mary Ann Toohey, and Steph Kepplinger, I extend a very grateful *thank you* for your help distributing surveys at your schools. I couldn't have done it without you! I must also thank the 47 elementary teachers, most of whom I will never know, who participated in my study. Without your time and insightful words I would not have been able to complete my research. Thank You!

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Introduction

“Technology always has unforeseen consequences, and it is not always clear, at the beginning, who or what will win, and who or what will lose.”

Informing Ourselves to Death
-Neil Postman

Today when entering a 21st century elementary school classroom, be it public, private or parochial, the experienced educator and casual observer alike may notice something in the environment that did not exist a generation ago. This *something* is both “an awareness” *and* a palpable reality that denotes a change from classrooms of the past. This new millennium reality is obvious to both the trained and the untrained eye. No, it is not the iMac computers and the interactive Smart Boards, or the trendy Old Navy and Nike clothing the children are sporting. While these modern-day technology tools and contemporary clothing brands do alert visitors that changes have occurred in new millennium classrooms, this *something* is not as simple to identify as modern logos. Nevertheless, a very real change is taking place in classrooms today, and this change is provoking complex questions by parents, teachers, physicians, psychologists and neuroscientists, media researchers, and cultural theorists regarding the origins of the change.

The *something* is actually an adaptation, an *evolution* so to speak, which is taking place within elementary students themselves. And according to the American Academy of Pediatrics this adaptation is occurring at an increasing rate (www.aap.org). Duke English professor N. Katherine Hayles believes that this change is occurring in students within all levels of education, including colleges and universities (Hayles 187). What is

this elusive *something*? The something is *a perceptible change in 21st century students' attention spans*.

Students today growing up in the digital age do not have the same attention span style as their parents or, more importantly, their teachers (Prensky "Digital Natives" 1). And while a goodly percentage of today's students continue to thrive in their classrooms, an increasing number of millennium students are being diagnosed with attention span and self-regulatory disorders, including Attention Deficit Hyperactivity Disorder (ADHD) (www.aap.org). Hayles describes this adaptation in attention span type as a "generational shift in cognitive styles," (Hayles 187).

Today when visitors enter a 21st-century elementary classroom, where eager, curious students and a caring, competent teacher are present, the visitors typically witness students focused and engaged in active learning. Visitors also witness a number of *restless learners*, students who genuinely cannot sit still and pay attention to the teacher's instruction. While the majority of their peers are focused and attentive to the teacher, these *restless learners* are distracted, off task, and fidgety despite the fact the teacher has thoroughly prepared and enthusiastically presented the lesson. Some of these students even "tune-out" when the teacher is introducing inquiry-based, hands-on activities. It appears that a number of students' adapted attention spans, or lack thereof, make them simply unable to attend to the academic demands being placed on them. Why is this so?

According to the American Academy of Pediatrics website, "The number of children who are being treated for Attention Deficit Hyperactivity Disorder (ADHD) has risen. It is not clear whether more children have ADHD or more children are being diagnosed with ADHD." The web article goes on to say that "ADHD is now one of the

most common and most studied conditions of childhood. Because of more awareness and better ways of diagnosing and treating this disorder, more children are being helped,” (www.aap.org). The authors included a significant fact: teachers typically first notice ADHD and other attentional problems.

Why *are* more children today being diagnosed with self-regulatory difficulties including ADHD? What known genetic and environmental factors contribute to ADHD and other attention span disorders? Are parents and families living warp-speed lives, creating frenetic human beings? Are drug companies pushing pills on pediatricians, and pediatricians in turn pushing them on parents and children? Are environmental factors such as food additives and prenatal nutrition playing into rising ADHD rates? Might all of these factors contribute in some way to the rising rate of ADHD in today’s students?

Since teachers are typically the ones to first identify attention span difficulties and ADHD-like behaviors in their students, what do 21st century teachers believe is taking place? Are educators in fact observing a “generational cognitive shift” in attention span style as Professor Hayles believes? What light can contemporary teachers shine on these questions?

It would be helpful to conduct primary research on exactly what elementary school teachers are observing and theorizing with regards to attention span adaptations and styles over time. Could growing up in a digital media culture actually be contributing to a shift in attention span style? Or might students today simply be learning differently than they have in the past?

Is an educational transformation needed to effectively educate *digital natives*, those students who author, and video game designer Marc Prensky identifies as never

having known a world without digital technology (Prensky “Digital Natives” 1)?

According to Prensky, *digital natives*, who comprise today’s current student population, are the first generation to grow up, in effect, “speaking digital.” These children and teens are growing up surrounded by digital media and technology, and thus “speak digital” as a first language. “Our students today are all ‘native speakers’ of the digital language of computers, video games and the Internet,” (Prensky “Digital Natives” 1). In contrast, *digital immigrants* are those individual who later in life, not while they are growing up, learn how to use and navigate digital technology. “Today’s older folks were ‘socialized’ differently from their kids, and are now in the process of learning a new language. And a language learned later in life, scientists tell us, goes into a different part of the brain,” (Prensky “Digital Natives” 2).

Today’s *digital natives*, when not sleeping or in school, are spending the majority of their free time involved with media: they are talking on their cell phones, instant messaging on their computers, listening to MP3 players and playing video games, and oftentimes they are doing these simultaneously! It seems logical to research this question: Could the current *technology revolution*, with its excessive screen time exposure, be contributing to attentional disorders and increased ADHD rates in school aged children?

Dr. David Walsh, president and founder of the National Institute on Media and the Family, and an expert on the impact of media on children and teens, stated at a fall 2008 presentation at Clayton High School in St. Louis, Missouri “that current brain research is showing that children’s media habits and excessive exposure to electronic screens are re-wiring their brains and causing students to claim they are bored at school.”

In August of 1999 the American Academy of Pediatrics issued a Media Education policy statement. The policy recommends that pediatricians “should urge parents to avoid television viewing for children under the age of two, and encourage more interactive activities that will promote proper brain development, such as talking, playing, singing, and reading together,” (www.aap.org). The policy also encourages pediatricians to discuss healthy media use with parents during children’s routine examinations. One can surmise that if the AAP created a media education policy, the organization’s leadership must believe media education is key to raising healthy children and that parents should be educated on constructive media usage.

Recent research has shown that young children, exposed to excessive television viewing between the ages of 1 and 3, have a 30 % greater risk of exhibiting attentional problems by age 7 (Christakis et al. 710). Dr. Gary Small, professor of psychiatry, neuroscientist, and co-author of *iBrain*, writes in his newly published book, “ The current explosion of digital technology not only is changing the way we live and communicate but is rapidly and profoundly altering our brains...gradually strengthening new neural pathways in our brains while weakening old ones. Because of the current technological revolution, our brains are evolving right now—at a speed like never before,” (Small 1). Small goes on to say, “A certain level of brain stimulation is healthy and enjoyable, but when exposure to new digital technology becomes excessive, the brain response can become maladaptive, especially if someone carries a genetic risk...and sometimes ADD and ADHD can result,” (Small 64).

This paper will attempt to shed light on the following question: Is growing up in the digital age preparing elementary school children for successful lives in the 21st century, or is it rewiring children's brains and forever altering their attention span development?

It will be beneficial for readers to have a fundamental understanding of ADHD as well as information on children's current media habits and trends. A background section will be included to provide a brief overview of these subject areas. The literature review will synthesize study data, journal articles, and books that focus on children and the effects of electronic media on their attention spans and developing neurology. The methodology section will describe the anonymous survey that experienced elementary teachers voluntarily completed. Teacher survey data will be reported and analyzed. The paper will conclude with a call for more in-depth, longitudinal research to be conducted on the effects of *new* media on elementary students' cognition and attention, and how *digital immigrants* might more effectively educate *digital natives* for successful 21st century futures.

Background: ADHD

“Poor attention regulation among grade-school children significantly impairs educational performance, imposes significant cost burdens on schools, and is source of considerable anxiety for parents and teachers.”

-Media Researchers *Frederick Zimmerman and Dimitri Christakis*

According to the American Academy of Pediatrics (AAP), ADHD is “currently the most common chronic condition of childhood.” ADHD is not a new phenomenon. The behaviors associated with the disorder have been observed and documented for over the past 100+ years. A review of historical ADHD material reveals that in 1854 Heinrich Hoffman, a German physician, medical writer and illustrator, wrote about a boy named *Fidgety Philip* in a children’s book. In his book Hoffman described in detail the symptoms of ADHD.

In the 19th Century ADHD was originally defined as an unruly, hyperactive behavior disorder found primarily in boys (Greydanus, Pratt, Patel 71). Dr. Russell Barkley, international ADHD authority, writes in his book *Attention-Deficit Hyperactivity Disorder, Third Edition: A Handbook for Diagnosis and Treatment* that “early conceptualization of ADHD focused on defective moral control of behavior and deficits in behavior inhibition,” (Barkley 39), and that, “scientific credit is typically awarded to George Still and Alfred Tredgold for being the first authors to focus serious clinical attention on the behavioral condition in children that most closely approximates what today is known as ADHD,” (Barkley 4). Their initial findings were published between 1902 and 1908.

ADHD, according to the AAP, is a neurological condition that makes controlling behavior very difficult. Approximately 4% to 12% of school-aged children are affected

with ADHD, with boys being diagnosed three times more often than girls. The disorder includes three groups of behavior symptoms: inattention, hyperactivity, and impulsivity. These symptoms vary in intensity in children diagnosed with the disorder. The AAP's website classifies three types of ADHD: inattentive only (formerly known as attention deficit disorder [ADD]), hyperactive/impulsive, and combined inattentive/hyperactive/impulsive.

Voluminous research into the etiology of ADHD has been conducted since this disorder was initially described and diagnosed. In the ADHD world, it is widely acknowledged that genetics play a key role in ADHD. Barkley writes, "increasing research on heredity and genetics has clearly shown a striking hereditary basis to ADHD, along with the identification of several candidate genes that hold some promise in explaining some aspects of the disorder," (Barkley 39). Dr. Barkley does not agree with "popularly held views that ADHD is caused by excessive television viewing," (www.russellbarkley.org).

This disorder has had many names over the past 100 years. Barkley states ADHD has previously been labeled as "minimal brain damage, minimal brain dysfunction, or MBD, hyperactive child syndrome, hyperactivity, hyperkinesis, or hyperkinetic disorder of childhood." What is currently defined "ADHD" was up until very recently labeled attention deficit disorder (ADD).

The American Psychiatric Association's (APA) publication *Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision* (DSM-IV-TR) indicates that ADHD is usually diagnosed during elementary school years, when students begin exhibiting difficulty adjusting to school rules and routines. The DSM-IV-TR also

states “the disorder has been found to be more common in the first-degree biological relatives of children with ADHD than in the general population. Considerable evidence attests to the strong influence of genetic factors on levels of hyperactivity, impulsivity, and inattention as measured dimensionally. However, family, school and peer influences are also crucial in determining the extent of impairments and comorbidity,” (APA 90).

There exist many resources today for children, teens, adults and families who are affected with and by ADHD. Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD), a national non-profit, organization is one of those resources. Their mission statement, which is prominently displayed on their website reads, “ CHADD improves the lives of people affected with ADHD.”

The CHADD website states that it takes time and there are many steps involved before a child is diagnosed with ADHD. A significant challenge in making the diagnosis is there is no specific test for ADHD. A comprehensive evaluation of the child needs to be completed and “should include a clinical assessment of the child’s school, social, and emotional functioning and developmental level” (www.chadd.com). CHADD also states that background information should be gathered from the child, the parents and the child’s teacher.

Effective treatment for ADHD does now exist. CHADD writes that proper and successful treatment in children and teens requires a multimodal approach. The chief components in a multimodal ADHD treatment plan include: “parent training, behavioral intervention strategies, an appropriate ADHD educational program, and medication when necessary” (www.chadd.com).

Barkley concurs, “ADHD is now recognized as a universal disorder, with an ever-growing international acceptance of both its existence and its status as a chronic disabling condition, for which combinations of medicines and psychosocial treatments and accommodations may offer the most effective approach to management” (Barkley 40).

It has been said “art mirrors life and culture.” It is extremely interesting to note that currently on Broadway Cynthia Nixon, better known as Miranda Hobbes from *Sex in the City*, is starring in a play titled *Distracted*. “This play is a fast-paced and disarmingly funny look at parenting in the age of the Internet and Ritalin...a contemporary American mom reaches out to teachers, psychotherapists, and neighbors to figure out if Attention Deficit Disorder is the root of her son’s problems,” (www.roundabouttheatre.org). It appears that “the number one chronic childhood condition” according to the AAP is now entertaining us at the theatre. Hmmm...?

Background: Children’s Media Habits and Trends

“The sheer amount of time young people spend using media—an average of nearly 6 ½ hours a day—makes it plain that the potential of media to impact virtually every aspect of young people’s lives cannot be ignored.”

Generation M-Media in the Lives of 8-18 year-olds
-Kaiser Family Foundation

In November 1999 the Kaiser Family Foundation released *Kids & Media @ The New Millennium*, “one of the most comprehensive national public studies ever conducted of young people's media use” (www.kff.org). The Kaiser Family Foundation is a U.S. non-profit organization that designs and conducts its own research in partnership with other non-profits and media businesses. This foundation identifies themselves as “A leader in health policy and communications” (www.kff.org). They pride themselves as

serving as, “A non-partisan source of facts, information, and analysis for policymakers, the media, the health care community, and the public. Our product is information, always provided free of charge” (www.kff.org).

Kaiser’s 1999 seminal research study included 3,000 children and teens ages 2 - 18. This study revealed very significant findings on the participants’ media usage, habits, and trends. (See KFF Fact Sheet in appendix). Many key trends and patterns were identified. Two noteworthy findings reported were: on average children and teens between the ages of 2-18 daily spend approximately 5 ½ hours using media, and school aged children 8-18 daily spend approximately 6 ¾ hours using media. In comparison, these same children spend only about 44 minutes reading.

The study data also indicated that average American children and teens in 1999 grew up in a home with: 3 TVs, 3 tape players, 3 radios and 2 CD players, 2 VCRs, 1 video game player and 1 computer. Compare that to an American household in the 1970s, just a generation prior. The study reports that: 1) In 1970 35% of American household had more than one TV, and in 1999 88% of households had more than one TV, 2) the percent of homes with three or more TV sets in 1970 was 6% compared to 60 % in 1999, and 3) the percent of 6th graders with a TV in their bedroom in 1970 was 6% and in 1999 was 77% (Kaiser Family Foundation Fact Sheet). Over the approximately 30-year study reporting period the prevalence of TV ownership greatly increased. There are no data reported about other electronic media but one can reasonably assume that there was an increase due to the fact that many of these pieces of equipment did not exist until after 1970.

In March 2005 the Kaiser Family Foundation, in partnership with Stanford University, published a second children and teen's media usage study titled *Generation M: Media in the Lives of 8-18 Year-olds* (www.kkf.org). This study anonymously surveyed 2,032 3rd to 12th grade students (8-18 year olds) in their classrooms between October 2003 and March 2004 about their media usage habits.

It was reported in a Kaiser Family Foundation news release prior to the publication of *Generation M* that “Children and teens are spending an increasing amount of time using ‘new media’ like computers, the Internet and video games, without cutting back on the time they spend with ‘old’ media like TV, print and music,” (www.kff.org).

The study's executive summary explains that while “the abundance of media in children and teen's lives has grown, the total amount of time kids spend with media—and the dominance of TV and music—have remained the same.” One very interesting change since the 1999 study: while kids in 2003/2004 still consumed approximately the same number of hours of media they did five years previously, 6 ½ hours, *Generation M* survey participants reported that they were using *more than one* medium at a time. For example, kids might be listening to music, while they are instant messaging and doing Internet research. It seems that today's kids are becoming experts at media multitasking! At the time of the study's release, children and teens were spending an average of 6 ½ hours with electronic media but since they were using more than one media at a time in effect they were exposed to 8 ½ hours of media content (www.kff.org).

Following is a brief summary of significant findings based on data reported in *Generation M: Media in the Lives of 8-18 Year olds*:

Summarized key findings based on: *Generation M: Media in the Lives of 8-18 Year-olds*

- 1) Children and teens live media-saturated lives. They currently are spending an average of 6 ½ hours (6:21) per day with media. The most popular media activities are: watching TV, listening to music and using computers.
- 2) Children and teens live in homes with an unprecedented amount of media. Two-thirds (68%) of survey participants have a TV in their bedroom, half (54 %) have a VCR/DVD player and a video game player (49%), and approximately one-third (31%) have a computer in their rooms. And when they leave home almost two-thirds have a portable CD, tape or MP3 player (65%) and half (55%) have a handheld video game player.
- 3) Children and teens with easy access to media spend more time using media.
- 4) It appears that children who spend the most time with media, also report spending more time with their parents, being physically active and pursuing their hobbies.
- 5) About half (53%) of the 8-18 survey participants state their families do not have household rules governing media usage (TV, video, music, computers).
- 6) Young peoples use of “new” media (computers and videos) does not hinder their use of “old” media (television and music). “In fact, those young people who are the most avid users of computers and video games are the same kids who are spending the most time watching TV.”
- 7) Children and teens today are “masters of multitasking.” Approximately one quarter, 26% of those surveyed, state that when they are using one medium they are typically engaged in another media activity.
- 8) Overall this generation of children and teens is content and well-adjusted. But the least content children and teens, or those with the poorest grades, spend more time playing video games and less time reading than their peers.
- 9) Television continues to rank highest as major media used by this age group. Young people spend an average of three hours a day watching TV. When videos and recorded shows are averaged in the amount increases to nearly four hours a day (3:51).
- 10) Listening to music is hugely popular, especially with older kids. The way music is listened to is changing. Today music is listened to on Internet radio and MP3 players, as well as radios and CD players.
- 11) Computers and the Internet are becoming commonplace in most children and teens’ lives. The amount of time kids spend on a computer outside of school is much less than time they spend with TV and music.
- 12) While the gap between those children and teens that have home Internet access has tightened, there still exist significant differences. In 2003-2004 81 % of Caucasian youth had home Internet access compared to 61 % of African

American youth. “While 54% of kids going to school in communities where the median income is less than \$35,000 a year go online each day, 71% of those from communities where the median income is greater than \$50,000 a year do.”

- 13) On average 8-18 year-olds spend about $\frac{3}{4}$ of an hour (0:43) reading for pleasure. The kids who read less are those with TVs in their bedrooms, those where the TV is on all day long, and those whose parents do not have TV watching rules.
- 14) Video games are gaining importance in the lives of 8-18 year-olds. They still spend less time with video games than watching TV.

-Summary based exclusively on:
Generation M: Media in the Lives of 8-18 Year-olds

According to both Kaiser Family Foundation reports, new millennium children and teens during their formative years are surrounded by a tremendous amount of media equipment in their homes, and they are using media for a large percentage of their day. This is very different from American homes in past decades.

If today's average school-aged child or teen sleeps 8-hours a day, attends school for 7-hours a day, and consumes approximately 6 $\frac{1}{2}$ hours of media per day, this lifestyle leaves little time for family meals, playing outdoors or hanging out with friends, recreational sports, talking on the phone, reading and just being a kid. In fact, this media pervasive lifestyle only allows two free hours a day to engage in the above-mentioned activities. If a child spent 6 $\frac{1}{2}$ hours a day at the gym or running cross country, one could theorize that child would have Herculean super-power strength and Olympian skills and finesse! Exactly what types of changes and transformation are happening to the brains and minds of today's elementary school children?

Literature Review

“The results clearly show that there is a strong correlation between media exposure and long-term negative health effects to children. This study provides an important jumping-off point for the future research that should explore both the effects of traditional media content and that of digital media—such as video games, the Internet and cell phones—which kids are using today with more frequency.”

*-Ezekiel J. Emmanuel, M.D., Ph.D.
National Institutes of Health*

There are multiple questions posed in this paper’s premise. No one literature source was found to effectively answer all of the questions presented. To comprehensively research the premise “Is growing up in the digital age preparing elementary school children for successful lives in the 21st century, or is it rewiring their brains and forever altering their attention span development?” a wide variety of literature sources were reviewed. Representative samples of works from media researchers, physicians, neuroscientists, educators, nonprofit advocacy groups, and cultural and social theorists, were considered. When key pieces of information are synthesized and looked at in total, the literature provides insight into the premise posed.

Common Sense Media, a nonprofit advocacy group, released the report *Media + Child and Adolescent Health: A Systemic Review* in November 2008. This report asserts that while previous systematic reviews have been conducted on the relationship between media exposure and subsequent violent behavior in children, there has never before this systemic review been as comprehensive an evaluation of media’s impact on children’s health in areas other areas (Nunez-Smith).

Researchers from Yale University School of Medicine, National Institutes of Health, and California Pacific Medical Center, in partnership with Common Sense Media,

conducted a meta-analysis of 173 quantitative studies, which researched the effects of media on children's health within the past 28 years. According to the report, over 30,000 studies were initially evaluated, eventually paring the body of work down to the 173 strongest studies. This systemic review examined the relationship between children's media exposure and the following health outcomes: obesity, tobacco use, drug use, alcohol use, low academic achievement, sexual behavior, and attention deficit disorder with hyperactivity (ADDH) (www.common sense media.com). The report states that not only were the studies critically analyzed, the relative strength of the studies were determined and then graded with an A, B, or C letter grade. Areas where more research is needed were noted.

The report documents that in 80% of the studies reviewed, "Greater media exposure is associated with negative health outcomes for children and adolescents" (www.common sense media.com.) This proves especially true for childhood obesity. The review looked at 73 studies in this area. The panel deemed the strength of evidence for this section with an "A" rating. Eighty-six percent of the 73 studies found a correlation between increased media exposure and an increase in childhood obesity rates. It appears that children who watch greater than 8 hours of television a week have double the rate of childhood obesity as those children who watch less than 4 hours. (According to Kaiser data, the average 8-18 year-old in 2004 watched 3 hours of TV *every day*.)

Of the 173 studies and articles analyzed for this systemic review, the researchers examined 13 articles that focused on children, media and ADHD. Only 7 % of the 173 studies and articles analyzed for this report focused on children and ADHD. Nine studies (69%) found an association between media exposure and increased attentional problems

(www.common sense media.com). It is significant to note that the strength of evidence grade given to this section of the review is a grade “C”. The validity of this information is rated as average.

In the recommendations section of this meta-analysis, action steps are outlined by the reviewers as to what parents, schools and policy makers can do to reduce media’s negative impact on children. Parents are told to limit their children’s media usage and encourage kids to play outside. It is suggested that schools teach media literacy skills—students need to learn about the power of media and how to balance it in their lives, and promote physical education. Children need to learn about healthy habits during their formative years.

A large amount of responsibility is placed on policymakers to support future research on the effects of media on children. The reviewers note that chiefly studies focusing on TV and movies were analyzed for the review, and very few “new media” studies—those looking at the effects of Internet, video games and cell phones, even exist. The recommendations suggest that “new media” research studies need to be promoted and supported because children today are using new media as well as traditional media. It is also suggested that policymakers support research on media content and not just on the hours of media used. It is also strongly recommended that policymakers set limits and guidelines with regards to junk food advertising aimed at children and teens, and help develop public service campaigns that promote healthy habits and lifestyles.

It appears that the effects of electronic media usage on children’s attention spans and the question regarding the role media plays in ADHD diagnosis in children are considered significant to the panel of reviewers who oversaw this systemic meta-analysis.

The fact that ADHD was included among the seven areas studied suggests that this is an area of concern to the reviewers. The lack of credible studies, the letter C grade, and the insufficient number of studies focusing on “new” media, such as Internet, video games and cell phones, support the panel’s recommendation that more research in this area needs to be conducted.

A study published in April 2004 in *Pediatrics* titled, “Early Television Exposure and Subsequent Attentional Problems in Children,” by researchers Dimitri Christakis, Fredrick Zimmerman, David DiGiuseppe, and Carolyn McCarthy concluded that television exposure during very early childhood, specifically ages 1 and 3, did indeed result in attentional problems by age seven (Christakis et al. 710). It must be stated that while the researchers did see a pattern of attention disorders by age seven, the researchers clearly state they did not study or find a direct association in TV viewing in young children and ADHD. They utilized a longitudinal data set, The National Longitudinal Survey of Youth, for their study.

In their article the researchers contend that to their knowledge their work is the first, “to test the hypothesis of very early television viewing on subsequent inattention using a nationally representative longitudinal sample” (Christakis et al. 710). Their study included the TV viewing data of 1,278 one year olds and 1,345 three year olds. It was determined that the one year olds were watching an average of 2.2 hours of TV per day and the three year olds were watching an average of 3.6 hours per day. The authors state that 10% of these children had attention difficulties by age seven.

In the article’s introduction the researches state their belief that there exists an “under-appreciation of the potentially crucial role that early childhood experiences may

have on either the development or the modulation of attentional problems”

(www.pediatrics.org). The authors write that new research suggests a relationship between the genetic predisposition for ADHD and the role environmental factors play in determining the intensity and progression of the disorder.

Additionally, two researchers who collaborated in the 2004 longitudinal study, Fredrick Zimmerman and Dimitri Christakis, conducted further and more specific research on media’s effects on young children. In their second study the pair examined the content type of television and video/DVD viewed by children and subsequent attentional and self-regulation difficulties. The content types examined were classified as educational, nonviolent entertainment, and violent entertainment.

In 2007 the pair published, “Associations Between Content Types of Early Media Exposure and Subsequent Attentional Problems.” They found no attention difficulties in eight-year old children who, before age three, watched educational television and videos. However, eight-year old children who had watched nonviolent entertainment and violent programming before age three manifested significant attentional problems. It was noted that viewing any of the three types of television programming at age four and five did not result in attentional difficulties. The authors conclude that there is a strong correlation between early viewing of non-educational programming and subsequent attention problems.

Another pair of media researchers, Marie Evans Schmidt and Elizabeth Vandewater, analyzed 23 studies specifically looking at the impact of digital media on school-aged children and adolescents’ cognitive skills. Their findings were published in the spring 2008 issue of *The Future of Children* in the article, “Media and Attention, Cognition

and School Achievement.” *The Future of Children* is a collaborative publication between the Woodrow Wilson School of Public and International Affairs at Princeton University and the Brookings Institute. It is interesting to note that the entire spring 2008 volume of this online periodical is devoted to children and electronic media. According to Schmidt and Vandewater, a key research finding has surfaced: the genre and content of the media consumed appear to be critical when determining media effects on children and adolescents. It appears that viewing educational programming is positively linked to academic success while viewing non-education and entertainment TV is negatively linked to academic success (Schmidt and Vandewater 63).

Significant information about video games is described in the article. It appears that playing video games can actually improve specific cognitive skills and “enhance spatial skills, such as visual tracking, mental rotation, and target localization. Gaming may also improve problem-solving skills” (Schmidt and Vandewater 63). While video games are being used more often in academic settings, not much is actually known about what children are learning from the games. According to Schmidt and Vandewater, and additional researchers, “there is a lack of rigorous research on (video game) learning outcomes” (Schmidt and Vandewater 73).

The pair also examined the possible links between electronic media and attentional difficulties in children and adolescents. The authors write, “ Researcher have found evidence for small positive links between heavy electronic media use and mild attention problems among young people but have found only inconsistent evidence so far for a link between attention deficit hyperactivity disorder and media use” (Schmidt and Vandewater 63). The researchers report that very few studies have investigated any other medium

besides TV when studying the possible connections between media use and attention span disorders.

In her article, “Hyper and Deep Attention: The Generational Divide in Cognitive Modes,” Duke University English professor Katherine Hayles hypothesizes that human beings “are in the midst of a generational shift in cognitive styles that poses challenges to education at all levels, including the colleges and universities. The younger the age group, the more pronounced the shift; it is already apparent in present day college students, but its full effects are likely to be realized only when youngsters who are now twelve years old reach our institutions of higher education (Hayles 187).” The author describes two diverse attention span styles, which she defines as *deep attention* and *hyper attention*.

Deep attention is described as “concentrating on a single object for long periods (say, a novel by Dickens) ignoring outside stimuli while so engaged, preferring a single information stream, and having a high tolerance for long focus times” (Hayles 187). *Deep attention* is the more traditional style of focused attention one thinks of as necessary for successful learning in a typical classroom setting. *Hyper attention* “is characterized by switching focus rapidly among different tasks, preferring multiple information streams, seeking a high level of stimulation, and having a low tolerance for boredom” (Hayles 187). According to Hayles, “*hyper attention* is on the rise and that it correlates with an increasing exposure to and desire for stimulation in general and stimulation by the media in particular” (Hayles 191).

Hayles suggests that to adequately prepare and plan for this shift in student attention span style, educators first need to recognize that indeed a change has occurred. She believes educators need to understand why the shift has taken place, and think creatively

about ways to best teach students in which this shift has occurred. For example, Hayles states that educators from around the U.S. have observed that their students can no longer read entire novels. Many educators are adapting their curriculum and are assigning short stories instead of novels to better meet the abilities of their students' cognitive attention span styles.

Hayles states that when a child is diagnosed with ADHD, that child must exhibit at least six of fourteen behaviors listed in the DSM-IV as being indicative of ADHD. The behaviors must be causing serious social or academic impairments. She writes that a child might present with four or five ADHD behaviors and clearly have ADHD characteristics who is not diagnosed because six symptoms must be present for the diagnosis to be properly made. "ADHD should be understood, then, as a category occurring at the end of a spectrum that stretches from normal" (Hayles 190). She goes on to say, "My hypothesis can now be stated in terms that link it with ADHD. *The generational shift towards hyper attention can be understood as a shift in the mean towards the ADHD end of the spectrum*" (Hayles 190).

In essence, Hayles believes that the human attention span encompasses a broad spectrum of normal behaviors, with deep attention at one end of the spectrum and hyper attention existing closer to the ADHD behaviors. She believes that ADHD and *hyper attention* are on the rise in part due to "brain plasticity" and contemporary children's neurological responses and adaptations to the saturated media environment by which children are surrounded today. "In contemporary developed societies, this plasticity implies that the brain's synaptic connections are coevolving with an environment in which media consumption is a dominant factor. Children growing up in media-rich environments

literally have brains wired differently from those of people who did not come to maturity under that condition” (Hayles 191).

What exactly is this “brain plasticity,” or “neuroplasticity” as it is also called, to which Hayles refers? According to the Society for Neuroscience’s publication *Brain Facts*, “the extent of the brain’s capabilities is unknown, but it is the most complex living structure known in the universe ...ultimately it shapes our thoughts, hopes, dreams, and imaginations. In short, the brain is what makes us human” (Miller 4). One known skill the human brain does possess is its ability to modify and adapt itself when injured, sick or adapting to environmental changes and stimuli. This process is called neuroplasticity or brain plasticity. Neuroplasticity is defined as “The brain's ability to reorganize itself by forming new neural connections throughout life. Neuroplasticity allows the neurons (nerve cells) in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment (www.medterms.com).”

The Society for Neuroscience also writes that “most major diseases that have a genetic basis are strongly influenced by the environment...Environmental influences include many factors such as toxic substances, diet and levels of physical activity but also encompass stressful life events” (Miller 4). It appears that the human brain, with its ability to acclimate itself to its environment, can not only heal itself following a traumatic brain injury, but adapt itself to survive and thrive within a variety of environments. For example, it is possible, due to brain plasticity, for children’s brains to rewire themselves in order to adapt to the media-rich environment that exists in contemporary digital culture.

Back in 1997, Professor of Education Robert Sylwester wrote an article titled *Bioelectronic Learning: The Effects of Electronic Media on a Developing Brain*. In the article

Sylwester points out a newly observed trend in children's behavior. The trend, which more than likely began prior to 1997, was that children were spending more of their free time with electronic media "at the expense of nonelectronic media and socialization, although new forms of socialization are evolving around watching T.V. and playing video games" (Sylwester 20). The professor writes, "...this is the first generation to directly interact with and alter the content on the screen and the conversation on the radio" (Sylwester 20).

Sylwester reasons, "Because biological evolution proceeds much slower than cultural evolution, we're born with a generic human brain that's genetically tuned more to the pastoral ecological environment that humans lived in thousands of years ago than to our fast-paced urban electronic environment" (Sylwester 20). It appears Sylwester is referring to the type of attention style Professor Hayles calls *deep attention*. He also adds that brain development is a mixture of "nature and nurture." He contends that the human brain is able "to adapt its cortical networks to the environment in which it lives...thus excessive childhood involvement with electronic media that limit social interaction could hinder the development of a brain's social systems" (Sylwester 21).

This author believes the converse is true. Children should not be denied the opportunity to explore electronic media and technology because to do so might cause problems later as the child grows into an adult who will not know how to survive and thrive in a digital world. Sylwester does believe in creating a healthy "balance" for children between media exposure and usage, and the additional aspects of children's lives. "Children who mature in a secure home and school with adults who explore all the dimension of humanity in a nonhurried, accepting atmosphere can probably handle most electronic media without damage..."(Sylwester 22). He asserts these children, if guided in the right direction, will grow

and develop a sense of balance which allows them to understand the digital world in which they live, as well as develop social relationships with other human beings.

In his book *iBrain*, published in 2008, neuroscientist Dr. Gary Small contends that living in the digital age is causing human brains to evolve. Small essentially makes the case that living in the digital age is causing a neurological evolution in human beings' brains! "Daily exposure to high technology—computers, smart phones, video games, search engines like Google and Yahoo—stimulate brain cell alteration and neurotransmitter release, gradually strengthening new neural pathways in our brains while weakening old ones. Because of the current technological revolution, our brains are evolving right now—at a speed like never before" (Small 1).

Small asserts that not since the first human beings began using tools has the human brain "been so affected so quickly and so dramatically" (Small 2). He adds that this "evolutionary brain process has rapidly emerged over a *single* generation and may represent one of the most unexpected yet pivotal advances in human history" (Small 2). Small emphasizes that children's brains are "the most exposed, as well as the most sensitive to the impact of digital technology" (Small 3).

Small argues that average amounts of neurological stimulation, specifically media stimulation, are "healthy and enjoyable," but "when exposure to new digital technology becomes excessive, the brain response can become maladaptive, especially when someone carries a genetic risk" (Small 64). The neuroscientist acknowledges that some people are unable to manage the levels of media exposure and multitasking that are becoming commonplace in contemporary culture. Small adds that, "sometimes syndromes such as ADD or ADHD can result" (Small 64). He writes that both the environment and genetics play a

major role in children's neurological development and chronic over-exposure to media can increase the risk of ADHD. Small cites recent studies conducted by researchers in Taiwan and South Korea that have established a relationship between Internet addicted elementary school children and higher rates of attention span disorders, including ADHD.

Small believes that an actual "brain gap" exists between digital immigrants and digital natives. This *gap* is not simply a disconnect between the generations' music or clothing style preferences. This gap "points to an actual evolutionary change in the wiring of today's younger minds—a change in neural circuitry that is fundamentally different from that of their parents and grandparents" (Small 24).

Small writes that as digital natives, as well as digital immigrants, learn how to best navigate through and adapt to the *digital age*, it is critical that we continue to foster our personal relationships and stay in tune with our humanity. "We know that normal human brain development requires a balance of environmental stimulation and human contact. Deprived of these, neuronal firings and brain cellular connections do not form correctly" (Small 8).

Author and video game designer Marc Prensky has written many articles on the transformations that have occurred in contemporary 21st century digital culture. In his 2001 article, *On the Horizon*, Prensky introduced his readers to the concepts of *digital natives* and *digital immigrants*, and the differences that exist between the two generations. In the article he asserts, "Our students have changed radically. Today's students are no longer the people our educational system was designed to teach" (Prensky "Digital Natives" 1). He attributes this change to: "the arrival and rapid dissemination of digital technology in the last decades of the 20th century" (Prensky "Digital Natives" 1). Prensky strongly believes that K-college students

“think and process information fundamentally differently from their predecessors.” He emphasizes the fact that teachers, as *digital immigrants*, simply do not speak the same language as their *digital native* students. Today’s students receive and process information at rapid speeds. Digital natives enjoy “parallel process and multi-task. They prefer graphics *before* their text rather than the opposite. They prefer random access like hypertext...They thrive on instant gratification and frequent rewards. They prefer games to “serious” work” (Prensky “Digital Natives” 2). He then asks parenthetically, “Does any of this sound familiar?”

Prensky believes digital immigrant teachers need to change how they teach their digital native students. He suggests that today’s teachers learn to speak their students’ language by teaching faster and not in such a sequential process, and “more in parallel, with more random access” (Prensky “Digital Natives” 4). He also believes a curriculum upgrade is in order. He suggests today’s teachers need to break material into two different content areas: *legacy* and *future* content. Legacy content refers to traditional curriculum, and includes subjects such as reading, writing and arithmetic. Future content refers to digital and technological areas and also “includes the ethics, politics, sociology, languages and other things that go with them” (Prensky “Digital Natives” 2). Prensky suggests involving students in the curriculum development process, and supports the invention of computer games to teach in curriculum even in the more challenging content areas.

In an open letter written in early 2009 to the Obama Administration, Prensky claims that the U.S. educational system is broken and in need of serious reform. He writes, “...before any technology can really help our kids’ education, we need to reform both what we teach and how we teach, in a fundamental way. The surest road to failure for our students would be to ‘fix’ education so that it does the same work it did in the 20th century, with some extra

equipment, rather than change our education fundamentally for the 21st century” (Prensky Obama Letter 1). He states that K-12 curriculum is seriously outdated and should be completely overhauled, making room for “future-oriented skills that are currently untaught.”

Prensky comments that children beginning school in 2009 will be competing for jobs two decades into the future. These students need to begin to learn now the skills that will help them succeed in their futures. He strongly believes teachers need to amend their “lecture-explain to the whole class” style and allow students to “learn on their own and from each other with their teachers as guides.” This style of teaching is also known as “inquiry-based learning,” and according to Prensky, is Deweyism at its best! Prensky states then maybe kids will not feel the need to wear T-shirts that advertise, “It’s not Attention Deficit—I’m just not listening.” Prensky closes his letter with this statement, “If all we get are better ways to do the same old stuff, even if test scores rise in the short term, in the long term we all lose.”

Author and Audubon Medal winner Richard Louv believes today’s children are *categorically losing* an appreciation for the natural world. In the second edition of his book, *Last Child in the Woods*, published in 2008, Louv claims that children today are suffering from Nature-Deficit Disorder, which he defines as “the human cost of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates for physical and emotional illness” (Louv 36).

Louv claims research is showing that it is beneficial to take children with ADHD out into nature. “Studies suggest nature may be useful as a therapy for Attention Deficit Hyperactivity Disorder (ADHD), used with or, when appropriate, even replacing medications or behavioral therapies” (Louv 100). Louv suggest, “More time in nature—combined with less television and more stimulating play and educational settings—may go a long way

towards reducing attention deficit in children, and, just as important, increasing their joy in life” (Louv 108).

Methodology

In February 2009 an anonymous, 10-question survey titled, *Elementary Student Attention Span*, was created to gather information from public, private and parochial elementary teachers, with five or more years of experience. The questions asked focus on: 1) student attention spans in general, 2) changes teachers may have observed over time related to student attention spans, 3) and teachers’ perceptions about students’ media usage habits. Three blank areas were included on the survey form to allow participants the opportunity to add their attributions about such changes (if any) and their individual perspectives on the questions posed.

The thesis supervisor reviewed the survey and made recommendations on how to improve the survey. The recommendations were implemented and the survey was presented to the Webster University Institutional Review Board, and was approved for distribution.

Sixty surveys were distributed to teachers at 10 elementary schools in Missouri, North Carolina and South Carolina between March 16 and March 24, 2009. A self-addressed stamped envelope was provided to each survey participant with the survey document. Forty-seven surveys (78%) were returned. No surveys from the state of South Carolina were returned.

Survey data were tallied, percentages and trends were identified, and tables were created to document the most significant findings. Individual teacher’s reflections and

opinions were woven into the data reporting and analysis sections of this paper. A copy of the survey document is included in the appendix.

Survey Distribution Table

Sixty surveys were distributed to teachers (having taught 5+ years) at 10 different schools between March 16 and March 24th. Surveys were sent to the following schools:

SCHOOL NAME	CITY, STATE	TYPE	# of SURVEYS
Claymont Elementary	St. Louis, Missouri	Public	8
Jackson Park Elementary	University City, Missouri	Public	8
Spoede Elementary	Ladue, Missouri	Public	8
Little Flower School	Richmond Heights, Missouri	Catholic	5
Our Lady of Lourdes	University City, Missouri	Catholic	5
St. Peter's Catholic School	Kirkwood, Missouri	Catholic	5
The St. Michael School	Clayton, Missouri	Independent	3
Meadowmere Elementary School	Kansas City, Missouri	Public	6
Rolesville Elementary	Rolesville, North Carolina	Public	6
	South Carolina	Public	6
10 Schools	3 States		60

**47 surveys were completed and returned, yielding a 78% rate of return.
No surveys were returned from the South Carolina school.**

Data Reporting

“It seems that you almost have to “perform” to get students attention. I think they are so used to watching videos, games, and T.V. that things need to be moving quickly.”

-Teacher from St. Louis, Mo. with 25+ years experience

“I think we live in a fast-paced world. No one focuses their attention on anything more than 30 seconds.”

-Teacher with 25+ years experience

“This generation and the previous I call the “microwave generation” because they have never had to have the patience to wait –they get food cooked quickly, hundreds of channels of entertainment at the push of a button, and information on the web in minutes. We have made it possible for them to have a short attention span in these instances.”

-Teacher from Kansas City, Mo. with 25+ years experience

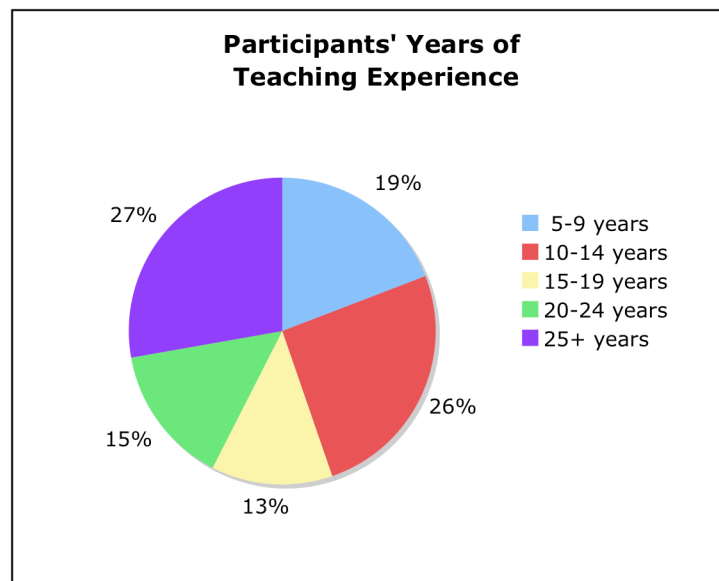
In this pilot study, elementary school teachers were surveyed in late March and early April 2009 primarily focusing on student attention span and factors that experienced teacher believe influence student attention span. Sixty anonymous surveys were distributed and 47 were returned, yielding a 78% rate of return. All survey participants have been teaching for at least five years or more in grades Kindergarten through 6th. The majority of the participants live in Missouri, primarily in the greater metropolitan St. Louis area. A small percentage of respondents live in Kansas City, Missouri, and North Carolina. Respondents were asked 10 questions related to student attention span. Two areas were provided on the survey for teachers to share their comments and further explain the factors they believe influence children’s ability to sustain their attention.

Years of Teaching Experience

The survey form requested participants identify their years of teaching experience. Years of experience were broken into the following categories: 5-9 years, 10-14 years, 15-19 years, 20-24 years and 25+ years. Chart 1 shows the participants’ years of

teaching experience. A wide-range of teaching experience is reflected in the population surveyed. It is interesting to note the largest group of respondents is the 25+ years experience group, followed closely by the 10-14 years experience group.

CHART 1



The 47 survey respondents represent a wide range of teaching experience:

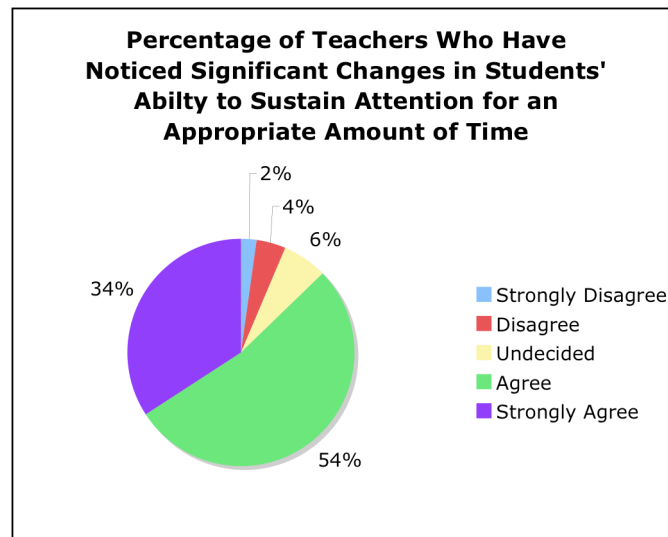
- **9 Participants with 5-9 Years Teaching Experience**
- **12 Participants with 10-14 Years Teaching Experience**
- **6 Participants with 15-19 Years Teaching Experience**
- **7 Participants with 20-24 Years Teaching Experience**
- **13 Participants with 25+ Years Teaching Experience**

Significant Changes in Student Attention Span Reported

The initial survey question asks, “During the years you have been teaching have you noticed significant changes in your students’ ability to sustain their attention for an appropriate amount of time?” As reflected in Chart 2 an overwhelming percentage of

respondents have noticed significant changes in their students' ability to sustain their attention.

CHART 2



Of the teachers surveyed **6% have not** noticed a significant change in their students' ability to sustain their attention for an appropriate amount of time. Conversely, **88%** of the teachers surveyed have observed a significant change in their students' ability to sustain their attention for an appropriate amount of time. When question one data are broken down further into "years of experience" categories, the following data emerge:

TABLE 1

Years of Experience	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
5-9 Years		11%		88%	
10-14 Years		8%	25%	66%	
15-19 Years				50 %	50%
20-24 Years				28%	71%
25+ Years	7%			46%	46%

It appears teachers with 15+ years experience and greater reported the most significant change.

Teachers were asked to comment upon what they attribute the change in student attention span. The majority of teachers, **41 respondents or 87%** of total survey group, added personal comments in the blank area provided. A multitude of factors emerged which teachers credit as influencing and changing student attention spans.

These factors include: children needing to be entertained at school, lack of unstructured outdoor play, lack of “down time,” lack of structure at home and lack of family meals, lack of family conversations, over structured lives, low income and less educated families, lack of sleep, lack of practice at *actively* sustaining attention, need for instant gratification, lack of reading for pleasure, lack of parent interaction and involvement, and poor parenting. The most common factor listed is **digital media and technology** (predominantly TV and video/computer games), which appeared in 28 of the 41 respondents’ comments.

Following are comments from three teachers on the subject of contemporary factors that influence and/or alter students’ attention spans:

“As a society we are spending more time interacting with electronic media and less time interacting with family, friends, neighbors and others.”

- Teacher with 15-19 years experience

“I attribute this (change) to the lack of development of their attention span. Kids are not made or asked to focus their attention for extended periods of time at home. T.V. video games, and too many extra curricular activities have reduced their ability to focus.”

-Teacher with 20-24 years experience

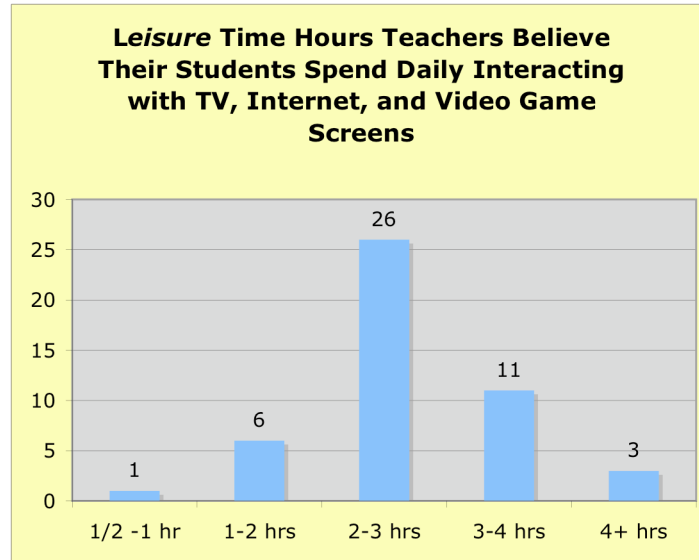
“I did observe the phenomenon starting in the 1980’s with the MTV age of fast moving/changing video images among middle and high school students. Now with video games, it has trickled down to elementary school aged children.”

-Teacher with 25+ years experience

TV, Internet, and Video Games

Teachers were asked to estimate the number of hours their students spend interacting with TV, Internet and video games during their free time. Most participants believe their students engage with media screens for 2-3 hours per day.

CHART 3



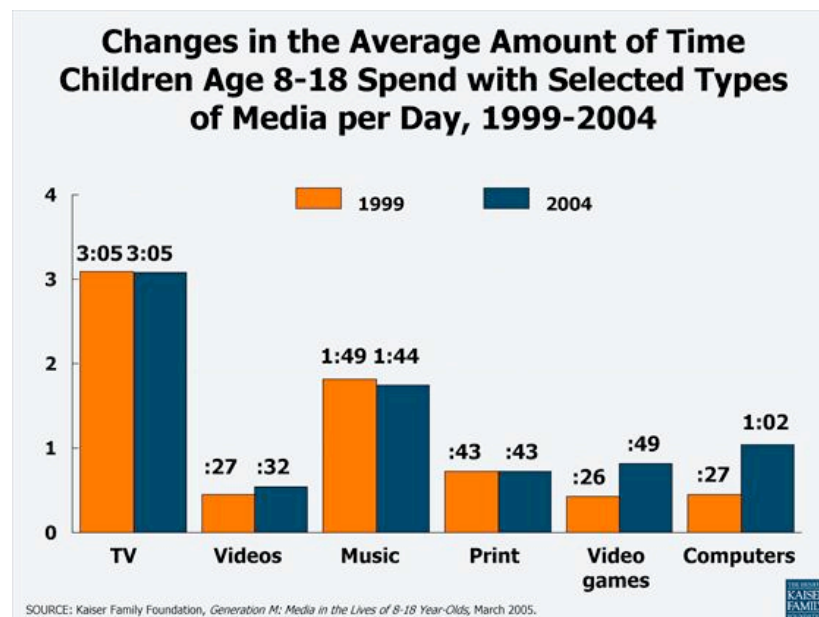
Number above bar = number of teacher responses

- 2 % of respondents believe their students interact with screens for ½ to 1 hr. daily
- 13 % of respondents believe their students interact with screens for 1-2 hrs. daily
- 55 % of respondents believe their students interact with screens for 2-3 hrs. daily
- 23 % of respondents believe their students interact with screens for 3-4 hrs. daily
- 6 % of respondents believe their students interact with screens for 4+ hrs. daily
-

According to Kaiser Family Foundation's research published in March 2005, *Generation M: Media in the Lives of 8-18 Year Olds*, children and teens consume an average of **nearly 6 ½ hours of total media daily**, but are actually exposed to 8 ½ hours a day due to the fact they are using more than one media source at a time (Rideout 6). For this pilot study survey,

participants were asked not about *total* media consumption, but specifically how many hours of TV, Internet, and video games students interacted with in a given day. According to Kaiser data, children and teens spend approximately **5 hours a day** with TV, Internet and video game screens. (See chart 4.) The majority of teachers surveyed estimated their students spend **2-3 hours** with TV, Internet, and video games. It appears that those teachers who participated in this pilot study are unaware of the actual amount of time their students are spending with media.

CHART 4



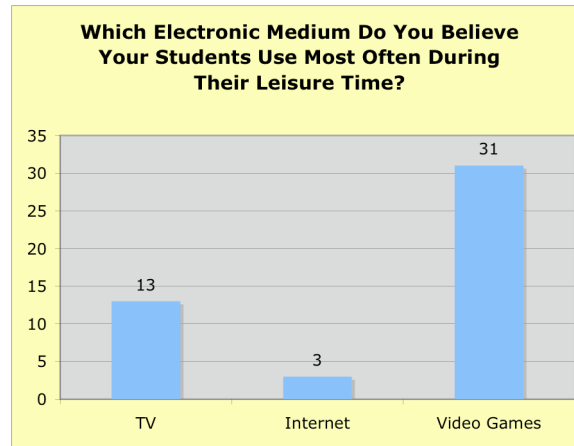
A comparison of the time 8-18 year olds spent with media in 1999 verses 2004.

Students' Favorite Electronic Medium

Teachers were asked, “Which electronic medium (TV, Internet, or video games) do you believe your students use most often during their leisure time?” Teachers believe their students most often 1) play video games (66%), 2) watch TV (28 %), and 3) use the Internet (6 %). According to Kaiser research data, TV viewing is still the dominant youth media, followed by listening to music. (Music was not addressed in this pilot study).

Children and teens watch an average 3 hours of TV a day and listen to 1¼ hours of music. Interactive media is the next most popular form of media used by children and teens. Children and teens on average use computers 1 hour each day and play video games approximately 1 hour (49 minutes) each day.

CHART 5



The majority of survey respondents, 31 of the 47, believe their students play video games more often than watch TV or use the Internet. Thirteen teachers believe their students watch TV most often, and only 3 teachers believe their students use the Internet most often. Again the teacher who participated in this survey are not aware that children and teens typically spend more time watching T.V. than playing video games.

CHARTS 6 & 7

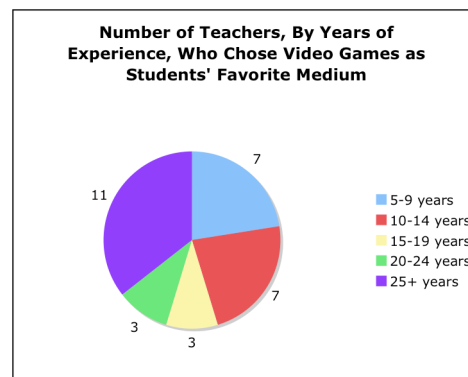
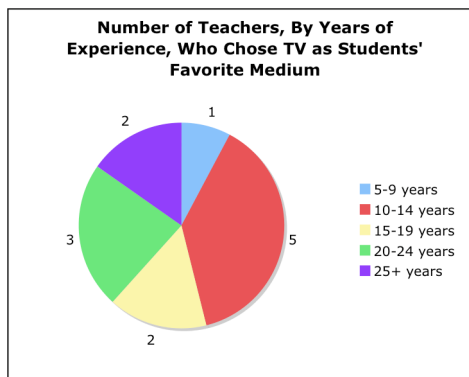


TABLE 2

Teachers Who Chose TV

5-9 years	1
10-14 years	5
15-19 years	2
20-24 years	3
25+ years	2

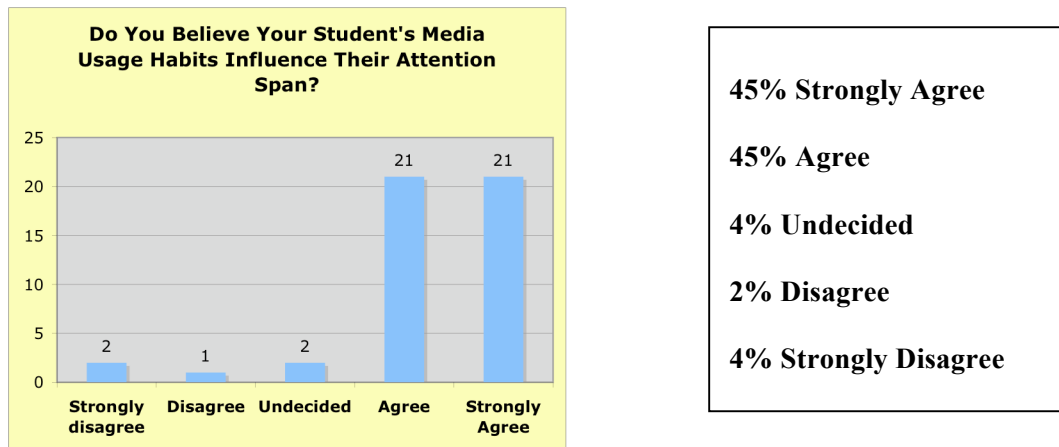
Teachers Who Chose Video Games

5-9 years	7
10-14 years	7
15-19 years	3
20-24 years	3
25+ years	11

While the majority of all respondents chose “video games” as the medium their students’ used most of the time, a greater number of teachers from the 25+ years experience group chose video games over TV than any other age group. Of the 3 teachers who chose Internet as their students most favorite medium, 1 was from the 5-9 years experience group, 1 from the 15-19 years experience group, and 1 from the 20-24 years experience group.

Student Media Usage Habits and Attention Span

CHART 8



Teachers were asked if they believe their students’ media usage habits influence their attention spans. The participants overwhelming (90%) believe that student media usage habits influence attention span. This question did not ask if media habits *positively* or *negatively* influence attention span, only that it did indeed *influence* attention span.

When asked if student media habits *positively influence* their students' ability to sustain attention to ordinary classroom instruction, 28 % of respondents strongly disagree with the question, and 53 % disagree, for a total of 38 teachers or 81 % of respondents stating they do not feel their students' media habits *positively influence* student attention spans. Four teachers were undecided on this question, and 5 teachers believed student media usage habits *do positively influence* student attention span.

When asked if student media habits *negatively influence* their students' ability to sustain attention to ordinary classroom instruction, 55 % of respondents agree with the question, and 38 % strongly agree, for a total of 44 teachers or 93 % of respondents stating they believe their students' media habits *negatively influence* student attention spans. Two teachers were undecided on this question, and 1 teacher *disagrees* that student media habits *negatively influence* student attention span. The one teacher who disagrees writes:

"I believe the teacher in the classroom is the most important factor. If he or she is prepared the students will sustain attention. I doubt that I am in the majority of feeling regarding this issue. In my 43rd year of teaching, I find students quite similar to my second year. My first year was my problem. I learned from it and know how to involve students in the class."

-Teacher with 43 years experience from St. Louis

Teacher Perceptions of Student Attention Span

"It seems to me that many of my students have less experiences outside of the home and they spend more time playing inside with very stimulating toys and technology. It is very hard to compete! I think that even beyond the video games, television, and the other technology that students engage in, even the educational toys that kids receive at a young age are 'flashier' and more stimulating than they once were.

Kids are used to lights and noise in their learning well before they even begin school. I think this constant stimulation makes being in a classroom feel very boring, and paying attention to someone who is simply talking or writing on a board just doesn't keep their attention."

-Teacher with 5-9 years experience from North Carolina

“I attribute the decrease in attention to T.V. and video games that send rapid-fire stimuli to children. I think children expect instant gratification today because that is what they are used to getting.”

–Teacher with 20-24 years experience from St. Louis

Teachers were asked on the survey, “ *If you have observed changes in your students’ ability to sustain their attention, do you believe these changes have *positively* influenced your students’ learning?*” Teachers were also asked the converse, “*If you have observed changes in your students’ ability to sustain their attention, do you believe these changes have *negatively* influenced your students’ learning?*”

According to the pilot survey data, most teachers **do not** believe the adaptations they have observed in students’ attention span over the years have positively influenced student learning. Of the 44 respondents who answered the first question, **57% disagreed** (27 teachers) with the question and **27% strongly disagreed** (13 teachers) with the question, for a combined total of **87% who disagree**. Three teachers, **6%, do agree** that student attention span adaptations have positively influenced student learning. One teacher with 5-9 years of experience **agrees** that the attention span changes both positively and negatively influence student learning. This teacher wrote in that “it depends on child’s learning style.” Three teachers did not respond to this question and one was undecided.

The percentages for the converse question are approximately the same. Most teachers **do** believe that the adaptations they have witnessed in student attention span over the years has negatively influenced student learning. The majority of respondents, **53% agree** (25 teachers) and **36% strongly agree** (17 teachers) with the question, for a

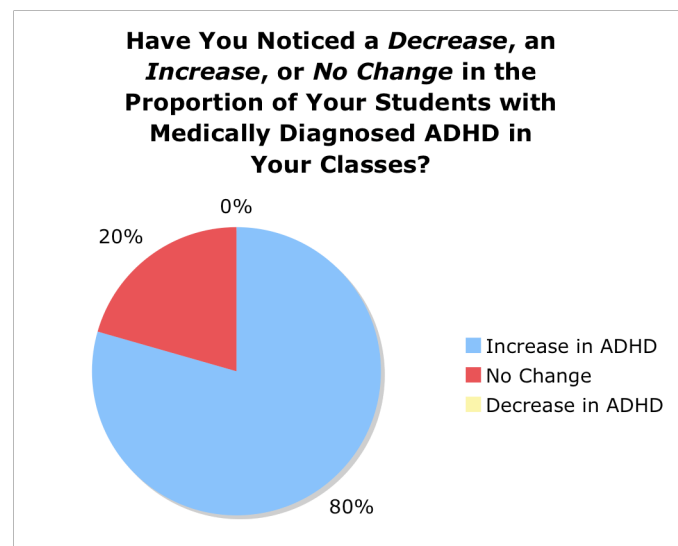
combined total of **89% who agree**. Two teachers were undecided about this question and two did not respond.

According to this pilot study, it appears that the majority of elementary school teachers who participated in the study have witnessed changes in their students' attention spans, which the teacher perceive as negatively influencing their students' learning.

ADHD Diagnoses: Decrease, Increase, or No Change?

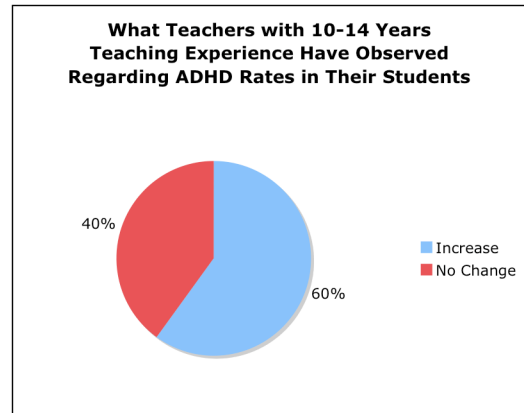
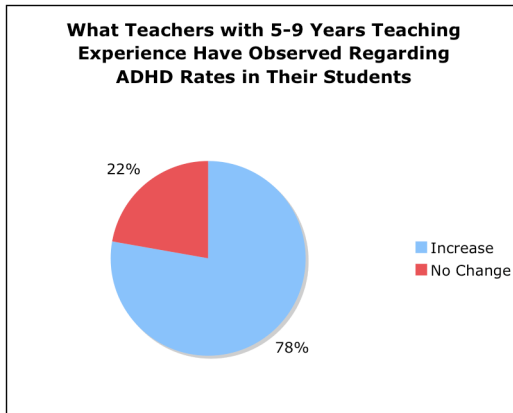
The second to last survey questions asks, "In your years of teaching have you noticed *a decrease, an increase, or no change* in the proportion of your students with medically diagnosed Attention Deficit Hyperactivity Disorder (ADHD) in your classes?" According to the pilot study data **80%** of teachers surveyed report they have observed an ***increase*** in students with ADHD diagnoses.

CHART 9

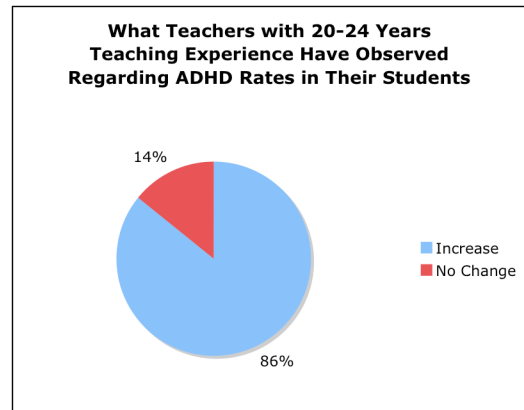
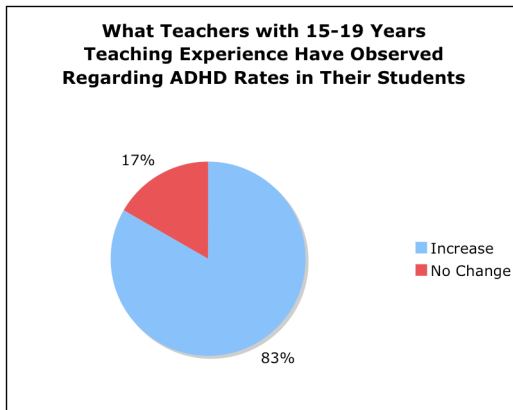


*** Three teachers did not answer this question. When included in the results, the percentages are as follows: 74% surveyed have noticed an increase in ADHD rates, 19% have not noticed a change in ADHD rates and 6% did not respond.**

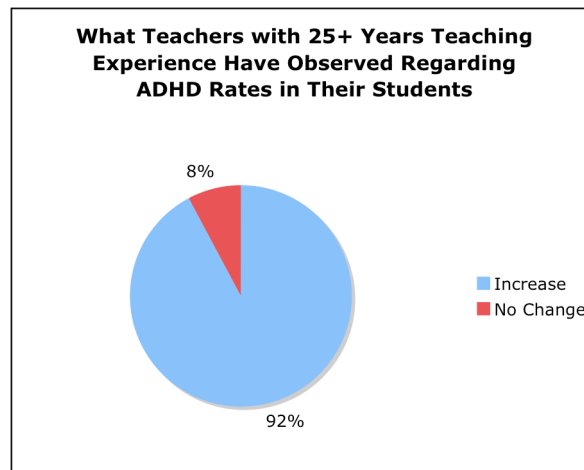
CHARTS 10 & 11



CHARTS 12 & 13



CHARTS 14



With increasing experience, there is an incremental rise in observable ADHD rates with the exception of the 10-14 year group.

It is interesting to note that when respondents are grouped by “years of experience” with respect to this question, there is an incremental rise with experience in the percentage of teachers who are observing increased rates of students with ADHD diagnoses, with the exception of the 10-14 years group:

**5-9 years = 78%, 10-14 years = 60%, 15-19 years = 83%,
20-24 years = 86%, and 25+ years = 92%.**

It appears that teachers with more experience are observing greater increases in ADHD diagnoses than their less seasoned colleagues. When looked at as a group, 80% of the entire survey population has observed, during their teaching careers, a rise in the number of students diagnosed with ADHD.

Data Analysis

“My own children are 27, 25, and 21. When they were young, the baby toys required the child to interact with the toy and the child had to make the play and interaction. For example: Fitting different blocks into different holes. Recently I’ve bought baby toys for nieces’ and nephews’ babies. Now you can’t find a toy where the child is the initiator/action maker. Now the BABY toys have flashing lights, bells and whistles...No wonder the child of today is less attentive. He has been entertained with bells and whistles since birth. He no longer knows how to create his own play or own ideas. He doesn’t play outside or make forts out of pine needles and sticks. So sad!”

- Comments from survey participant with 25+ years of teaching experience

This section will discuss the patterns and trends identified in the pilot study data, and attempt to analyze and create meaning from the information gathered. Teachers’ comments and opinions will be included and explored when appropriate. Since this is a limited pilot study in which a small number of teachers was surveyed, discussions will be formulated based on data received but no firm conclusions will be drawn. Hypotheses based on study data, respondent comments, and literature reviewed will be synthesized and presented.

Response Rate

It appears that the majority of teachers who participated in this study are interested in and concerned about the topic of student attention span. Forty-one respondents, 87% of the total respondent group, included comments similar to the quote above on their surveys. Adding personal comments was something respondents *could choose to do* but were not *required to do* in addition to directly answering the survey questions. It appears the majority of teachers truly appreciated and took the opportunity to share their observations and ideas regarding student attention span.

As was stated in the data reporting section, 60 surveys were initially distributed and 47 were returned, for a 78% rate of return. It is interesting to note that while no surveys from South Carolina were returned, surveys from every other recruited school were returned. While the cause of the failure of this group to respond will never be known, it can be theorized there was a mailing error, a human error, or a lack of interest on the teachers' part. Possibly the surveys never arrived at the South Carolina school, or the designated faculty member never distributed the surveys. While the explanation that no teachers from the South Carolina school were interested in participating in the study is possible, it seems unlikely given the fact that the rate of return was robust from the other recruited schools. If the six surveys sent to South Carolina are removed from the total distributed, and the total distributed is changed from 60 to 54, the rate of return for this pilot study then becomes 87%.

TABLE 3

# Of Surveys Distributed	# Of Surveys Returned	Rate of Return
60	47	78%
54 (South Carolina removed)	47	87%

In summary, teachers first choose to participate in this anonymous study, and secondly did take the opportunity to express themselves on the subject of student attention, adding insightful, thought provoking comments they were not required to add. It appears that teachers are eager to discuss this issue.

Years of Experience

It was predetermined that to participate in this study, teachers needed to have 5 years teaching experience. This guideline assures that respondents have enough teaching experience with children to adequately assess generalized, overall changes in student attention span over time. Teachers from all five pre-selected years of experience subgroups did indeed participate in the survey. Survey data from teachers with a range of 5 to 25+ years teaching experience was in fact collected, which allowed for a greater overall perspective on the question. Since participation was totally voluntary and open to any willing faculty member with 5 years experience at recruited schools, it is interesting to note the largest sub-group represented is the 25+ years, those educators with the most teaching experience.

Is it that more experienced teachers have more to say on this subject or is it purely coincidental that more experienced teachers volunteered to participate? This question cannot be answered in this limited study. Further investigation may reveal the answer. For purposes of this limited study, a cross-section of information regarding student attention span was collected from teachers with a wide-range of teaching experience. Teachers with more than 25 years teaching experience and teachers with 10-14 years experience were the most well-represented subgroups.

Attention Span Changes

Teachers *overwhelmingly* agree that today's elementary school students are having a difficult time sustaining their attention. As reported in Chart 2, 88% percent of the total respondents surveyed agree or strongly agree that their students are finding it difficult to sustain attention for an appropriate amount of time during classroom

instruction. Table 1 figures reveal that the more experience a teacher has, the greater the intensity with which the teacher agrees with the attention span question. Essentially, the survey data reveal that more experienced teachers, those with 15+ years of experience, are noticing student attention span changes at higher rates than teachers with less than 15 years experience.

According to Daniel Erker, a New York University Ph.D. candidate experienced with statistical analysis, the findings for this question are *nearly* statistically significant. Erker put this specific data through several typical analyses such as Chi-square, ANOVA, and T-test but none returned statistically significant generalizations. According to Erker the reasons no statistically significant generalizations can be made is largely due to the sample size. Erker writes, “If Gallagher were to have gotten similar data from twice as many people, it is very likely that the following generalization would be statistically supported: The more experience teachers have, the more likely they are to strongly agree that students attention spans have diminished in recent years.”

These observations do indeed correlate with the opinions of both Marc Prensky and Katherine Hayles. The survey findings and Erker’s analysis support Prensky’s theory that the more seasoned *digital immigrants* (more experienced teachers) observe their *digital natives* (elementary students) struggling to attend and focus because they are essentially not speaking the same language. *Digital natives* are accustomed to rapid stimuli and have a low tolerance for boredom, due in large part to the media in their lives, while *digital immigrants* teach in an out of lecture format. Hayles would state that the more experienced teachers have a *deep* attention span style while their students have a *hyper* attention span style, and therein lies the disconnect.

When questioned about the probable causes of student attention span changes, respondents listed a large number of contributing factors, from changes in parenting and an overall sense of *hurried* family lifestyle, to the lack of practice at actively sustaining attention. As reported in an earlier section, the majority of teachers who participated in this study believe that digital media and technology play a tremendous role in changes and adaptations that they have noticed in children's attention span. It does appear that some teachers in fact are blaming attention span changes primarily on media:

"Media images are projected at increasing speeds. Free time activities for children and adults, in general, involve more time watching T.V. and movies, computer games and surfing the Internet. Instant messaging and text messaging-using abbreviated text inhibits proper use of grammar and punctuation, and mastery of proper writing skills."

- Comments from survey participant with 15-19 years of teaching experience

Screen Time Hours

Survey respondents are greatly underestimating the number of hours their students are spending each day interacting with media screens. The majority of teachers, 78%, believe their students are interacting with media screens somewhere between 2-4 hours per day. Only 6% of the respondents believe their students are interacting with media screens for more than 4 hours a day. According to 2004 Kaiser Family Foundation data, elementary students on average interact with media screens (T.V., Internet and video games) for **5 hours each day**. (See Chart 4). According to Kaiser data, children and teens interact with all media a total of 6 ½ hours each day, and are actually exposed to 8 ½ hours due to media multitasking. For example, a student might be listening to music, and talking on their cell phone while surfing the Internet. While teachers do believe their students spend quite a large proportion of their free time involved with *screen time*, they are not tuned-in to the actual amount of hours.

Students' Medium of Choice

Teachers who participated in this survey believe their students' favorite digital media is video games, followed by T.V. viewing. According to 2004 Kaiser data, these teachers have a generally incorrect perception regarding their students' media habits. (See Chart 4). They are not aware of how long their students are engaged with media screens nor do they know the type of media their students use most often.

According to Kaiser data, T.V. is still the favorite youth media, with children and teens watching an average of 3 hours of television per day. It is interesting to note that both the 5-9 year sub-group (87% of this group) and the 25+ year sub-group (84% of this group) had the largest percentage of teachers in each individual sub-group who believe elementary children preferred video games above all other forms of media. (See Table 2). It is easy to understand why the 25+ sub-group would show a lack of awareness regarding media habits, since they are farther removed in time and age from their students, but it is not as easy to understand the disconnect between the younger, and less experienced teachers. This finding is peculiar and yet at the same time very interesting.

Could these findings possibly be illustrating the beginning of a new trend? Possibly these teachers are not as out of touch as the data reveal. Since the Kaiser data are somewhat outdated, at least in the world of rapid digital changes, could a shift have begun in the 4+ years since the Kaiser study was conducted? Might the reality in 2009 be that elementary aged children *are in fact* choosing video games as their favorite and most popularly used medium, and those closest to their students' age and those farthest removed are noticing this trend? Might the Kaiser data itself need updating? It is not easy

for scientific research studies to keep up with the rate of change in the digital age. This is an area where further more in-depth and ongoing research is warranted.

Teacher Perception of Student Media Habits and Attention Span

According to this pilot study's survey findings, the respondents *overwhelmingly*—90 %—believe that their students' media usage habits do indeed influence their attention spans. With regard to this question, teachers' perceptions do reflect the academic study findings as well as the opinions of those authors and scholars quoted in the literature review. Twenty-first century children's attention spans are, in varying degrees, being influenced by contemporary digital media culture.

Many respondents, 81%, also believe that students' media influences and habits do not *positively influence* student attention spans. While the majority of respondents agree with this view, it is important to note that five teachers, approximately 11%, *do agree* that their students' media habits *positively influence* their students' attention span. One respondent included a comment stating that it depends on each individual student's learning style whether media habits positively or negatively influence attention. An even more interesting finding is that, with the exception of one 5-9 year respondent, teachers who perceive media usage habits as a *positive influence* on student attention are teachers with 15+ years experience.

In addition, 93% of teachers surveyed also believe that their students' media usage habits *negatively influence* their ability to pay attention to typical classroom instruction. This finding may shed light on “the disconnect” that Prensky argues exists between *digital immigrant* educators and their *digital native* students. Since 21st century

teachers believe media usage habits are *negative influences* on students' attention spans, contemporary teachers may be less inclined to utilize digital media and technology in their teaching, believing their students spend enough time with media during their free and leisure time.

It may benefit all involved if teachers would incorporate greater use of constructive media in their teaching rather than create "the forbidden fruit" dilemma. With all the demands placed on teachers today, this is not easy to achieve, especially if the teacher does not have much personal experience with digital technology. One could compare this to a biology teacher being requested to teach Spanish. While both are educators, their content areas and tools used are very different from each other. While one primarily instructs with flora and fauna in hands-on experimentation, the other utilizes audio tapes, books, and cultural immersion experiences to teach a second language.

Rising Rates of ADHD in the Classroom

The respondents overwhelmingly, 80%, agree that indeed during their teaching careers they have seen a rise in the number of students with ADHD diagnoses. Whether more children are actually being diagnosed, or teachers are simply more aware of the disorder has yet to be determined. This is a complex issue with many factors contributing to this 21st century reality. The reasons for the rise in the rate of ADHD diagnoses are multiple and complex. What is key, however, is that contemporary teachers are noticing this increase, and according to this pilot study data, as teaching experience increases so does teachers' intensity of agreement that ADHD is on the rise.

Summary

There exist today *restless learners*, children who simply cannot pay attention in the classroom, even to the best and most qualified teachers. Pediatricians, scholars, researchers, and neuroscientists are all in agreement that more children today suffer from attention span and self-regulating disorders, including ADHD, than ever before in history. It appears that the elementary school teachers, who participated in this pilot study, also believe this to be true. These teachers report significant changes, over time, in their students' ability to sustain attention.

Extensive research has proven that genetics play a significant role in the development of ADHD. Research has also shown that environmental influences also play a role in the manifestation of self-regulating disorders, especially in those children who are genetically predisposed to these types of disorders.

According to Kaiser Family Foundation data, children (8-18 years) who are growing up in the digital age, are consuming somewhere between 6 ½ -8 ½ hours of electronic media per day. Some studies conducted on the effects of digital media on children's cognitive skills have reported that early exposure to high amounts of T.V. cause attention span difficulties later in childhood. There is not sufficient research on the effects of other media, especially new media such as video games, computer and the Internet, to determine how they affect children cognitively. More research in this area is desperately needed.

There definitely exists "a disconnect" between 21st century teachers and their students. Some would say teachers and students no longer speak the same language. Students speak *digital* and teachers do not. Other claim that growing up *wired* in the

digital age is causing changes in children's neurology. Whether a neurological evolution is underway, or a shift in attention span style is taking place, further research is needed to help reveal exactly what is happening in the minds and brains of 21st century children.

Conclusion

*“There was a child went forth every day,
And the first object he look'd upon, that object he became,
And that object became part of him for the day or a certain part of the day,
Or for many years or stretching cycles of years...
from Leaves of Grass - Walt Whitman*

Restless learners are occupying more chairs in today's classrooms. And while many of these children merely appear distracted and overly inattentive, many are at increasing rates, being diagnosed with ADHD. Pediatricians, academic scholars, neuroscientists, and elementary school teachers are all noticing a shift in the attention span style of today's *digitized* elementary students. Opinions vary greatly on what to do about this 21st century reality, and finding a solution to this contemporary problem is very complex.

Self-regulatory disorders including ADHD have existed for many, many years. Physicians documented these types of disorders as early as the mid-1800s. But never before in human history have so many children been diagnosed and medicated for attention span disorders as they are currently. This is a troubling new trend. Also troubling is the fact that children spend an inordinate amount of their free time using media, somewhere between 6 ½ to 8 ½ hours each day. The question begs to be asked, “If

children today are spending so much time with media, with what, and whom are they not spending time?”

According to new research and many professionals, children’s brains are being rewired through the process of neuroplasticity. In essence, there appears to be a *neurological evolution* underway, which is causing a vast chasm, “a disconnect” between today’s student population, who speak *digital* and their parents and teachers, who do not speak *digital* as a first language.

It is very apparent that more extensive, longitudinal research studies need to be conducted in the area of digital media, both new and old, and its effects on the developing human brain. Any activity that occupies so much of children’s times deserves a very thorough investigation.

It appears to this researcher that the answer to the premise initially posed is two-fold. Children *are indeed* growing up in a digital media culture, and their futures most assuredly will include digital technology. Digital technology is here to stay! To succeed in the future, children today need to fully grasp and constructively navigate their contemporary digital world. And they desperately need teachers who understand the digital methods of communication, to help guide them. At the same time, children’s brains are *indeed* adapting—children are evolving to better survive and succeed in the digital environment by which they are surrounded. There is no judgment intended here, only the observation that *yes* living in the digital age is altering human neurology.

This researcher suggests that 21st century teachers be educated in the areas of technology, and taught and encouraged to incorporate technology into their curriculum. And as Dr. Sylwester advises, *balance* needs to be the ultimate aspiration. All the fastest,

high-tech electronics mean nothing if the human being directing the machinery has no one with whom to communicate. Otherwise, humans may as Walt Whitman writes, “become the objects they look upon,” and in the process lose a piece of their humanity. The solution to this complex issue lies in staying balanced, and not allowing one aspect to rule everything else.

“The environment that a child is exposed to has a strong impact on a child’s behavior and attention. People’s behaviors are largely the result of their experiences with the environment. Many of today’s families are constantly on the go. Children do not get the opportunity to calm their little brains down and focus on what they are doing or should be doing.”

-Teacher with 10-14 years experience

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APPENDIX

Elementary Student Attention Span

Dear Participants: This is an anonymous survey. Whether you complete this survey or not, you are not subject to any type of penalty. The data collected in this survey will be coded, analyzed, and used in my media communications research. Please complete this survey and mail it back to me in the stamped, self-addressed envelope provided. Return the completed survey by March 30th. It is critical that only elementary school educators and administrators with 5 or more years teaching experience participate in this survey. Thank you for your time! MP Gallagher

- 1) A. During the years you have been teaching have you noticed significant changes in your students' ability to sustain their attention for an appropriate amount of time?**

____ Strongly Disagree ____ Disagree ____ Undecided ____ Agree ____ Strongly Agree
(Check one)

- B. If you checked "agree or strongly agree" to the above question, to what do you attribute this change?**

- 2) How many *leisure* time hours do you believe your elementary students spend interacting with electronic media screens (TV, Internet, Video Games) in a typical day?**

____ 0 hrs ____ 1/2 hr-1 hr ____ 1-2hrs ____ 2-3hrs ____ 3-4 hrs ____ 4+ hrs
(Check one)

- 3) Which electronic medium do you believe your students use most often during their *leisure* time?**

____ TV ____ Internet ____ Video Games
(Check one)

- 4) Do you believe your students' media usage habits influence their attention spans?**

____ Strongly Disagree ____ Disagree ____ Undecided ____ Agree ____ Strongly Agree
(Check one)

5) Do you believe your students' media usage habits positively influence their ability to sustain attention to ordinary classroom instruction?

____ Strongly Disagree ____ Disagree ____ Undecided ____ Agree ____ Strongly Agree
(Check one)

6) Do you believe your students' media usage habits negatively influence their ability to pay attention to ordinary classroom instruction?

____ Strongly Disagree ____ Disagree ____ Undecided ____ Agree ____ Strongly Agree
(Check one)

***** Only answer questions 7 & 8 if you answered, "agree or strongly agree" to # 6. Otherwise, please proceed to question 9. *****

7) If you have observed changes in your student's ability to sustain their attention, do you believe these changes have positively influenced your students' learning?

____ Strongly Disagree ____ Disagree ____ Undecided ____ Agree ____ Strongly Agree
(Check one)

8) If you have observed changes in your student's ability to sustain their attention, do you believe these changes have negatively influenced your students' learning?

____ Strongly Disagree ____ Disagree ____ Undecided ____ Agree ____ Strongly Agree
(Check one)

9) In your years of teaching have you noticed a decrease, an increase, or no change in the proportion of your students with medically diagnosed Attention Deficit Hyperactivity Disorder (ADHD) in your classes?

____ Increase in students with ADHD ____ No Change ____ Decrease in students with ADHD
(Check one)

10) How many years have you been teaching elementary school students?

____ 5-9 years ____ 10-14 years ____ 15-19 years ____ 20-24 years ____ 25+ years
(Check one)

I 1) Are there any other factors that you believe influence children's ability to sustain attention?

I2) ADDITIONAL COMMENTS:

**To receive survey results, you may contact me at 2mpgal@earthlink.net in
June '09.**

**Mary Pat Gallagher ~ 314-727-7636
Webster University, St. Louis, Missouri**

THANK YOU for taking the time to complete this survey!



Facts

Fact Sheet

KIDS & MEDIA

Note: All data originates from the Kaiser Family Foundation study, *Kids & Media @ The New Millennium*, November 1999, unless otherwise noted.¹

Amount of time children spend using media each day, on average:²

All kids 2-18	5:29
2-7 year-olds	3:34
8 and older	6:43

Amount of time kids spend each day, on average:³

Watching TV	2:46
Listening to music	1:27
Reading for fun	:44
Watching videos	:39
Using a computer for fun	:21
Playing video games	:20
Online	:08

Percent of kids who spend more than an hour a day:

Watching TV	64%
Reading for fun	20%
Listening to CDs or tapes	19%
Listening to the radio	17%
Using a computer for fun	9%
Playing video games	8%
Online	3%
Playing computer games	2%

Amount of time kids spend each week, on average:⁴

Watching TV	19:19
Listening to music	10:04
Reading for fun	5:15
Using a computer for fun	2:29
Playing video games	2:17

In a typical day, the percent of kids who watch TV for:

One hour or less	36%
One to three hours	31%
Three to five hours	16%
More than five hours	17%

The average American child grows up in a home with:

3 TVs
3 Tape players, 3 radios and 2 CD players
2 VCRs
1 Video game player
1 Computer

Percent of kids with the following media in their bedroom:

Age	2-7	8-18
TV	32%	65%
Cable/satellite TV	14%	30%
Premium channels	5%	15%
VCR	16%	36%
Video game player	13%	45%
Computer	6%	21%
Internet access	2%	10%
Radio	42%	86%
Tape player	36%	81%
CD player	14%	75%

Percent of kids who have a computer in the home, by age and income:

2-7 year-olds	62%
8 and older	73%
Lower income ⁵	49%
Upper income	81%

Percent of parents with Internet access at home, over time:⁶

1998:	38%
1999:	50%
2001:	69%

Percent of kids who use a computer in a typical day:

All kids 2-18	42%
2-7 year-olds	26%
8 and older	51%

The Henry J. Kaiser Family Foundation: 2400 Sand Hill Road, Menlo Park, CA 94025 (650) 854-9400 Facsimile: (650) 854-4800

Washington, D.C. Office: 1450 G Street, N.W., Suite 250, Washington, DC 20005 (202) 347-5270 Facsimile: (202) 347-5274

Request for Publications: (800) 656-4533 <http://www.kff.org>

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Percent of school-aged children who use a computer in a typical day, by income:⁵

<u>In school:</u>	
Lower income	32%
Upper income	30%

<u>Out of school:</u>	
Lower income	23%
Upper income	48%

The TV in the home, over time:

<u>Percent of homes with more than one TV:</u>	
1970:	35% ⁷
1999:	88%

<u>Percent of homes with 3 or more TV sets:</u>	
1970:	6% ⁷
1999:	60%

<u>Percent of 6th graders with a TV in their bedroom:</u>	
1970:	6% ⁸
1999:	77%

Parental oversight of kids' TV use:

<u>Percent of kids...</u>	
With no rules about TV:	49%
In homes where TV is on most of the time:	42%
In homes where TV is usually on during meals:	58%

<u>Percent of time parents watch TV with their kids:⁹</u>	
2-7 year-olds:	19%
8-18 year-olds:	5%

¹ The study was conducted from November 1998 through April 1999, and included a nationally representative sample of more than 3,000 children ages 2-18. More than 2,000 students in grades 3-12 completed self-administered written questionnaires in the classroom concerning their media use the previous day; more than 1,000 in-home interviews were conducted with parents or caregivers of 2-7 year-olds; and more than 600 week-long media use diaries were collected for children participating in the study.

² Time is presented in hours:minutes.

³ Times can't be summed, due to use of more than one medium at a time.

⁴ Week-long averages are based on mean times with each medium, separating out weekday and weekend reports. Times can't be summed due to use of more than one medium at a time.

⁵ Income categories are based on the median income of the zip code in which the child lives (for 2-7 year-olds) or goes to school (for 8-18 year-olds), and represents the following ranges: "low income" is less than \$25,000, and "high income" is \$40,000 or more.

⁶ The Kaiser Family Foundation, *Parents and the V-Chip 2001*, July 2001. A nationally representative, random sample survey of 800 parents of children ages 2-17, conducted in May and June 2001.

⁷ Nielsen Media Research. (1998). 1998 report on television. New York: Author, p. 15.

⁸ Lyle, J., & Hoffman, H. (1972). Children's use of television and other media. In E.A. Rubinstein, G.A. Comstock, & J.P. Murray (Eds.). *Television and social behavior* (Vol. 4, pp. 129-256). Washington, DC: U.S. Government Printing Office, p. 140.

⁹ Based on media-use diaries.