

What is the Impact of Digital Technology on Young Students?

by

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Bachelor of Education, University of Victoria, 1986

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Supervisory Committee

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Abstract

This project focuses on the impact of the misuse and/or overuse of digital technologies on children's cognitive, social, emotional, and physical development. The purpose of this report is to impart knowledge about technologies' side effects when misused or overused, and also to offer parents strategies, tools, and tips to help their children develop a positive, balanced, and healthy relationship with technology so that it enriches their lives instead of diminishing them. In Chapter Two, I review the existing literature on this topic, finding much evidence that the impact on the development of children aged 12 and younger is predominantly negative and thereby supporting the ongoing and growing concern about this issue among parents and educators. In Chapter Three, the final chapter, the focus is on healthy digital habits. I describe a PowerPoint presentation and a print brochure I created that give parents important tips and strategies to help ensure that their children use digital technologies in a healthy and balanced manner.

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Dedication

I would like to dedicate this project to my supportive and amazing husband who never stopped giving of himself in countless ways. To my daughters Kaitlyn and Angelina who were by my side during this long journey and encouraged me every step of the way. Both of you have been my best cheerleaders. Lots of other family members provided much needed support and encouragement which made the final weeks of work possible. This accomplishment would not have been possible without them. Thank you. I am grateful to everyone who helped me along this journey.

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Chapter One

My Personal Interest in the Research Topic

I was well-raised and have many happy childhood memories of playing outside for long hours with my friends. Bicycle rides, hikes, picnics, puppet shows, and imaginative play filled my childhood. Computers, the Internet, and mobile phones were as yet unheard of. However, I also remember how I loved to watch television on rainy days. Quality family programs like *Mr. Rogers' Neighborhood*, *Captain Kangaroo*, and *The Friendly Giant* were prominent in our household. Our parents monitored how much time was spent in front of the television and were cognizant of the fact that too much television “[wasn’t] good for your brain.” Meal times were spent conversing with family members, and, in our Italian family, food and social interaction went hand-in-hand.

Fast-forwarding a few decades, I have now been an educator for thirty years and have seen great changes throughout my teaching career. As adults connect more and more to their electronic devices, they disconnect from their children, and educators are seeing children form such close attachments to these devices that they prefer using them to having face-to-face interactions with their peers. One of the trends I have noticed in the past five years is that young children, especially kindergarten students, come to school less prepared than they used to be because they lack some basic skills.

These include communication skills; the ability to pay attention; social and emotional skills; and fine-motor skills such as the ability to draw, colour, and print. I began to wonder if technology use had any bearing or effect on the acquisition of these essential skills. Although the students certainly were very proficient in using computers and other digital devices, I could not

help but wonder about those other basic skills. Where had they gone? Why had they appeared to diminish? Were they replaced with a different set of skills? Was there a connection between these “lost skills” and children’s technology use? I hope to shed some light on these questions in the following chapters.

Introduction

“The intrusion of technology into human lives has hit us so fast and with such force, that there has been little time to plan how to accommodate the profound change technology has made to our lives” (Rowan, 2010, p. 13).

Technology has completely changed virtually every aspect of our society over the past couple of decades. It has been a widely held belief that digital technologies (such as television, Internet, video games, cell phones, to name a few) can be unplugged by children at any time. However, research shows that children are “plugged in” for many hours of the day and parents are not monitoring this, as they are too busy responding to emails and being otherwise “plugged in” themselves.

Rowan (2013) suggests that as children connect more to technology, they disconnect from humanity. Heider and Jalongo (2015) report that research conducted by the Academy of Pediatrics in the United States shows that the use of all types of media has increased in the past decade and that by the time children are eight years old they spend over five hours a day using media. A slightly more recent study by the American Academy of Pediatrics (2013, as cited in Davou & Sidiropoulou, 2017) showed that 8- to 10-year-olds spend approximately 8 hours/day using digital technology while older children spend 11 hours/day; by comparison, in 2006, time spent watching TV was 2 hours/day. Davou and Sidiropoulou (2017) state that 30% of children’s screen time is spent using two or more devices simultaneously.

How does this bombardment of technology affect our children? Opinions on the influence of technology on children have been divided. Research shows that there are both drawbacks and advantages to the use of technology during the formative years. The literature that I reviewed primarily dealt with children of elementary-school age (under 12). Although the literature is divided on this topic, some commonalities emerged. It is widely agreed that, overall, technology can be an advantageous “tool.” Rogers (1994, as cited in Donohue & Schomburg, 2017) utilized technology to support early learning with an emphasis on relationships. As he states, “No matter how helpful they are as tools (and of course, they can be very helpful tools), computers don’t begin to compare in significance to the teacher–child relationship, which is human and mutual. A computer can help you to learn to spell H-U-G, but it can never know the risk or the joy of actually giving or receiving one” (Donohue & Schomburg, 2017, p. 9). The amount of time children spend using electronic devices has increased, and many researchers agree that *excessive* time spent on devices is not conducive to a healthy lifestyle. As to how technology use affects social, emotional, and cognitive well-being, the evidence is mixed, although there is widespread agreement that too much screen time can impact physical well-being. There is a significant correlation between the number of hours spent looking at screens and the incidence of childhood obesity. Research shows that obesity levels have risen dramatically in recent years. According to the World Health Organization (2018), childhood obesity has tripled in the past thirty years. Over 340 million children and adolescents aged 5–17 were overweight or obese in 2016.

The increasing integration of technology in B.C. classrooms, as well as the addition of coding skills to the kindergarten-to-Grade-12 curriculum in 2016, sparked my interest in the topic of technology and its impact on students. I wondered whether this was a positive trend,

considering that technology has become ubiquitous in our everyday lives and in many instances has had the effect of disconnecting people from each other.

Although there has been more emphasis on technical skills, including computer-coding skills, mandatory daily physical exercise was also added to the B.C. curriculum from kindergarten to Grade 12 (2016). The rise of obesity and the increase in sedentary activities such as the use of technological devices suggest that the majority of today's students are not getting enough informal or formal exercise. According to Statistics Canada, which looked at data from 2007–2017, only seven percent of children and youths are getting the recommended 60 minutes of moderate to vigorous activity per day, which is down from nine percent the previous decade (“Canadian Kids Not Getting Enough,” 2017).

Interestingly, there has been a surge in outdoor nature activities during school instructional time. One cannot help but wonder whether this is in part related to teachers' recognition that students will go home and retreat into solitude with their mobile devices. Outdoor play is often seen as a foreign activity by today's young students.

The purpose of this paper is to examine the impact of the misuse and/or overuse of digital technologies on children's cognitive skills and on their social, emotional, and physical development. In Chapter 2, a literature review, I survey and analyse research on the negative impact of misuse or overuse of technology on children's development in three areas: (1) their thinking patterns and cognitive development, (2) their social and emotional development, and (3) their physical development. In Chapter 3, the closing chapter, I discuss what can be considered healthy digital habits in today's society. Strategies will be examined that parents and educators can use to implement healthy technological practices. These strategies will help foster a balanced

relationship to technology, which will help ensure that children's cognitive, social, emotional, and physical development proceeds in a healthy manner.

Chapter Two

Literature Review

As stated in Chapter One, a major purpose of this project was to investigate the various ways that the misuse and/or overuse of digital technologies impact children's cognitive, social, emotional, and physical development. This chapter will review recent research regarding the effects of digital technology on children's development in each of these important areas.

Cognitive Development

It is evident that technology has changed in recent decades and that this change has influenced our culture. What is clear is that children today are being given increasing access to various technological devices to help them "get ahead" and that they are using digital technology at younger and younger ages. In her book *Mind Change: How Digital Technologies Are Leaving Their Mark on Our Brains*, Greenfield (2015) explains that the human brain adapts to the environment, which is changing in an unprecedented way; hence, the brain may also be changing in an unprecedented way. "The research is showing us that screens are dulling rather than sharpening our young developing minds," (Kardaras, 2016, p. 33). In a study done in the 1980s, Mikulak (as cited in Kardaras, 2016) discovered that children living in technologically advanced societies had duller senses than those living in traditional societies and were inferior students as well. Mikulak (as cited in Kardaras, 2016) conducted parallel studies, in which she compared children in Latin America and Africa with children in Europe and the United States. She found that sensory acuity and sensitivity to the environment were up to 30 percent higher in

the children from the so-called “primitive societies” (as cited in Kardaras, 2016, p. 33). In further research, she found that children from low-tech societies, such as those of Guatemala and similar countries, showed an immense capacity for learning. When these “deprived” students were given equal or similar learning environments they outperformed their North American and European counterparts, demonstrating “an ability to learn estimated to be three or four times greater than that of their higher tech peers, showing far superior attention, comprehension and retention” (Kardaras, 2016, p. 34) This research indicated that lower tech equaled better minds and thus better learners.

One of the biggest differences between earlier technologies and current digital technologies is that computer, tablet, and smartphone screens monopolize our attention for many more hours than television screens ever did. In Greenfield’s (2015) view, “The ubiquity of digital technologies compared to inventions from previous eras is a shift from technology as a means to its being an end in and of itself” (p.18). Although people use the Internet for traditional pursuits such as reading, playing games, listening to music, and learning, the digital world is also capable of becoming a world unto itself. Being in front of a screen in such a world is threatening to outcompete real life. From shopping to socializing, much of everyday life can be carried on in the virtual world, and therein lies the problem. “Neurologically,” writes Kardaras (2016), “human beings haven’t caught up with today’s overstimulating environment, which is why many neuroscientists and psychologists theorize that we are seeing an explosion of developmental and psychiatric disorders” (p. 26).

Technology is often too stimulating and comes at us too fast for our brains, especially children’s brains, to adapt to the sensory overload. We are now seeing some of the consequences in the form of drastic increases in attention-deficit–hyperactivity disorder, tech addiction, and

mood disorders. In his book *Glow Kids: How Screen Addiction Is Hijacking Our Kids—and How to Break the Trance*, Kardaras (2016) explains that the idea of tech addiction is not a new concept. Decades ago, long before Steve Jobs became famous, Postman (1985) wrote a book entitled *Amusing Ourselves to Death* in which he argued that we were living in a new electronic age and that television was as addictive as a drug (cited in Kardaras, 2016). By today's standard, television seems pretty tame, given the many technological devices we have at our fingertips almost every waking hour. Postman believed that television marked the beginning of a shift in the ways that we think and communicate. Writing in 1985, he was a sort of visionary. I wonder what he thinks about the iPad and other tech gadgets that are accessible to everyone today?

Even the former executive chairman of Google, Eric Schmidt, worries about the overwhelming rapidity of information transfer and its effects on cognition: "It is affecting deeper thinking. I still believe that sitting down and reading a book is the best way to really learn something. And I worry that we're losing that" (as cited in Greenfield, 2015, p. 27).

Many educators are also voicing their concerns. Several believe that technological devices are creating a generation of people with short attention spans. In a study that surveyed 400 British teachers in 2012, three quarters reported a significant decline in their young students' attention spans (Pearson, 2012 as cited in Greenfield, 2015). "In the same year," according to Greenfield (2015), "a survey of more than two thousand U.S. secondary school teachers showed that 87 percent of teachers believed that digital technologies are creating 'an easily distracted generation' who have trouble focusing" (p. 28)

Research has shown that people who are predisposed to addiction have lower baseline levels of dopamine and other feel-good neurotransmitters such as endorphins; this makes them more liable not only to substance abuse but also to addictive behaviours such as gaming

(Kardaras, 2016). Various substances and behaviours can raise dopamine levels significantly. For example, brain imaging research shows that eating chocolate can raise dopamine levels by 50%, having sex by 100%, snorting cocaine by 350%, and using crystal meth by 1,200%. Koeppe — (1998) found that playing video games increased dopamine levels by 100%, and this was when the games were much less sophisticated and stimulating than those we have today (as cited in Kardaras, 2016). The rise in dopamine levels makes playing games hard to resist; children, in whom the frontal cortex is not yet fully developed, find resisting them nearly impossible unless boundaries are imposed.

Substances and behaviours that activate dopamine are called “dopaminergic”; they correlate highly with addictive behaviour (Kardaras, 2016). Dopamine is the neurotransmitter that is the most critical factor in the addiction process. When a person performs an action that satisfies a need or desire, dopamine is released into the *nucleus accumbens*, also known as the pleasure center, a cluster of nerve cells beneath the cerebral hemispheres that is associated with pleasure and reward. When one engages in dopaminergic behaviour, dopamine levels increase so that the dopamine reward pathway is activated, which increases one’s desire to repeat that behaviour; Kardaras (2016) refers to this as a “dopamine tickle” (p.60). Natural dopaminergic activities such as eating or sex come after effort and delay and have a survival function (Kardaras, 2016). However, addictions or addictive behaviours—such as substance abuse, gambling, or video gaming—provide a shortcut, flooding the *nucleus accumbens* with dopamine without having any survival value. Unfortunately, when people become addicted, they experience a reduction in the dopamine boost that being in front of a screen provides. This provides some relief to their overwhelmed nerve receptors, which then becomes a problem. Chronic indulgence in addictive behaviours negatively affects the prefrontal cortex, which is the

brain's decision-making center and is associated with impulse control. Any damage to the prefrontal cortex affects one's ability to refrain from addictive behaviour, making it harder to stop the vicious cycle.

In *iBrain: Surviving the Technological Alteration of the Modern Mind*, Small and Vorgan (2008, as cited in Rowan, 2010) explain that researchers who studied the developing neurological system of children who overuse technology for prolonged periods “found that during video game use, these children were not activating the *longer* (and therefore slower) neuronal tracks to the frontal cortex but defaulting to using the shorter, faster neuronal circuitry” (p. 44). The developing brain's response to this “disuse” was for it to “prune” or stop neuronal transmission to the prefrontal cortex. To lose the function of one's frontal lobes is to lose the capacity for higher thinking, morality, and wisdom. This forces people, especially children, to fall back on more basic cognitive functions such as those used in performing mundane tasks. Rowan (2010) questions the advantages of high-tech devices as “learning tools” in the classroom since the detrimental effects of being sedentary, as well as of decreasing access to frontal lobes, may outweigh any benefits. Educational games are programmed similarly to video games. In these studies, when students who had overused technology reduced their usage for one year, the neuronal connections in their frontal lobes had yet to reform. Such studies suggest that children who are excessively exposed to digital technology may be damaging their brains, specifically in regions essential to learning. However, she points out that many of studies of educational technology are conducted by major tech companies that have vested interests and although games are appealing and hold children's attention, that may be counterintuitive to long term learning.

Studies on changes in cognitive processing show that people find ways to adjust to the amount of information they encounter, but with costs in accuracy and depth of processing (Davou & Sidiropoulou, 2017). Readers attempt to process Internet texts by skim reading, trying to extricate what information is important, rather than reading them through word by word. Readers tend to focus on the left side of the page, the first few words of a sentence, and the first few sentences in a passage; they also read less and less as they move down the page. Thus, much potentially important information is neglected.

Pfeifer's (2013) research indicates that people tend to remember the source of information they have retrieved but not the actual information (as cited in Davou & Sidiropoulou, 2017). They do not assimilate the newfound information into their knowledge base and are thus unable to access it when needed. This finding suggests that little effort is invested in critically comprehending information, illustrating a surface approach to learning as opposed to an in-depth approach. Technological advances appear to foster a superficial handling of information and an inclination to appear up-to-date and informed rather than truly knowledgeable (Davou & Sidiropoulou, 2017).

Multitasking (often a response to limited time) is facilitated by technologies but also contributes to surface learning. Ophir et al. (2009) have shown that interference from irrelevant information cannot be filtered out, so the multitasker is subject to intrusions from irrelevant stimuli and memory representations. According to Giedd (2012), "These intrusions create confusion, reduce cognitive performance and have time and accuracy costs, as they exert a tremendous metabolic effort to the brain which cannot handle fragmental loads of information due the natural limitations of attention and working memory" (as cited in Davou & Sidiropoulou, 2017, p.268.) This means that multi-tasking weakens the thought processes necessary for

scientific and critical thinking, as well as for imagination, since these forms of cognition all require the depth of processing and the flexible knowledge associated with single-task learning.

Finally, it is well known (Freed, 2018, Harris, 2016) that the tech industry intentionally designs devices, games, and apps that capture children's attention to keep them continually engaged and re-engaged (for example, by seeing how many likes a photo they posted on a social-media platform received).

In his article "Tech Industry's Psychological War on Kids," Freed (2018) describes how the tech industry employs a multitude of psychologists, neuroscientists, and social-science experts who use their knowledge of children's psychological vulnerabilities to devise products that capture their attention for the sake of sales and profit. Ramsay Brown (2017), the founder of Dopamine Labs, says that his company has developed a rigorous technology of the human mind which is both "exciting and terrifying":

"We have the ability to twiddle some knobs in a machine learning dashboard we build, and around the world hundreds of thousands of people are going to quietly change their behavior in ways that, unbeknownst to them, feel second-nature but are really by design. Programmers call this "brain hacking," as it compels users to spend more time on sites even though they mistakenly believe it's strictly due to their own conscious choices." (as cited in Freed, 2018, para 21).

Tristan Harris (2016), a former Google manager, was one of the first Silicon Valley insiders to acknowledge publicly that smartphones and apps are being designed to attract and hold children's attention. If at any moment, reality gets dull or boring, one's phone offers something more "stimulating" and pleasurable. For example, while waiting in line, one checks one's email or Facebook messages as opposed to conversing with people in line or even to

enjoying a few moments of quietude. Harris believes that once one sees one's phone this way, one naturally turns to it more often: "our phone puts a new choice on life's menu, in any moment, that's 'sweeter' than reality" (Harris,2016, para 8)

In his article "Tech Companies Are Designing Your Life—Here's Why You Should Care," Harris (2016) argues that our agency is at stake, meaning by agency our ability to live the lives we want to live, to have space for thinking and reflection, and to relate to others the way we want to. Harris (2016) views this as an existential threat: "When you're shaping people's attention you're reshaping their thoughts. Their thoughts precede action, and you're really shaping society and culture. . . . There is an entire set of consequences when you shape people's attention through design" (as cited in Ell, 2018,para 3). In 2014, because of growing concern about technology's dominance in people's lives, Harris and a few other Silicon Valley tech alums founded the Center for Humane Technology, of which Harris is the executive director. The group's mission is to fight tech addiction. Harris is concerned that technology continues to "exploit how our minds work" (as cited in Ell, 2018,para 5). Through his center, Harris continues to put pressure on the tech industry to alleviate some of the problems relating to tech addiction.

What can consumers do? Harris (2016) suggests that the main companies such as Google and Apple will respond to consumers' demands if they are made forcefully enough. He notes that when privacy became an important issue these companies responded by developing and adding new privacy and security features. Harris believes that when consumers frame tech addiction as a design problem, and not just a personal accountability issue, the big tech companies will respond to their concern.

Unfortunately, Facebook recently launched Messenger Kids, a social-media app designed to reach kids as young as five. It appears that marketing with the use of seductive design

continues to target children and that the age limit continues to drop. According to Messenger Kids' art director Shiu Pei Luu, "We want to help foster communication (on Facebook) and make that the most exciting thing you want to be doing" (as cited in Freed, 2018, p.15). This vision of childhood is reflective of how out of touch the big tech corporations are. It is clear they are interested in profit and not in the well-being of our children. In response to Messenger Kids, the Campaign for a Commercial-Free Childhood sent Facebook a letter signed by numerous health advocates requesting that the company withdraw the app from the market. Facebook has yet to respond and continues to market the product aggressively to young children.

The National Institutes of Health (NIH), the United States' central agency concerned with public-health issues, has recently launched the most ambitious study of adolescent brain development ever attempted (Cooper, 2018). The agency will be researching how screen time impacts the physical structure of children's brains as well as their emotional and mental health. At twenty-one sites across the U.S., scientists have begun interviewing nine- and ten-year-olds and scanning their brains. They plan to follow 11,000 children for a decade and spend \$300 million on the project. In preliminary data released by the NIH, brain scans of 4,500 participants showed significant differences in the brains of some children who use smartphones, tablets, and video games more than seven hours per day. Colour differences in the scan images represent changes in the brains of these nine- and ten-year-old children. Specifically, they reveal a premature thinning of the cortex, which is the part of the brain that processes information from the five senses. The thinning of the cortex is something that is typically seen later in children's lives. This is interesting information, but it would be premature to draw any definite conclusions. It will be fascinating to follow this study to the point at which concrete conclusions emerge (National Institute of Health, 2018).

Social and Emotional Development

In the past decade, technology has changed how we communicate. Face-to-face conversations and talking on the phone are no longer the most common ways people interact with each other. Technology has changed the way kids socialize with others, a trend that can have a major impact on their mental and emotional well-being.

With the surge of technology in the past decade, language acquisition has declined in the formative years. While parents are busy on their own devices (primarily smartphones), parents' conversations with their children have declined, which impacts children's speech development and also their ability to socialize. Children learn to talk and communicate through interactions with other people. The first few years of a child's life are crucial for language development. That is when his or her brain is most capable of learning language. According to Goodwin (2016), "New brain-imaging technologies have provided clear evidence of what happens neurologically when adults interact with babies. A 2015 study found that it is the combination of both infant-directed speech from parents and direct gaze that leads to enhanced brain activation" (p. 64).

Dimitri Christakis (2009), a paediatric researcher at Children's Hospital and Regional Medical Center in Seattle, reports that children learn language skills mostly by engaging in verbal interactions with their parents (as cited in Rowan, 2010). In a 2009 study, he placed digital recorders on both parents and found that adults generally spoke approximately 941 words/hour, yet those adult words were almost completely absent when the television was on and audible to the child. Dr. Christakis (2009) found that periods of audible television correlated with significant reductions in child vocalizations, vocalization duration, and conversational turns (back and forth conversation) (as cited in Rowan, 2010). Christakis (2009) noted that, on

average, each hour of television exposure resulted in a decrease of 770 words the child heard from an adult.

In a pilot project in a school in B.C., Rowan (2010) observed that the speech of one in five kindergarten children was unintelligible; hence, these children had difficulty communicating with peers and teachers (p. 59). Although no direct link between technology use and unintelligible speech has been established, Rowan believes that lack of social communication may be one of the most detrimental effects of technology on child development. Children who have communication challenges become frustrated as they struggle to have their needs met.

According to a study by the British government, teachers and health professionals report that increasing numbers of children are entering kindergarten with underdeveloped language skills: “there was a 71 percent increase in the number of school children requiring expert help for speech and language difficulties between 2005 and 2011” (Goodwin, 2016, p. 67). Paediatric health professionals in Australia and other developed countries report similar concerns.

Educators Clement and Miles (2018) believe that as students have retreated more and more into the digital world, their communication skills have worsened. Many educators have noticed a sharp decline in communication skills among children entering the school system. I belong to an online group called Kindergarten Connections, in which teachers share their expertise and ideas. One member reported that in her school “we flagged 21 of 42 kids for speech issues during gradual entry this year. I asked our SLP what on earth could cause this. She said iPads. Parents on phones. There are fewer back and forth conversations happening now so kids are not practicing language” (personal communication, March 10, 2018). Another teacher in the group states, “I see so many more speech problems too” (personal communication, March 10, 2018). A third reports that 10 out of 35 students in her kindergarten class have speech and language issues

(personal communication, March 10, 2018). The students find it difficult to communicate their thoughts and feelings and to cooperate with others, and teachers devote much class time to developing these important skills.

Rowan (2010) suggests that the overuse of technology has had an impact on the formation of self-identity, which is an important factor in a child's ability to form relationships. As children immerse themselves in the solitary worlds of virtual reality, their ability to determine who they are becomes increasingly impaired. Children younger than eight have difficulty distinguishing between fantasy and reality, or between virtual games and games played in the real world. When middle-school students use social media, they often compare their own lives to others'. Being "liked" and "followed" have become common experiences for today's generation. As one sees the highlights of other people's lives, one may feel envious, and envy can lead to depression. Parents are concerned that exposure to social media may cause anxiety and a constant need for reassurance. Adolescents have always wanted to fit in or be accepted; however, obsessive checking, posting, and sharing of personal information online can be problematic. Some students who have low self-esteem may be at risk for this type of behaviour (Liu, 2018).

With today's wide variety of social media interactions, "Social media can potentially connect and isolate us" (Clement & Miles, 2018, p. 2). People can stay in touch with the stroke of a technological device. Children can connect with anyone in the world. However, despite these great advances, students are reporting greater feelings of withdrawal and loneliness. When children use technology to escape feelings of boredom, loneliness, or sadness, they miss out on opportunities to develop emotional strength. They may become less mindful, less resilient, less independent, and less connected. Too much screen time can prevent children and adolescents

from forming social relationships and developing empathy for each other. This makes it more difficult to pick up on social cues and develop meaningful relationships (Turkle, 2018).

Empathy requires personal interactions with others, and if a large proportion of children's time is spent using technological devices, then face-to-face interactions will be limited and/or haphazard. Research shows a 40% decline in college-age students' capacity for empathy over the past two decades, mostly during the past ten years (*Snuggle Up with Technology*, 2018). In an interview, Sherry Turkle (2018) expressed her belief that this stems from people turning to phones more often than physically present human beings (*Snuggle Up with Technology*, 2018), and she's not alone in her opinion of technology as a risk to human interaction. There is much evidence that we are losing our introspective knowledge of who we are. It appears that we have become less tolerant of being alone or lonely for short periods of time; hence, we often turn to our phones to entertain ourselves or to "check in." (Turkle, 2018) Moments of boredom are not necessarily a terrible thing as they give us the opportunity to look within ourselves.

Turkle (2018) considers self-knowledge to be a vital skill because it helps one enter conversations; once you have a sense of who you are and not just accept what others perceive. She goes on to explain that we need to develop this in childhood; hence, parents should have to have face-to-face conversations with their children so that they may develop their conversational skills at a young age. By having conversations, children also learn to be empathetic by reading facial and body cues—which cannot be learned from any technological device.

In one study elementary-school students participated in a five-day overnight nature camp (Uhls, Y. T., Michikyan, M., Morris, J., Garcia, D., Small, G. W., Zgourou, E., & Greenfield, P. M. 2014). Those in the experimental group, who engaged in traditional social interactions and did not use any digital devices, significantly improved their ability to read non-verbal emotional

cues, as compared to those in the control group, who used digital media throughout the five days (as cited in Savina, Mills, Atwood, & Cha, 2017). These findings are thought-provoking, especially given that the reported difference arose in a period as short as five days.

One of the most troubling things about digital technology use is its correlation with depression, particularly in people who spend more than six hours per day using digital devices. In the quantities that we can easily access digitally, information can produce information overload. When overload is chronic and the demand to process more information is ongoing, one lives in a state of unresolved stress and anxiety.

Sadly, as the typical age when children get their first smartphone has fallen to ten, it is no surprise to see the associated psychiatric problems—once restricted to teenagers—becoming common among young children. Cases of self-inflicted injury (in the form of cutting) that are serious enough to require treatment have increased dramatically in girls aged 10–14, rising from 19% per year since 2009 to 2018 (Freed, 2018).

Generally, girls appear to be drawn to smartphones and social media while boys are more likely to be seduced into the world of video gaming often at the expense of a lack of focus or interest in school. A study by the American Academy of Paediatrics (2011) found that excessive gaming may lead to depression, anxiety, and poor grades in school. The World Health Organization (2018) recently declared video-game addiction to be a mental-health disorder. The symptoms of abnormal gaming behavior include increased priority given to gaming and escalation of gaming despite negative consequences (Wakefield, 2018). Large amounts of time spent gaming are linked to lower grades, so it is no surprise that some students struggle to make it into college. Fifty-seven percent of college admissions are granted to women as opposed to only 43% to men. It appears that as boys transition into manhood, they cannot shake off their

gaming habits (Freed, 2018, para 38). Economists with the National Bureau of Economic Research recently released statistics demonstrating that many U.S. men aged 21–30 choose to play video games rather than join the full-time workforce. Of course, technology may not be the only factor in this equation as some of these young men may live at home, perhaps hold part-time jobs, and thus may have extra time on their hands which they choose to spend playing video games.

One final factor to consider is media content. Violent media content is linked to increased aggression in children (Rowan, 2010). Entertainment technology has immersed us in violent imagery, and there are many opportunities for children to view violent content, especially when not supervised by an adult. The Committee on Public Education of the American Academics of Pediatrics (2001) reports the following responses to violent media content: increased physiological arousal, chronic release of cortisol, desensitization, increased aggressive thought patterns, increased anti-social and aggressive behavior, and increased verbal and physical abuse (Rowan, 2010).

Strong associations between violent media content and aggressive behaviour in children have been documented by Christakis and colleagues (2009 as cited in Radesky et al., 2016). Children often imitated onscreen behaviour and exhibited arousal responses to the terrifying content. Middle-school students who engaged in online activities such as gaming, chatting, gambling, and/or viewing pornography were more likely to engage in aggressive behaviour.

Pornography

The increasing availability of pornography online has raised concerns about the impact it may have on children and young people. The areas it may impact include knowledge of and attitudes toward sex, sexual behaviours, and attitudes and behaviours in relation to gender

equality. The average age of first exposure to pornography is 11 years (Goodwin, 2016). However, many teachers and health professionals report that many students are exposed at around 8 years of age. By the time they reach the age of 18, 93% of boys and 62% of girls have had at least some exposure to online pornography (Clement & Miles, 2018, p. 163).

Also, young children sometimes post inappropriate pictures online. In recent months, the RCMP's Internet Child Exploitation unit identified four children between the ages of 8 and 12 in New Brunswick who voluntarily shared nude and/or sexually explicit photos or videos of themselves and made them available on public websites (Royal Canadian Mounted Police, 2019).

In 2012, a teenager in British Columbia named Amanda Todd created and posted a YouTube video, entitled "My Story: Struggling, Bullying, Suicide, Self-Harm," in which she used flashcards to recount her horrific experiences of being bullied and blackmailed (Kardaras, 2016, p. 103). When Amanda was in the seventh grade, she met a stranger online who convinced her to show her breasts on camera. He attempted to blackmail her and stalked her relentlessly. As the picture began circulating, Amanda became increasingly depressed; she committed suicide on October 10, 2012.

In this digital age, children have easy access to pornography via their phones or other digital devices. If they use their own data plans, rather than their school network, pornography becomes more accessible. Online pornography often portrays acts of physical aggression and verbal abuse. If we want our young people to understand how a healthy romantic relationship looks, then we need to prevent or at least reduce their exposure to pornography.

According to research published in the *Journal of the American Medical Association* (in Clement & Miles, 2018), pornography has worrying effects on the brains of regular viewers.

There is a negative correlation between the amount of time spent watching pornography and the amount of gray matter in the brain's reward center: more porn equals less gray matter. Also, as a person's brain becomes used to watching a certain amount of pornography, he or she has to watch an increasing amount to receive the same reward. Extensive pornography viewing weakens the connection between the reward center and the prefrontal cortex (the part of the brain that governs decision-making) (Clement & Miles, 2018).

Physical Development

Prevalent and influential technologies are reshaping childhood and luring children away from family and school so that they spend more time in front of screens. Children's screen time is encroaching on their time spent in physical activity (Goodwin, 2016). Children do not get as much exercise as they used to. Goodwin refers to an Australian study which has found that 80% of Australian children aged 5-17 are not getting enough exercise and *Active Healthy Kids Australia* estimates that one in three Australians will be obese by 2025 (Goodwin, 2016). When students are playing video games, using tablets, or if smartphones are added to the mix, it is no wonder so many children remain sedentary after they get home from school as opposed to going outside to play with their peers. "It is a simple cause-and effect relationship: the more time children spend with screens, the less time they have being physically active and this increases the risk of obesity and other health ailments." (Goodwin, 2016, p.134). This result underscores the importance of early intervention and education concerning screen usage.

One result is that childhood obesity has risen tremendously in recent decades. In 2012, 18% of children were obese, as compared to 7% in 1980 (Patel, 2017). Not only is there a distinct correlation between the number of hours spent on various technological devices and the

incidence of childhood obesity, there is a simple cause-and-effect relationship: the more time children spend watching screens, the less time they spend being physically active. It is not surprising that with an increasingly sedentary lifestyle, obesity and diabetes have been steadily rising during the past decade. The World Health Organization reports that globally, more children will die from conditions related to obesity than from starvation (Rowan, 2010, p. 41).

In her book *The Cyber Effect*, Aitken (2017) provides an example that demonstrates the effect of lack of activity in people who use devices for large amounts of time. A young man named Chris “lived for his X-box” and could play games on it for up to twelve hours at a stretch. After a day of marathon gaming, Chris woke up in the middle of the night feeling strange but was able to go back to sleep. The next day during a visit to a job-placement centre, he reached down to pick up a pack of gum that he had dropped and suddenly fell to the ground. A friend who was with him called an ambulance, but it was too late. A blood clot had formed in the veins of his lower body—a process known as deep vein thrombosis (DVT)—and had traveled to his lungs, blocking his arteries and causing his death (Aitken, 2017, p. 67). DVT is caused by inactivity, especially by sitting still for long periods of time. Extreme gamers like Chris (the 4% of the total U.S gaming population who average 48.5 hours/week in front of a screen) are at risk for DVT, which has led the U.S. media to call this life-threatening condition “gamer’s thrombosis” (p. 67).

In addition to not getting enough exercise, many children do not experience the pleasure and the health benefits of spending time outdoors in natural surroundings. Spending time outdoors has a positive effect on the body, as sunlight exposure supplies vitamin D and assists in keeping one’s sleep cycle regular by influencing the body’s production of melatonin (Patel, 2017).

It is well documented that having a TV or other screen devices is associated with poorer sleep quality as well as reduced sleep time. Screen use can lead to sleep disturbances. The NIH reports that watching a screen (such as that of a computer, television, tablet, smartphone, etc.) before bed is associated with insomnia and daytime sleepiness (Aiken, 2017). The brightness of the screen can affect a person's everyday rhythms. A sleepy child can be moody, emotionally volatile, anxious, and/or aggressive: "In one study involving 2,463 children ages six to fifteen, children with sleep problems were more likely to be inattentive, hyperactive, and impulsive and display oppositional behaviours" (Aiken, 2017, p. 109).

Palmer (2015) suggests that the decline of free play has also led to delays in physical development. As childhood is reshaped by technological devices, the idea of "free play" seems to disappear. The belief of some parents that their children are not safe outside and that allowing them to play games or use social media is the "safer option" contributes to this trend. Therefore, children's freedom to roam, whether to the park or down the block for a quick game of road hockey, has been greatly curtailed as compared to the days of my own childhood. According to *Natural Childhood*, a report published by the National Trust in 2012 (as cited in Palmer, 2015), over the last thirty years, children's radius of activity (the area around their home where they are allowed to play without constraint) has shrunk by 90%. As a result, children no longer have everyday adventures in which they not only learn about the world, but develop physical coordination and control.

It is important to take a more balanced approach to the use of technological devices, one in which the basic elements of child development, such as play, exercise, and social interaction, are not sacrificed.

Fine Motor Skills

Fine motor skills are another area in which children's developmental processes have changed over the past few years. There is some concern among kindergarten and primary-school teachers that the rise of touchscreen devices means that more children are beginning school not ready to write, draw, or perform basic tasks such as printing their names. A new study by the Heart of England Foundation NHS Trust (Holland, 2018) finds that children are coming into classrooms ill-prepared for writing and other activities that require muscle strength (para. 3). British paediatricians cite technology and the decline of "traditional activities" such as colouring, using scissors, stringing beads, and moulding clay for this decline in dexterity. According to Payne, (2018) who is the foundation's head paediatric occupational therapist, children enter school unable to hold a pencil because they lack the required fine motor skills. I have also noticed this decline among young children, in particular incoming kindergarten students. In our Kindergarten Connections Facebook group, which is mostly comprised of kindergarten and primary-school teachers from B.C and Alberta, the consensus is that fine-motor skills have declined considerably over the past five years. The teachers who have noticed this deterioration are mostly those who have been teaching for over ten years.

Conclusion

This chapter has endeavoured to shed light on issues associated with the misuse and/or overuse of digital technology as it impacts children's cognitive, social, emotional, and physical development. The point was not to demonize technology but to examine the implications of misusing or overusing digital devices for children's development. Parents and educators need to be well-versed in these issues so as to be able to make informed decisions about the use of various digital devices in the home or in the classroom. There are certainly advantages to using

technology; when used appropriately and thoughtfully, technology can support learning and other forms of childhood development in healthy ways.

We need to help our children navigate the digital world, while keeping their safety and development in mind. We must ensure that their digital habits are not detrimental to their development.

In Chapter Three, I will explore healthy digital practices with a view to helping parents and educators ensure that the children in their care form a healthy and balanced relationship with digital technology. Strategies for using technology in ways that enhance and enrich children's development will be analysed. "Technology is like a fertilizer," writes Buckleitner "A little bit and the right types and the plant will blossom. Too much or the wrong type and you'll burn the plant." (cited in Goodwin, 2014, Retrieved from <https://drkristygoodwin.com/confession-im-a-low-tech-parent/>)

Chapter Three

A Project to Encourage Healthy Digital Habits

It is evident that digital technology is here to stay. It is ubiquitous among today's generation—"the millennials"—and it pervades most aspects of most people's everyday lives. Parents care deeply about ensuring that their children do not miss out on using computers and learning computer skills. However, they may also be unaware of the research, reviewed in Chapter Two, showing that the misuse and/or overuse of digital technology has many potentially harmful consequences. Evaluating the risks and opportunities that an increasingly connected world presents can be a daunting task (Boehm, 2018).

So how do we as educators and parents help the children in our care develop a positive, healthy, and balanced relationship with technology? In this chapter, I explore some strategies and provide some useful tips that parents and teachers can put to use in their homes and classrooms.

What are healthy digital habits? According to Goodwin (2016), “digital habits are patterns that children form around technology” (p. 183). Parents and educators play a vital role in shaping these habits. Ensuring that healthy digital habits are established early on will help our children and youth avoid developing a problematic relationship with technology.

Different strategies or guidelines regarding the use of digital devices may be appropriate at different stages of a child’s development. However, some important common themes run through the literature that have a bearing on how healthy digital habits can be established. Based on my research, therefore, I have designed two teaching resources: a PowerPoint presentation on healthy digital habits and a brochure for parents to reference when setting up guidelines for their children’s use of digital devices. In my presentation and brochure, I have attempted to include the essential information of which parents and teachers should be aware in order to help children establish *balanced* and *healthy* digital habits. I wanted not only to explain why healthy technological habits are important, but also to provide practical advice as to how such habits can be developed.

The Brochure

In my brochure (see Appendix A), I have outlined eight main areas of focus:

1. Communicate. Above all, it is essential to keep lines of communication open with one’s child. An open dialogue should be initiated early and continue to evolve as the child ages.

2. Be a role model. It is important that parents and educators model healthy digital habits. As we know, children often imitate our own behaviour. Goodwin (2016) cites a study by

Jago and others that found strong correlations between children's screen time and their parents' screen time. If we ask our children to limit screen time, then we should follow our own advice.

3. Follow recommended screen-time guidelines. The Canadian Paediatric Society provides the following guidelines for regulating children's screen time:

- For Children under two, no screen time
- For children aged two to five, one-hour daily maximum
- For children aged five and over, two hours daily maximum

4. Establish no-tech zones. It is important to identify and establish areas in the home where the use of digital technology is not permitted (e.g., in the bedroom or at the dining table).

5. Set ground rules. Create rules for children's digital use and be clear and consistent in enforcing them. Perhaps a written online-safety contract should be created. If rules are not followed, then privileges can be revoked. (It can also be incorporated into Family Media Plan)

6. View content and use media together. When possible, watch video content together, play video games together, or otherwise interact with your children when they are online. Ask questions. What are they learning? What does the content show? What is their opinion of it? How does it relate to real life? Is the activity for leisure or for learning? Are they being active or passive? With older children, parents can use Facebook or Instagram to continue the dialogue.

7. Filter the content. It is very important that onscreen content be age-appropriate. Media violence can lead to aggression and to seeing violence as an accepted form of behaviour. Parents should examine children's media content as much as possible, particularly when they are young. No child should be exposed to racist, sexist, and otherwise inappropriate content. It is difficult to "un-see" something once it has been seen, and disturbing content can be traumatic to

young children. As children age and mature, the question of age-appropriate content can be revisited and discussed with them.

8. Make a family media plan. A family media plan addresses issues such as how much screen time is permitted for each family member and what technologies can be used when, where, and by whom. To help parents get started, I provide the following URL:

<https://www.healthychildren.org/English/media/Pages/default.aspx>

The PowerPoint Presentation

The second part of my project consists of a PowerPoint presentation that introduces parents and educators to the topic of implementing healthy digital habits.

In the spring of 2018, I gave a professional-development presentation to the staff at my school on how the misuse and/or overuse of digital technology impacts children's cognitive, social, emotional, and physical development. I was encouraged to offer a presentation for parents as well. In designing such a presentation, I decided to focus on empowering parents with strategies and tips to help their children develop healthy digital habits (see Appendices B–J). The following is a brief overview of the slide presentation, which should run for approximately one hour, depending on the number of attendees, along with some possible questions I might put to the audience.

Slides 1 and 2. I introduce the topic and discuss my personal connection to it. I ask parents to share their concerns, as well as any experiences they may have had regarding their children's technology use.

Slide 3. I express the importance of striking a balance between technology and other vital areas of children's development such as sleep, play, and social connections.

Slide 4. I review the Canadian Paediatric Society’s guidelines for screen time. A video of a family experiment will be shown, revealing how children react when they have free rein to use digital devices with no parental oversight.

Possible questions for the audience: Have you experienced any mood swings in your children when they are using technology? How much screen time does your child log daily?

Slide 5. This chart presents not only screen-time recommendations but also physicians’ recommendations regarding physical activity and sleep.

Possible question for the audience: Does your child (or someone you know) exceed the recommended screen time so that his or her sleep or physical activity is affected in some way? Discuss with a partner.

Slides 6 and 7. I discuss how to use technology mindfully.

Possible question for the audience: What does “mindful” use of digital devices mean to you? Discuss (approximately five minutes).

Slide 8. I discuss the importance of limiting screen time during shared family events such as meals.

Possible questions for the audience: How do you feel about this? Do you agree? Do you have certain times when using digital devices is not allowed? Explain or share.

Slide 9. I discuss the importance of paying attention to the messages children receive when they spend time online.

Possible question for the audience: What messages are being sent about gender, body image, or violence? General open discussion.

Slides 10 and 11. I explain how to develop a family media plan. A family media plan can help set boundaries and limits.

Possible questions for the audience: If you have a family media plan, what does it include? Where and when are screens allowed? Have you discussed the plan with your children?

Slide 12. I review various considerations regarding healthy screen-time limits.

Slide 13. This slide examines seven essential building blocks of healthy childhood development. Goodwin (2016) explains these “building blocks,” which are itemized below. Each can be supported by the appropriate use of technology or undermined if technology is misused or overused.

1. ***Attachments and relationships.*** Children need to form strong attachments to parents, siblings, caregivers and peers. Media and technology should enhance and strengthen these relationships.
2. ***Language.*** Children need to hear and use language. Language use helps develop our brains.
3. ***Sleep.*** Adequate sleep is important for children’s emotional, physical, and mental development.
4. ***Play.*** Play helps develop cognitive and communicative competencies as well as creative and social skills.
5. ***Physical movement.*** Physical movement is critical for intellectual, mental, and overall well-being.
6. ***Nutrition.*** Good nutrition is essential to optimal development.
7. ***Executive-function skills.*** These are higher-order thinking skills such as attention, working memory, and impulse control.

Goodwin (2016) explains her concept of building blocks using the following analogy with a glass jar. If all the essential building blocks are in the glass on most days, then there is

room for screen time to fill up the extra space in the jar. In that case, children's use of digital devices will not impede their development (p. 196). However, if screen time is excessive, then one or more of these essential building blocks will be displaced.

Possible questions for the audience: Have you noticed that one or more of these building blocks are affected by your child's use of digital technologies? If so, what can be done to make his or her technology use more balanced?

Slide 14. I use the letters of the words "techs" and "no" as a memory aid to review the most important points made in the presentation. Then I ask for questions or comments (Rowan, 2010).

Slide 15. I consider some questions that educators should consider when using technology.

Possible questions for the audience: What do you believe is the role of technology? Do you have ideas about how technology use in the classroom or lab can be improved? Group discussion. Brainstorm and write ideas on chart paper.

Slide 16. I end the presentation with my favourite quote from Buckleitner, (Goodwin, 2014, Retrieved from <https://drkristygoodwin.com/confession-im-a-low-tech-parent/>) about the balanced use of technology.

Slide 17-References

Final Conclusion

I began this research-and-development project with some basic questions about childhood development and whether or not it had changed over the years. Basic skills appeared to be lacking in students entering the school system, and I wondered whether children's use of digital technology had an impact on these basic skills. Thus, I formulated my research question, "How

does the misuse and/or overuse of technology impact children’s cognitive, social, emotional, and physical development?”

Technology has changed dramatically over the years. It has become so widely used that it has changed how we interact in our daily lives. Digital technology is often so stimulating that its use is difficult for our brains to process. Despite ongoing research, many questions and concerns remain regarding the effects of digital technologies on our children and youth.

Several studies show that excessive screen time may potentially harm children’s development. (Goodwin, 2016, Freed, 2018, Rowan, 2010) Research on cognitive development shows that ADHD is on the rise and that electronic stimulation can become addictive, displacing critical developmental experiences such as play, socialization, quiet time, and sleep. Dopamine is one of the brain’s neurotransmitters (chemicals that affect the transmission of information between neurons). Dopamine contributes to feelings of pleasure and satisfaction; hence, it is known as the “feel-good” neurotransmitter and is the most critical chemical factor in the addiction process. The need for a “dopamine rush” can lead to addiction, including addiction to the use of digital devices.

Research shows that the amount of time children spend using screen devices can affect their social and emotional development. With the increased use of technological devices, face-to-face contact is no longer the main way we communicate with each other. The displacement of real-world interaction by virtual interaction can affect children’s language acquisition, their speech patterns, and their ability to socialize with each other.

Children’s screen habits also affect their physical development. Children do not get as much physical exercise as they used to. Technological devices encourage them to be sedentary, and this has led to increased obesity rates over the past three decades. Not only have gross motor

skills been affected, but educators and health specialists have noticed a decline in children's fine motor skills as well. Today's children come into classrooms poorly prepared for writing and other activities that require fine-muscle strength because they no longer engage in traditional activities such as colouring, using scissors, and moulding clay.

Technology has definitely had an impact on our daily lives particularly in this past decade. Whether we like it or not technology is here to stay. Digital abstinence is not a realistic option in our digital world. We encourage our young people to enter the digital world, but we should also teach them to stay safe in that world by acquiring healthy digital habits. If parents and educators implement the strategies and tips outlined in this chapter, they will help to minimize the negative impact of misuse and/or overuse of digital technologies, thereby allowing the children in their care to flourish and to use technology in ways that enhance their development rather than impeding it.

References

- Aiken, M. (2017). *The cyber effect*. New York: Random House.
- Boehm, H. (2018). *Parenting across the digital divide*. Bloomington, IN: Author House.
- Canadian kids not getting enough physical activity and too much screen time. (2017). *Global News*. Retrieved from <https://globalnews.ca/video/3812439/canadian-kids-not-getting-enough-physical-activity-and-too-much-screen-time>
- Canadian Paediatric Society. (2017). Screen time and young children: Promoting health and development in a digital world. *Paediatrics and Child Health*, 22(8) 461–468. <https://doi.org/10.1093/pch/pxx123>
- Clement, J., & Miles, M. (2018). *Screen schooled: Two veteran teachers expose how technology overuse is making our kids dumber*. Chicago: Chicago Review Press.
- Cooper, A. (2018, Dec. 9). Ground-breaking study examines effects of screen time on kids. *CBS News*. Retrieved from <https://www.cbsnews.com/news/groundbreaking-study-examines-effects-of-screen-time-on-kids-60-minutes/?fbclid=IwAR1MEq3IXhPcYDNIViFwKbvXZks4nr-7SvVJO4qHHSIDDHFHmoyhUirHiA0>
- Davou, B., & Sidiropoulou, A. (2017). Family life around screens: Some thoughts on the impact of ICTs on psychological development and the development of relationships. *Contemporary Family Therapy*, 39(4), 261–270.
- Donohue, C., & Schomburg, R. (2017, September). Technology and interactive media in early childhood programs: What we've learned from five years of research, policy, and practice. *Young Children*, 72(4). Retrieved from <https://www.naeyc.org/resources/pubs/yc/sep2017/technology-and-interactive-media>

- Ell, K. (2018). -Google employee calls tech addiction an 'existential threat' and calls for regulation. /retrieved from <https://www.cnbc.com/2018/02/07/ex-google-employee-calls-tech-addiction-an-existential-threat.html>
- Freed, R. (2018). Tech industry's psychological war on kids. Retrieved from <https://medium.com/@richardnfreed/the-tech-industrys-psychological-war-on-kids-c452870464ce>
- Goodwin, K. (2016). *Raising your child in a digital world: Finding a healthy balance of time online without techno tantrums and conflict*. Sydney, AU: Finch.
- Goodwin, K. (2014) Confession: I'm A Low-Tech Parent. Retrieved from <https://drkristygoodwin.com/confession-im-a-low-tech-parent/>
- Greenfield, S. (2015). *Mind change: How digital technologies are leaving their mark on our brains*. New York: Random House.
- Harris, T. (2016). Tech companies are designing your life—Here's why you should care. Retrieved from <https://medium.com/thrive-global/tech-companies-design-your-life-here-s-why-you-should-care-e962f412cc81>
- Heider, K. L., & Renck Jalongo, M. (Eds). (2015). *Young children and families in the information age: Applications of technology in early children*. Retrieved from <http://link.springer.com/>
- Holland, K. (2018). Too much technology: Children growing up with weak hands, fingers. Retrieved from <https://www.healthline.com/health-news/too-much-technology-children-with-weak-hands>
- Kardaras, N. (2016). *Glow kids: How screen addiction is hijacking our kids—and how to break the trance*. New York: St. Martin's Press.

- Lipnowski, S. & LeBlanc, C. (2017). Healthy active living: Physical activity guidelines for children and adolescents. *Canadian Paediatric Society*. Retrieved from <https://www.cps.ca/en/documents/position/physical-activity-guidelines> (Original work published 2012).
- Liu, S. (2018). Social and digital impact on health [Audio podcast]. Retrieved from <https://soundcloud.com/user-739684169/social-and-digital-impact-on-health-with-sam-liu>
- National Association for the Education of Young Children & Fred Rogers Centre for Early Learning and Children's Media at Saint Vincent College. (2012). Technology and interactive media as tools in early childhood programs serving children from birth through age 8. Retrieved from https://www.naeyc.org/files/naeyc/file/positions/PS_technology_WEB2.pdf
- Palmer, S. (2015). *Toxic Childhood: How the modern world is damaging our children and what we can do about it*. London: Orion Books.
- Patel, D. (2017). Will technology ruin your children's development? Retrieved from <https://medium.com/thrive-global/will-technology-ruin-your-childrens-development-663351c76974>
- Radesky, J. S., Kistin, C., Eisenberg, S., Gross, J., Block., G., Zuckerman, B., & Silverstein, M. (2016). Parent perspectives on their mobile technology use: The excitement and exhaustion of parenting while connected. *Journal of Developmental and Behavioural Pediatrics*, 37(9), 694-701.
- Rowan, C. (2010). *Virtual child: The terrifying truth about what technology is doing to children*. Sechelt, BC: Sunshine Coast Occupational Therapy.

- Rowan, C. (2013). The impact of technology on the developing child. Retrieved from https://www.huffpost.com/entry/technology-children-negative-impact_n_3343245
- Royal Canadian Mounted Police. (2019). Parents encouraged to be vigilant about children's online activities. Retrieved from <http://www.rcmp-grc.gc.ca/en/news/2019/parents-encouraged-be-vigilant-childrens-online-activities>
- Savina, E., Mills, J. L., Atwood, K., & Cha, J. (2017). Digital media and youth: A primer for school psychologists. *Contemporary School Psychology, 21*(1), 80-91. Retrieved from <http://dx.doi.org/10.1007/s40688-017-0119-0>
- Snuggle up with technology, but don't leave empathy in the cold—A conversation with Dr. Sherry Turkle [Video podcast]. (2018). Retrieved from <https://www.techemergence.com/snuggle-up-with-technology-but-dont-leave-empathy-in-the-cold-a-conversation-with-dr-sherry-turkle/>
- Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. New York: Hachet Book Group.
- What screen time does to a child's brain [Video file]. (2018, June 5). Retrieved from <https://www.nbcnews.com/better/video/the-impact-of-electronics-on-a-child-s-brain-1235967043828>
- Wakefield, J. (2018). Gaming addiction classified as disorder by WHO. *BBC News*. Retrieved from <https://www.bbc.com/news/technology-42541404>
- World Health Organization. (2018). Obesity and overweight. Retrieved from <https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight>

Appendix A- Healthy Digital Habits- Brochure



Screen Time Daily Guidelines*

- Children under 2
No screen time
- Children age 2-5
1 hour max
- Children age 5+
2 hours max



*Canadian Paediatric Society, Digital Health Task Force- Screen time and young children: <http://www.cps.ca/en/documents/position/screen-time-and-young-children>.

“Technology is like a fertilizer. A little bit and the right types and the plant will blossom. Too much and the wrong type and the plant will burn.”

-Warren Buckleitner, PhD
founding editor of Children's Technology Review

Healthy Digital Habits



St Joseph's Elementary School
By Pina Hendry

How do parents/ caregivers develop a positive and healthy relationship balanced with technology?



Communication

Parents should keep an "open line" of communication with their children.

Role Modelling

It is important that parents/caregivers model healthy digital habits, as we know children often imitate our behaviour.

No Tech Zones

Establish areas in the house (and times) where tech is and isn't permissible (i.e. bedrooms, meal times).



Content

Monitor the content your child views. Ensure the content is age-appropriate. Pay attention to messages about gender, body image, violence, diversity and social issues when choosing content.

Keep Devices in Public Places

Such as the kitchen or family room.



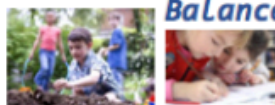
Co-view/Use Media Together

Whenever possible, co-view or watch, play or interact with your child when they are online. Ask questions (i.e. What are they learning? What does the content show?).

Develop a Family Media Plan

A family media plan can help parents/caregivers to think about media and create goals and rules that are in line with their own family's values.

Here's a good link to get folks started: <https://www.healthychildren.org/English/media/Pages/default.aspx>



Technology



& Movement, Connection & Touch.

It is important to maintain a healthy balance between using technology and other important aspects of childhood development such as sleeping and physical activity.

Appendix B-Power point Presentation

Healthy Digital Habits for Children Development



Professional Development
St. Joseph's School
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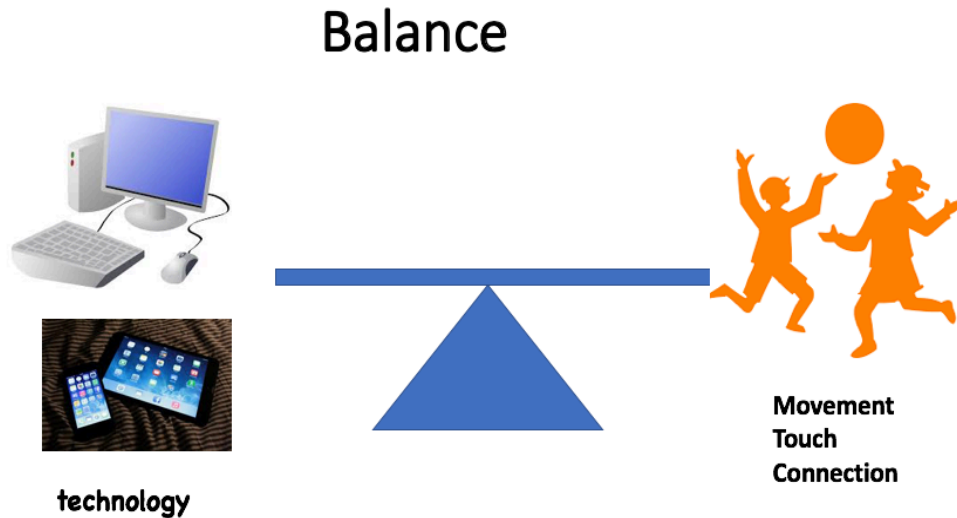
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Personal Connection



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Appendix C



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Screen Time-Recommendations



Canadian Pediatric Society Guidelines on Screen Time: (Nov 2017):

- Screen time for children younger than 2- No Screen time of any type
- For children 2 to 5 years, limit routine or regular screen time to less than 1 hour per day.
- Ensure that sedentary screen time is not a routine part of child care for children younger than 5 years.
- Age 6-12 < 2 hours
- Over age 12-17-limit recreational screen time to < 2 hours
- [Video-Family Experiment-No parental control on Technology \(3 Min\)](#)

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Appendix D

<i>Canadian Pediatric Society and Canadian Sleep Foundation 2017</i>				
Age	Average Screen Use	Doctor Recommendations for Screens	Dr. Recs for Sleep	Dr. Recs for Physical Activity
0-2 years	2.5 hours/day	No screens, especially no TV, tablets, phones.	14 hours/day & night.	No restraints > 1 hour; 3 hours of movement.
3-5 years	4.5 hours/day	No more than 1-hour total screens/day.	12 hours/night.	No restraints > 1 hour; 3 hours of movement.
6-12 years	7.5 hours/day	No more than 2-hours total screens/day.	11 hours/night.	3 hours of movement with 1 hour vigorous.
13-18 years	9.5 hours/day	No more than 2-hours total screens/day.	10 hours/night.	2 hours of movement with 1 hour vigorous.

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Screen time-What makes the difference? Mindful use of screen time...

- Children younger than 5 years learn best from live, face to face interactions with family members and caregivers.
- Given the choice, they will nearly always opt for talking, playing or being read to over screen time in any form.



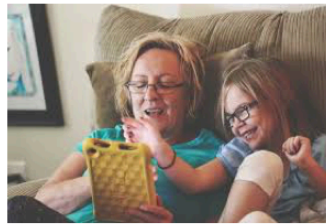
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Appendix E

Mindful use of screen time...Cont'd

By using screen time *mindfully*, parents and caregivers can:

- Actively enhance—and limit—media encounters by choosing them together and purposefully ('Let's watch or play *this* content, *at this* time, *for this* reason').



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- Limit screen use in public places and during family routines, such as at meals. Family times are prime opportunities for social learning.



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Appendix F

- Select content from quality, (non-commercial sources,) to minimize exposure to advertising.
- Pay attention to messages about gender, body image, violence, diversity and social issues when choosing content.



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Develop a Family Media Use Plan (with specific guidelines for each child and parent.)



Family Media Tips may include:

- Following screen time recommendations.
- When and where screens are allowed (i.e. screens should be kept out of the bedrooms, no screens at meal time, etc.)
- Keep the computer in a public part of your home, so you can check on *what* your kids are doing online (and also how much time they are spending there.)
- Have a special charging stations where devices are put away at night
- Talk to them about being good "digital citizens," (i.e. what type of material is appropriate, what types of information is safe to share/receive. (internet safety))

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Appendix G

A Family media plan can help parents to think about media & create goals & rules that are in line with their own family's values.



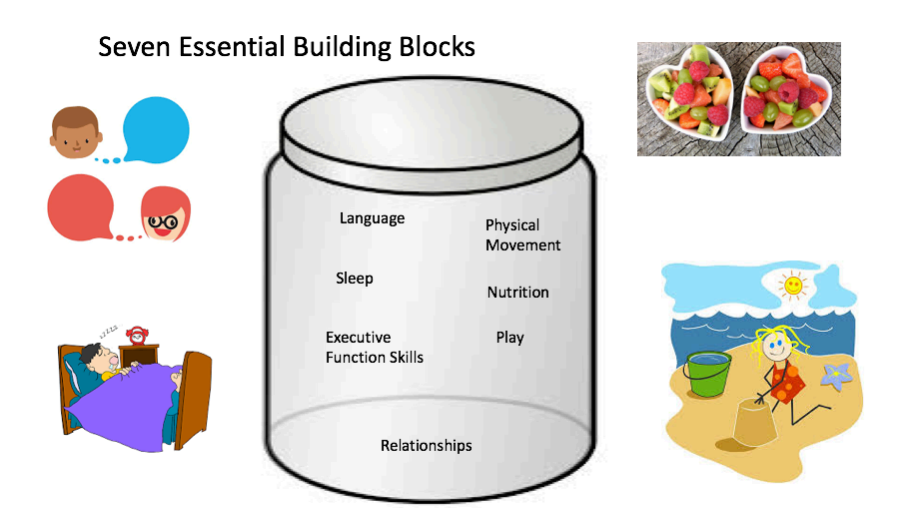
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Healthy Screen Time Limit-Considerations

- **What?** Consider what children are doing when using screens. Is it Active or Passive?
- **When?** Minimize screen use 90 min before sleep or school time. Avoid rapid fire screen activity before as it may cause hyperarousal making it difficult for student to focus.
- **Where?**-Establish Tech-free zones in your home.(i.e. Bedrooms, meal times, etc.)
- **Balance?**- Unplugged time-Screen time with **green** time. Kids need outdoor, unstructured play time to develop creative ideas
- **How?** Implement breaks (i.e.. After 20 min screen time- take break)
- **With whom?** Encourage child to use tech with someone (ideally parent) Reduces chances of accessing inappropriate content

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Appendix H



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TECHS-NO - Recommendations

- **T**ech- 1-2 hours (depending on age-Zero for children <2)
- **E**xercise- 1-3- hours/day (light, moderate & vigorous)
- **C**onnection –listen, talk, share
- **H**ome-No TVs/devices in bedroom & No Tech Dinners
- **S**chool-no tech at recess and lunch

- **N**ature-explore green space
- **O**utdoors- play, run, jump,

Adapted from Virtual Child by Chris A. Rowan (p.204)



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Appendix I

Educators:

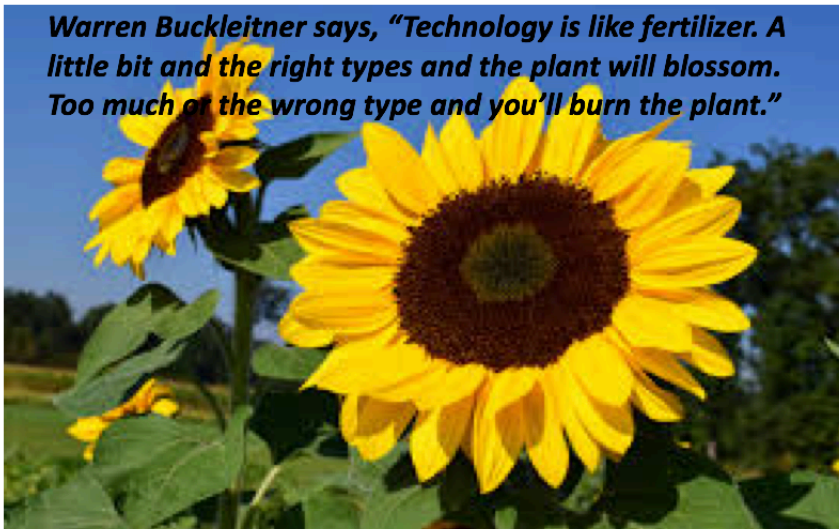
Below are questions to consider before deciding what technologies to use or include in your classroom/lab:



- What tools and technologies will contribute to *deep* learning in the classroom?
- How can I let students learn with technology the way that they already live with their technology?
- What is the appropriate role of the web, social media, mobile technologies, interactive white-boards, etc., in today's classroom?
- What are the digital literacies that have to be incorporated and taught? (**Digital literacy** is an individual's ability to access both information and methods of communication through technologic tools, such as ipads, laptops, etc.,)

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Warren Buckleitner says, "Technology is like fertilizer. A little bit and the right types and the plant will blossom. Too much of the wrong type and you'll burn the plant."



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Appendix J

References

- Canadian Paediatric Society. (2017). Screen time and young children: Promoting health and development in a digital world. *Paediatrics and Child Health*, 22(8) 461–468. <https://doi.org/10.1093/pch/pxx123>
- Goodwin, K (2014) Confession: I'm a Low-Tech parent. Retrieved from <https://drkristygoodwin.com/confession-im-a-low-tech-parent/>
- Goodwin, K. (2017). *Raising your child in a digital world: Finding a healthy balance of time online without techno tantrums and conflict*. Sydney, AU: Finch.
- Rowan, C. (2010). *Virtual child: The terrifying truth about what technology is doing to children*. Sechelt, BC: Sunshine Coast Occupational Therapy.
- What do kids do when there are no limits to their screen time?[Video file].Retrieved from <https://abcnews.go.com/GMA/Family/video/kids-limits-screen-time-53401681>

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