

## An Informed, Research-based, Mindful, and Double-looped School Technology Program

1. **Informed** – Share research and articles with faculty, parents, and students to understand both the implications of screens on health and development but also how technology is designed to take advantage of users
  - a. Risks
    - i. Physical and mental health
      1. Physical Health: [headaches](#), [neck](#) and [back](#) injuries, [obesity](#), [computer vision syndrome \(over 3 hours per day\)](#), [childhood myopia](#)
      2. [Mental health: depression, anxiety, and suicide-related outcomes and rates](#) have increased in recent years and may be linked to [screen use](#)
      3. [Sleep disturbance](#) as a result of screens before bed and [overall screen time](#); AAP recommends no screen time 1-2 hours before bed
    - ii. Neurological development
      1. Link to addiction: reward-based gaming has been linked to structural brain changes in the reward circuitry that [resemble the effects of substance addiction](#)
      2. Memory, attention, and cognition
    - iii. Symptoms of ADHD developed in teens with a higher frequency of digital media use ([Ra, C., Cho, J., Stone, M. et al. \(2018\)](#))
      1. The vast resources available online are affecting our thought processes for problem solving, recall, and learning. ([Storm, B., Stone, S., Benjamin, A. \(2016\)](#))
      2. [Information overload](#) negatively impacts long-term memory
      3. [Attention, concentration](#), and deep thinking impacted by information overload and overreliance on internet (vs. memory) for information
    - iv. Social emotional development
      1. [Emotional cues/empathy and screen time](#)
      2. Inappropriate content exposure, such as porn and hate speech
  - b. General brain development and technology
    - i. [Media multitasking](#)
    - ii. [Higher thinking](#), executive functioning, impulse control
  - c. Economy of attention and persuasive design
    - i. Devices and apps are designed for ease of use. Students only need “practice” for some technology skills. Learning how to operate a device or use PowerPoint, for example, are skills they can quickly learn when developmentally appropriate. These are not skills that build on themselves, like math or reading.



- ii. [Persuasive design](#): psychologists, neuroscientists, game theorists developing tech to be addictive. More you play = more money they make.
  - d. Gamification and motivation
    - i. Pending research is examining how reward-based educational gaming affects the intrinsic motivation of students. Known as the [overjustification effect](#), studies have shown that giving kids rewards reduced their desire to do the same task without rewards.
    - ii. “Constant Flow” or “The Zone” and motivation: state between anxiety and boredom. External motivation vs. intrinsic motivation.
  - e. [Precautionary Principle](#) implies that there is a social responsibility to protect the public from exposure to harm, when scientific investigation has found a plausible risk.
2. **Thoughtful, Research-based** – Choosing the right technology, at the right time, to enhance, enrich, and supplement learning without abandoning proven analog pedagogy
- a. Enhance or enrich the learning experience
    - i. Ted Talks, global communication
    - ii. Coding, robotics, 3D printing
    - iii. Multi-sensorial and multidisciplinary experiences (music, art)
  - b. Supplement (not replace or displace) traditional learning with both digital and analog skill development
    - i. “A” tool, not “The” tool: identifying when apps are helping students learn and when they are not. Providing other options and empowering students to try something new (i.e., Quizlet, Reflex Math).
    - ii. Handwriting and typing
      - 1. Encourage handwriting for [deeper thinking](#) and [bigger ideas](#) before typing final drafts
      - 2. Use handwriting to [practice capitalization, punctuation, spelling](#)
      - 3. Use handwriting to strengthen fine motor skills
      - 4. Research has indicated that the physical process of forming letters when writing (which becomes fluent around age 10) is an important part of encoding letters and sounds, which impacts the [development of letter recognition and literacy](#). “Keyboards cannot replicate the inherent cognitive and educational benefits that handwriting provides.” ([Mann et al. 2015](#))
      - 5. With respect to aspects of word recall, there may be certain cognitive benefits to handwriting which may not be fully retained in keyboard writing ([Mangen, A., Oxborough, G. \(2015\)](#))
    - iii. Notetaking
      - 1. [Research](#) suggests that taking [longhand notes is more effective than typing for learning](#) and retaining information (process of summarizing and categorizing information based on previous knowledge)

2. Students who had laptops and devices removed from class performed significantly better in exams than those with both restricted and unrestricted access ([Carter et al. \(2016\)](#))
  - iv. Analog and digital reading
    1. Studies suggest that [our brains process information differently](#) when reading analog print and digital print
    2. Readers recall details of written information based on where in the text it appeared ([Rothkopf, E. \(1971\)](#))
    3. Observations of tenth grade students participating in a study revealed students who read on a computer had a harder time finding the answers and couldn't flip back and forth between pages ([Mangen, A., Walgermo, B., Brønnick, K. \(2013\)](#))
    4. Analog reading drains [mental resources](#), negatively impacting memory
    5. Annotating, underlining, writing in margins all help students better process and remember what they've read
  - c. Develop processes for evaluating and teaching apps/online tools
    - i. Pros/cons, appropriate duration
    - ii. Identifying essential online tools and skills, and building those into the curriculum (i.e., coding, research, typing)
    - iii. Teaching students how to use apps/online tools appropriately and effectively
    - iv. Avoiding using technology for the sole reason that it's "cool," engaging, or easier
  - d. Find the balance
    - i. We do not know which materials are better delivered digitally; we can make assumptions but technology is changing quickly and science is slow to keep up
    - ii. Develop mechanisms for evaluating screen use by students so balance can be adjusted over time (i.e., what online tools are necessary (for example, when typing an essay), and what are not (for example, when submitting math homework digitally))
    - iii. Respect "media-lite families" and students who show signs of addiction
    - iv. Provide offline and non-digital options for students
    - v. Minimize online homework in order to help students minimize distractions and help parents attempting to monitor and limit students' overall screen time
3. **Mindful** – Many professionals believe mindfulness to be the antidote to too much screen time and schools are implementing practices to help students manage stress
- a. Employ mindfulness strategies to avoid distractions/multitasking
  - b. Single-task, removing notifications, unnecessary apps (i.e., text messaging)
  - c. Choose to engage vs. respond automatically to notifications
  - d. Use meditation, breaks, and power hours in order to be more efficient when using technology
  - e. Practice pausing and self-reflecting



4. ***Double-loop***

- a. Implement student-guided “Tech Talks”
  - i. What’s working? What’s not?
  - ii. How does screen time make them feel?
  - iii. How do they feel when other people are using screens?
  - iv. What do the studies tell us? Based on experience, do they agree?
- b. With students, self-reflect on knowledge and how we acquire knowledge
  - i. Reading digital vs. print
  - ii. Handwriting notes
  - iii. Focused studying
- c. Partner with parents
  - i. How is school-related screen time going at home?
  - ii. What concerns do parents have about screen time?
  - iii. How can parents and schools support each other to keep students safe?