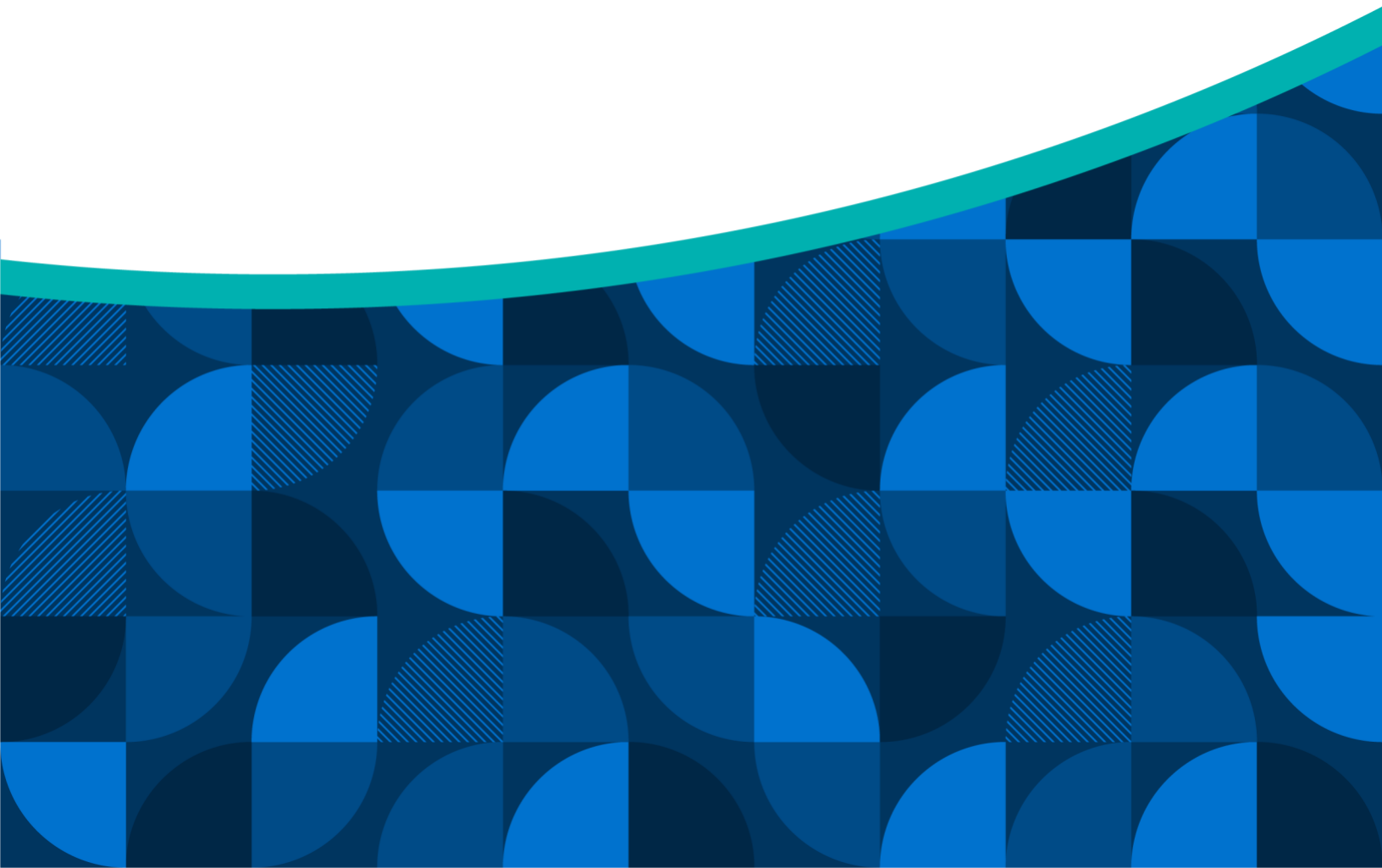




DISTRICT LEADERSHIP FORUM

The Impacts of Screen Time on K-12 Students

A Brief Look at the Literature
February 2024



District Leadership Forum

Shelby Rogers

Research Associate

(202) 747-1259
srogers@eab.com

Kaitlin Hawkes

Research Manager

(202) 568-7076
khawkes@eab.com

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Research Methodology

Our research team spent six weeks reviewing literature on the impact of screen time on child development and the benefits and risks of its use by students. The goal of this research is to provide valuable insight into the potential effects of prolonged exposure to screens on cognitive, socio-emotional, and physical aspects of child development.

There are two schools of thought among researchers who study screen time and its impacts: one that believes screen time for children is damaging even in small doses, and a second that views screen time as a conduit for learning and skill building, when used intentionally. This report considers each of these opinions and uses empirical evidence from academic and medical journals to evaluate each belief. Additionally, we provide evidence-based research and recommendations surrounding screen use for students in school as well as at home.

If you have any questions about the research itself or our methodology, please reach out to your dedicated advisor.

The forum approached this research with the following questions:

1. What does the current state of research show around screen time use for school-aged children? What are the recommendations for how much time children should spend per day on screens?
2. What specific research exists on screen use in educational settings for school-aged children? What is the impact of screen use on mathematics proficiency? On literacy? On the ability to write, spell, and read without the assistance of an electronic device?

Research and Recommendations on Screen Time Use for Students

The Increased Use of Screen Time Among Children and Its Consequences

In the ever-evolving digital era, technology has become integrated into everyday aspects of life, including K-12 education. Gone are the days of students using strictly pencil and paper to complete assignments, and for educators to teach from predominately hardcover textbooks. This integration of technology into the classroom poses both opportunities for learning as well as some challenges. For purposes of this report, “screen time” refers to time spent with **any** screen, including smart phones, tablets, television, video games, computers, or wearable technology.

To begin, we share an article from the [Center of Disease Control \(CDC\)](#), which details the average amount of time children spend each day in front of a screen for only recreational purposes:¹

- **8-10 years old:** 6 hours
- **11-14 years old:** 9 hours
- **15-18 years old:** 7.5 hours

Over the past few years, children and adolescents’ screen time use has increased dramatically. Considering the timeframe during which most current research was conducted, the observed increase of children on screens can be attributed, in part, to the circumstances surrounding COVID-19, such as greater access to technology and isolation. Numerous academic articles have delved into the psychological and social impacts of the COVID-19 pandemic on children.² For example, a recent study logged the screen time patterns of approximately 30,000 children ages three to 18 from January 2020 to March 2022 on a global scale. The findings of the study indicated a significant surge in screen time worldwide, with a 52 percent increase in use among children since the onset of the COVID-19 pandemic.³

Furthermore, researchers posit that the substantial increase in screen time during this period exacerbated even further the mental and physical toll inflicted by COVID-19 on children and adolescents.⁴ Children and teens alike during the pandemic suffered from loneliness in a brand-new way. Screen time became the main avenue for children to interact with peers, participate in school, and to occupy their free time.

According to pediatricians from OSF HealthCare, recent studies establish connections between prolonged screen exposure and various physical and mental health issues in children, including obesity, depression, behavioral problems, and anxiety.⁵ Moreover, excessive screen time adversely influences the development of social skills. Physicians highlight that impatience in real-world interactions is a significant consequence of prolonged screen engagement. Research from Harvard Medical School explored how adolescents and teens are struggling with a persistent lack of sleep due to the blue light emitting from their devices.⁶ Young adults who continually lose sleep overtime while simultaneously feeding their brain’s reward system with stimulation from these

[Blue Light](#) is a kind of high-energy visible light usually coming from the sun, but also emits from digital screens and LED lights.

1) ¹ Infographics - Screen Time vs. Lean Time | DNPAO | CDC. "n.d." <https://www.cdc.gov/nccdphp/dnpao/multimedia/infographics/getmoving.html>.
2) ² Saladino, Valeria, Davide Algeri, and Vincenzo Auriemma. 2020. "The Psychological and Social Impact of COVID-19: New Perspectives of Well-Being." *Frontiers in Psychology* 11 (October). <https://doi.org/10.3389/fpsyg.2020.577684>.
3) ³ Madigan, Sheri, Rachel Eirich, Paolo Pador, Brae Anne McArthur, and Ross D. Neville. 2022. "Assessment of Changes in Child and Adolescent Screen Time during the COVID-19 Pandemic." *JAMA Pediatrics* 176 (12): 1188. <https://doi.org/10.1001/jamapediatrics.2022.4116>.
4) ⁴ EAB Analysis
5) ⁵ Legner, Luke. 2022. "Kids' Screen Time: How Much Is Too Much? | OSF HealthCare." OSF HealthCare Blog. April 22, 2022. <https://www.osfhealthcare.org/blog/kids-screen-time-how-much-is-too-much/#:~:text=You%20said%20pediatricians%20generally%20recommend%20the%20following%20guidelines%3A,than%20two%20hours%20per%20day%2C%20except%20for%20homework>.
6) ⁶ "Screen Time and the Brain." 2019. Harvard Medical School. June 19, 2019. <https://hms.harvard.edu/news/screen-time-brain>.

devices will have trouble focusing on tasks, reiterating research above on how recreational screen time provides the craving for immediate gratification.

The instantaneous nature of screen interactions eliminates the need for patience by providing immediate gratification to the user. A study published in the National Library of Medicine affirms previously cited research on prolonged exposure to screen time as a child, finding that children’s substantial reliance on screen time and digital media is indeed concerning due to its potential to adversely affect cognitive, linguistic, and social-emotional development.⁷ Furthermore, prolonged screen use negatively affects social and emotional growth, and can cause sleep disorders and other mental health issues.⁸

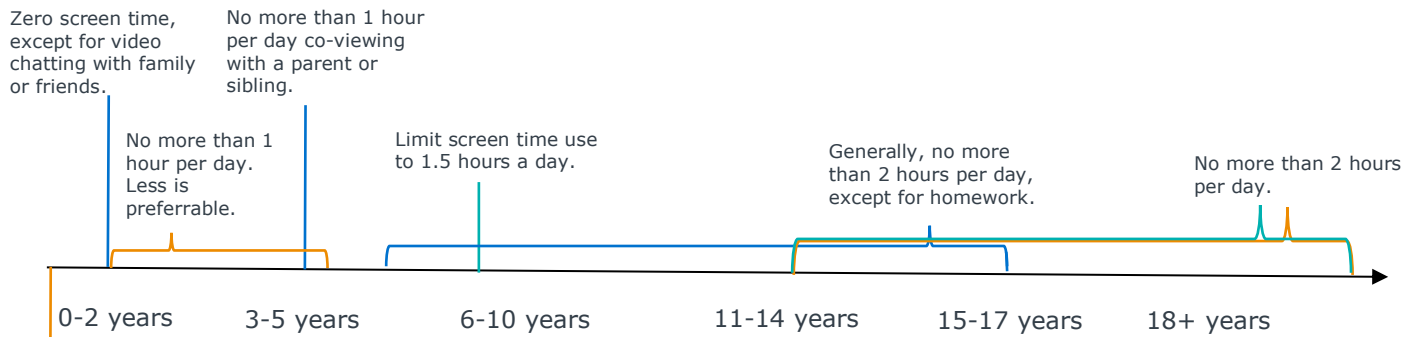
Moreover, too much screen time diminishes the quantity and quality of interactions between children and their caregivers, potentially negatively influencing language development. Contextual factors such as co-viewing and the appropriateness of content play a crucial role in determining the impact on language development. Co-viewing age-appropriate content with an adult provides a sounding board for children, as well as an outlet for questions on what they are watching or learning.

In 2019, the World Health Organization (WHO) recommended no more than one hour of screen time per day for children under five years old. Further, if a child under five is participating in screen time, experts encourage them to engage in some kind of physical movement simultaneously (e.g., dancing, jumping).⁹ The American Academy of Pediatrics advises that children in the age range of 6-10 limit their total screen time to a maximum of 1.5 hours per day. Both organizations emphasize that the overall recommended screen time for individuals, irrespective of age, **should not exceed two hours per day**.¹⁰ The diagram below serves as a visual representation of recommendations for screen time use in children by different guiding institutions.

Doctor-Recommended Screen Time Use by Age

Via OSF HealthCare, the World Health Organization, and the American Academy of Pediatrics

- OSF HealthCare
- World Health Organization
- American Academy of Pediatrics



No screen time recommended for children under 1 years old.

As we will discuss in the sections below, research outlines that there are both positive and negative cognitive outcomes related to screen time. While screens can enhance

7) ⁷ Muppalla, Sudheer Kumar, Sravya Vuppapapati, Apeksha Reddy Pulliahgaru, and Himabindu Sreenivasulu. 2023. "Effects of Excessive Screen Time on Child Development: An Updated Review and Strategies for Management." Cureus, June. <https://doi.org/10.7759/cureus.40608>.

8) ⁸ Kushima, Megumi, Reiji Kojima, Ryoji Shinohara, Sayaka Horiuchi, Sanae Otawa, Tadao Ooka, Yuka Akiyama, et al. 2022. "Association between Screen Time Exposure in Children at 1 Year of Age and Autism Spectrum Disorder at 3 Years of Age." JAMA Pediatrics 176 (4): 384. <https://doi.org/10.1001/jamapediatrics.2021.5778>.

9) ⁹ World Health Organization. 2019. "Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children under 5 Years of Age." 2019. <https://iris.who.int/handle/10665/311664>.

10) ¹⁰ "Media and Children." n.d. <https://www.aap.org/en/patient-care/media-and-children/>.

education and learning, excessive screen exposure and multitasking with other media have been linked to impaired executive functioning and academic performance. **A consensus of the literature confirms that prolonged screen time poses potential harm, particularly to younger children under two years old.**

Furthermore, while districts are not necessarily in control of how students and families are approaching screen time, it is more likely for students to have regulated habits when using school devices and minimize their screen time use when they have positive role models at home to observe.

Unraveling the Influence of Digital Devices on Child Development

How Moderated Educational Screen Time Can Be Beneficial

Recent research endeavors have been exploring the intricate relationship between screen time and child development, acknowledging the ubiquity of digital devices in modern society. Researchers are seeking to unravel the nuanced impacts of prolonged screen exposure on various facets of child development. The increase of screen-based activities, ranging from educational applications to recreational content, has prompted an urgency to discern the potential implications on children's cognitive abilities, social interactions, and overall well-being.

Fortunately for educators, current literature suggests that of the types of screen time, digital media for educational purposes is better for students than recreational screen time. Educators must carefully consider the possible advantages of increased digital device utilization in contrast to the potential drawbacks associated with extended screen exposure (described in the previous section).

For example, an article published by New York-Presbyterian Hospital (NYP) recommends that, if children aged 2-5 are using screens, they should be shown brief educational TV shows similar to "Sesame Street" or "Daniel Tiger's Neighborhood."¹¹ These shows feature characters engaging in cooperative play and serve as positive role models for social skills. Having the child view social skills and teamwork in action through these types of media can teach them how to imitate said behaviors in their everyday lives.

Doctors at NYP also advise caregivers to watch educational programs with their child when possible. Doing so can foster active engagement, enabling parents and educators alike to discuss and interact with the child regarding what they are watching and learning. As previously mentioned, **co-viewing screen time is a valuable form of engagement, fostering a relationship of trust by having the adult present for follow-up questions on content, or just overall encouragement.** Educators can even further use screen time to their benefit by preparing interactive lessons and games for the child to participate in after their screen time activity to assess their comprehension.

Acknowledging the above recommendations, it is important to note that nearly every child is inevitably exposed to screen time in various capacities. Technology and digital devices have enmeshed screens into the fabric of daily life, making the prospect of complete screen time avoidance a challenging endeavor. Instead of striving for a screen-free existence, parents and educators must navigate the digital landscape with a heightened sense of mindfulness. **Caregivers must conscientiously curate and monitor the content their children are exposed to, ensuring that engagement with screens contributes positively to their developmental milestones.** In this context, screen time can be harnessed as a strategic tool for reinforcing educational concepts acquired in school. By judiciously selecting and regulating digital content, parents can transform screen time from a harmful distraction into a valuable supplement to their child's education.

To that end, when considering what a positive screen time activity might look like for future implementation, the table below explores the characteristics of positive and negative screen time activities.

11) Aplesset, and Aplesset. 2023. "What Does Too Much Screen Time Do to Children's Brains?" NewYork-Presbyterian, August 24, 2023. <https://healthmatters.nyp.org/what-does-too-much-screen-time-do-to-childrens-brains/>.

Characteristics of Positive and Negative Screen Time Activities



Positive Screen Time Activity

- Is age appropriate and on the level of the viewers understanding.
- Is educational - if not an activity surrounding mathematics or language arts, it includes examples of social skills or executive functioning.
- Is completed with the direct or indirect supervision of a teacher or parent.
- Each activity does not exceed 30 minutes to an hour.

Negative Screen Time Activity

- Is not appropriate to the viewer's age or level of understanding.
- Holds no educational value.
- Does not follow a larger plot consisting of character development (does not have a moral to the story).
- Is a short burst of information without any follow up for comprehension.

Effects of Screen Time on Cognitive Development

A 2019 study demonstrated that **the nature of screen time plays a pivotal role in determining its impact**. This study involved 4,013 children, and categorized screen time into various types, such as social, educational, passive, and interactive, among others. According to the findings, educational screen time yields the most benefits, positively influencing children's persistence and educational outcomes without significant adverse effects on health.¹² On the other hand, interactive screen time, encompassing activities like playing video games, demonstrates positive educational outcomes but is linked to poorer health (e.g., less physical activity). Recreational screen time, such as those indulging in prolonged streaming of TV shows, was shown to be the least healthy form of screen time.

Dysregulation, or emotional dysregulation, is an inability to control or regulate one's emotional responses, which can lead to significant mood swings. It can involve many emotions, including sadness, anger, irritability, and frustration.

When it comes to self-regulation and academic achievement, a four-year longitudinal study involving 422 children sought to assess the hypothesis that the use of digital devices, such as smartphones and tablets, at the age of four is linked to later dysregulation symptoms and lower academic achievements at six and eight years old.¹³ The children's mothers provided information on their children's access to digital devices, average screen time, and whether they engaged in activities during screen time. The mothers also reported their children's emotional/behavioral functioning. The children's teachers also monitored and evaluated their screen time use and associated behaviors to provide more data on academic achievements and potential dysregulation symptoms. The results of this study showed a direct and significant association between screen time and dysregulation at four years old, and a negative association with mathematics and literacy grades at eight years old.

An increasing use of technology and screen time also impacts attention span. An article by TIME explains the impact of an increasingly digitalized lifestyle on the brain. Before the digital revolution in 2002, the standard human attention span was noted to be 12 seconds.¹⁴ However, researchers at Microsoft reported people now tend to lose

12)¹² Sanders, Taren, Phillip D. Parker, Borja Del Pozo-Cruz, Michael Noetel, and Chris Lonsdale. 2019. "Type of Screen Time Moderates Effects on Outcomes in 4013 Children: Evidence from the Longitudinal Study of Australian Children." *International Journal of Behavioral Nutrition and Physical Activity* 16 (1). <https://doi.org/10.1186/s12966-019-0881-7>.

13)¹³ Cerniglia, Luca, Silvia Cimino, and Massimo Ammaniti. 2020. "What Are the Effects of Screen Time on Emotion Regulation and Academic Achievements? A Three-Wave Longitudinal Study on Children from 4 to 8 Years of Age." *Journal of Early Childhood Research* 19 (2): 145-60. <https://doi.org/10.1177/1476718x20969846>.

14)¹⁴ McSpadden, Kevin. 2015. "You Now Have a Shorter Attention Span than a Goldfish." *TIME*, May 14, 2015. <https://time.com/3858309/attention-spans-goldfish/>.

concentration after only eight seconds. Researchers conducted a survey with 2,000 participants and studied the brain activity of 112 individuals using electroencephalograms (EEGs). Microsoft, drawing from the findings, suggests that the mobile revolution since the early 2000s has contributed to this decrease in attention span. However, the report also notes a positive shift, highlighting an improved ability to multitask in the mobile age. Microsoft theorizes that these changes reflect the brain's adaptability over time and that a shorter attention span may be a consequence of evolving towards a more digital lifestyle. Though this study was conducted with adult subjects, our research team finds its results to be insightful related to overall changes in cognitive responses to technology, and their implications for children attempting to learn in school.

Effects of Screen Time on Physical Development

Visual-Motor Integration is the ability to coordinate visual information with physical movement. This skill is essential for writing, drawing, cutting with scissors, and catching or hitting a ball.

Screen time affects more than just cognitive abilities, even posing challenges to children's development of dexterity. A study published in the Australian Occupational Therapy Journal explored the association between how much time kids spend on screens and how it relates to their fine motor skills, sensory processing skills, and play skills as reported by parents. The findings suggest that playing with toys and being creative in play, like using different objects for multiple different purposes, might help lessen the impact of screen time on visual-motor integration (VMI) skills.¹⁵ Having children incorporate the physical aspect of play rather than being sedentary throughout their screen time activities seems to be beneficial towards their growth.

Regarding digital writing compared to the regular pen and paper handwriting, one study highlights the benefits of screen time with a tablet and digital writing device versus a keyboard. This research compared learning through handwriting with an ink pen on paper, handwriting with a digital pen on a tablet, and typing on a keyboard. Behavioral and electroencephalographic measures were taken immediately after learning with each writing tool, and participants' moods during training were assessed.¹⁶

Participants were categorized based on their everyday use of a digital pen, and divided into groups of those familiar and unfamiliar with digital writing. An EEG experiment was conducted, revealing that the familiar group exhibited a better response when learning words with either a digital pen or an ink pen compared to typing on a keyboard. The unfamiliar group had a better response when learning words with an ink pen compared to typing. Positive mood during learning was consistently higher during handwriting, regardless of the writing tool.

While there were no behavioral changes during this study, the results suggest that the movements involved in handwriting contribute to better memorization of new words. **The study indicates that handwriting with a digital pen and tablet can enhance learning abilities compared to keyboard typing once individuals are accustomed to it.** These results confirm and expand upon previous studies explaining the benefits of handwriting compared to typing on a keyboard.¹⁷

15)¹⁵ Dadson, Paula, Ted Brown, and Karen Stagnitti. 2020. "Relationship between Screen-time and Hand Function, Play and Sensory Processing in Children without Disabilities Aged 4-7 Years: A Exploratory Study." Australian Occupational Therapy Journal 67 (4): 297-308. <https://doi.org/10.1111/1440-1630.12650>.

16)¹⁶ Ihara, Atsushi, Koji Nakajima, Akiyuki Kake, Kizuku Ishimaru, Kiyoyuki Osugi, and Yasushi Naruse. 2021. "Advantage of Handwriting over Typing on Learning Words: Evidence from an N400 Event-Related Potential Index." Frontiers in Human Neuroscience 15 (June). <https://doi.org/10.3389/fnhum.2021.679191>.

17)¹⁷ Askvik, Eva Ose, Frederikus Van Der Weel, and Audrey Van Der Meer. 2020. "The Importance of Cursive Handwriting over Typewriting for Learning in the Classroom: A High-Density EEG Study of 12-Year-Old Children and Young Adults." Frontiers in Psychology 11 (July). <https://doi.org/10.3389/fpsyg.2020.01810>.

Cultivating a Technological Balance in Schools

Resources to Manage and Teach Media Literacy

After considering the pros and cons of screen time use for K-12 students, it is important to remember that many habits a student may have related to technology begin at home. A research study on promoting healthy screen use in school-aged children explored the cognitive, psychosocial, and physical impacts of digital media on school-aged children and adolescents, emphasizing the significance of routines, context, and activities. The authors' recommendations for parents revolve around four guiding principles: promoting healthy management, fostering purposeful screen engagement, exhibiting positive role modeling, and maintaining a balanced and informed approach to monitoring screen time and associated behaviors.¹⁸

Recommendations for Promoting Healthy Screen Use in School-Aged Children

Healthy Management

Limit recreational screen time to 1-2 hours per day for children aged five and older.

Balanced and Informed Monitoring of Screen Time and Associated Behaviors

Cooperative or competitive video games, when played with family and friends, mirror and serve as a form of traditional play, providing opportunities for identity, cognitive, and social development.



Meaningful Screen Use

Age-appropriate cable or online programs, when co-viewed with family and consumed purposefully within limits, offer immersive and informative screen experiences.

Positive Modelling by an Adult

Both autonomous and collaborative learning is encouraged through screen-based programs, stimulating inquiry.

When opting to regulate screen time, it is crucial to establish agreement with other adults involved in the student's life. The American Academy of Child and Adolescent Psychiatry states that while screen time might look different for each child, it is still important to regulate the amount of time spent behind a screen, as well as the content they are viewing.¹⁹ The allowance and nature of screen time can vary between families, fluctuate daily, and differ among individual children. Once parameters are established for screen time within the home as well as at school, maintaining consistency is key. Framing and emphasizing screen time as an educational tool is also beneficial. Additionally, providing a positive example is crucial when assisting children in developing healthy habits. It is imperative when teaching a

18)¹⁸ "Digital Media: Promoting Healthy Screen Use in School-Aged Children and Adolescents." 2019. Paediatrics and Child Health 24 (6): 402-8. <https://doi.org/10.1093/pch/pxz095>.

19)¹⁹ American Academy of Child & Adolescent Psychiatry. n.d. "Screen Time and Children." https://www.aacap.org/AACAP/Families_and_Youth/Facts_for_Families/FFF-Guide/Children-And-Watching-TV-054.aspx.

child, adolescent, or young adult the importance of minimizing screen time to actively be that model for them.

As students increasingly engage online, they encounter more misinformation and advertising, amplified by big data and algorithms. Consequently, there is a rising initiative to incorporate media literacy skills into school curricula in public schools.²⁰ Advocates for media literacy emphasize the importance of early education for children to become responsible online users, asserting that delaying such education until later in middle or high school can put children at a disadvantage.



“If we can ensure that our K-12 students learn the critical thinking skills necessary in order to be able to identify credible sources of information, to ask questions, to create their own information, we would really be moving the needle on helping them become more civically responsible citizens.”

- Olga Polites, Leader Media Literacy Now (NJ Chapter)

The University of North Carolina Chapel Hill offers advice on how to improve media literacy skills. The author emphasizes the importance of teaching critical thinking when using the Internet to avoid misinformation.²¹ If a student is using the Internet in the presence of an adult and encounters a site or piece of information that they are curious about, it is important to create an open dialog between the adult and child for a more controlled learning experience.²²

Finally, we share resources from state departments of education that are ahead of the curve regarding sustainable virtual learning and media literacy.

- The **California Department of Education** provides literature and webinars for teachers, administrators, and faculty on the importance of comprehending and imparting media literacy skills.²³ Classroom teachers specifically are advised to collaborate with teacher librarians to explore available resources for developing contextual learning activities for students that integrate media content.
- Similarly, the **Ohio Department of Education & Workforce** has created K-12 curriculum on media literacy called Ohio’s Library Guidelines for Learners, which aims teach digital safety, responsible and ethical use, as well as proficiency in using different online software.²⁴

20)²⁰ Langreo, Lauraine. 2022. “A Media Literacy Requirement That Starts in Kindergarten? New Jersey May Start the Trend.” Education Week, November 28, 2022. <https://www.edweek.org/teaching-learning/a-media-literacy-requirement-that-starts-in-kindergarten-new-jersey-may-start-the-trend/2022/11>.

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22)²² Prothero, Arianna. 2022. “Media Literacy in Schools: 7 Ways The Subject Has Evolved.” Education Week, December 28, 2022. <https://www.edweek.org/teaching-learning/media-literacy-in-schools-7-ways-the-subject-has-evolved/2022/12>.

23)²³ California Department of Education. n.d. “Media Literacy Resources: A Collection of Resources to Support Media Literacy in the Classroom.” Accessed January 24, 2024. <https://www.cde.ca.gov/ci/cr/ml/>.

24)²⁴ “Learn to Build Media Literacy in Students | Ohio Department of Education and Workforce.” n.d. <https://education.ohio.gov/Media/Ed-Connection/April-2023/Learn-to-build-media-literacy-in-students?feed=NewsletterRSS>.

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