Prevalence of technology in schools and the world today has caused us to shift our focus to **HOW** to incorporate and manage laptop/device usage into the classroom and away from the real question of **IF** we should incorporate laptop/device usage in the classroom, and what is best for students and their learning/education?

**The research/data indicates that:**

1. **Academic performance decreases.** Studies show a direct correlation between general classroom laptop use and lower grades, GPAs and SAT scores. Personal screens (tablets, laptops) easily interfere with learning even without checking social media sites and playing online games.

   A 2015 Cambridge University study recorded the activities of more than 800 14-year olds and analyzed standardized testing results (GCSE) through age 16. On average, these 14-year-olds spent four hours of their leisure time on screens. Those who spent one extra hour on screens per day (Computers, TV, game consoles and phones) saw a drop in standardized test results equivalent to two grades lower overall.

   At 16, one additional hour of screen time resulted in a grade level in two subjects. Two extra hours resulted in dropping a grade level in four subjects. Even if students spent more time studying, the additional screen time still harmed their results.

2. **Critical and Deep-thinking skills diminish or fail to develop properly.** Instant answers and the shallow multi-tasking nature of personal screen use prevents students from sorting information into long-term memory areas of the brain. The key element for getting better at a skill is hard, thought-provoking work (i.e critical or deep thinking/problem solving). The idea centers around these concepts say that working hard for one thing leads you to work hard for others—high input, high reward. In the study, researchers found that mice who made a practice of routinely working hard for their food transferred those skills into working hard at subsequent tasks. However, screen usage is a low-effort, high-reward practice that does not mirror real-world achievement/success. It dangerously conditions students’ brains to bypass grit, hard work and the uncomfortable feeling of facing challenges and figuring out solutions. Looking up information does not translate into long-term understanding and learning or creative engagement.

3. **Learning is fragmented and less effective than traditional methods of instruction.** Research shows that personal screen use depletes neurochemical resources, increases stress hormones, and often makes it harder to tackle mental challenges. Dividing attention between screens and instructors strains focus and diminishes retention. Optimal learning environments use tools that do not distract students or trigger a dopamine rush. Personal screen use does both. While the human brain can multitask for some non-cognitive tasks, the same is not true with the cognitive tasks required in school. For a young developing brain, the “cognitive load”—or the amount of information being processed from the screen and teacher—can easily exceed the student’s capacity to manage it. A student who is listening to a teacher will retain less if he is looking at a personal screen rather than looking at the teacher who may be pointing to a smart board. They’re more likely to miss details, make mistakes, get overwhelmed, or simply give up.
4. **Hand written notes using paper and pen improve memory, information retention, thought organization and increase idea generation.** Neuroscience is clear that taking notes by hand requires students to process, interpret and translate material into their own words which increases understanding and retention because it requires higher levels of cognitive resources. This causes student to better understand the deeper concepts being conveyed. While typing may produce a nearly verbatim transcript, the information has not actually been taken in, processed or interpreted, but is instead simply transcribed. Transcription does not engage the mind in the same way or translate into learning. Many colleges are limiting or banning personal device use in classes and students who’ve relied primarily on electronic transcribed notes have insufficient handwriting and interpretive note-taking skills.

5. **Smarter kids perform significantly worse with classroom laptop use.** Some research reveals that high-achieving kids have more to lose with personal screen use in class, perhaps due to overestimating their ability to multi-task. Even when internet browsing included related academic content, it did not improve exam scores and overall performance.

6. **Students sitting near peers using personal screens performed lower.** Students who sat near peers who multitasked with screens were distracted and overall performed at a lower level and scored lower on tests.

7. **Screens at night negatively affects sleep.** Exposure to light (particularly blue light) and activity from screens before bed affects melatonin levels and can delay or disrupt sleep. Media use around or after bedtime can also disrupt sleep and negatively affect school performance.

8. **Temptation to go to non-academic sites is high.** And ultimately means students are less-focused on the teacher. A 2017 study used a server (instead of self-reporting) to report actual time spent on non-academic sites during class. The research found that 40 of every 100 minutes of class time was spent on non-academic sites. An additional 27 minutes was spent using smartphones during the same time period. All of this took place even though the students knew they were being monitored and tracked.
<table>
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<tr>
<th>Common “Benefit” Claims of Personal Laptops in the Classroom</th>
<th>Summary of the Research Response</th>
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<tbody>
<tr>
<td>Fosters online collaboration with other students.</td>
<td>While online collaboration can be convenient, as an educational resource, it is substantially inferior to face-to-face conversation and engagement in the classroom learning environment. In-person discussions improve students’ social skills, imagination and idea generation as well as foster teamwork and problem-solving. Online collaboration is a great tool outside of the classroom.</td>
</tr>
<tr>
<td>Empowers students to explore additional supporting curriculum concepts.</td>
<td>Additional curriculum support and information can be shared with greater retention via the teacher’s smartboard screen during classroom time, which also limits the distraction and fragmented learning associated with personal devices. Eye contact improves understanding and helps teachers better gauge student engagement/attention. Students can still use time outside the classroom for additional online exploration/research of their interests.</td>
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<tr>
<td>Allows students to receive and view assignments online and submit their work electronically.</td>
<td>Electronic downloads and assignments can easily be done from home computers and does not require personal laptops in the classroom. Students can turn their work in during homework hours outside of school. School computers can also be used to access password-protected cloud files for last-minute uploads during school hours. Additionally, students could even opt to have personal laptops on campus to access these items outside of class time without having them in the classroom.</td>
</tr>
<tr>
<td>Makes learning more interesting for today’s students.</td>
<td>While keeping students engaged is important, it is more important to use multi-sensory learning experiences that best meet their cognitive/developmental needs and develop long-term learning skills. Students need opportunities and perspectives outside the tech world for learning. The low-effort/high-reward nature of screen-based learning dangerously conditions students’ brains to bypass grit, hard work and the uncomfortable feeling of being challenged. It leads to lack of motivation and determination when instant rewards/gratification aren’t present. Hands-on, in-person engagement is superior for long-term educational benefits. People aren’t struggling to find ways to get more technology in their lives.</td>
</tr>
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FAQ’s

And the answers based on the research

What do tech-industry experts say when it comes to technology use and education?
“Technology moguls like Bill Gates, Steve Jobs, and other high-powered [tech] entrepreneurs … share the philosophy that kids ought to be raised tech-free.” More commonly, those closest to the technology industry choose anti-tech schools for their kids. “Those at tech’s bleeding edge know full well how dangerous tech products can be, and understand the damage smartphones, social media, and other forms of tech can do, especially to young minds.” Tech designers acknowledge designing apps and programs to maximize time spent using them, as opposed to benefits received from using them. They also understand the core benefits of fact-to-face educational experiences.

What about high level computer skills?
More advanced computer classes can be great. Intentional, hands-on, directed computer instruction is different from using personal devices for other courses in the classroom. Interestingly, even many computer science concepts like binary numbers, algorithms, and data compression are taught using engaging games, puzzles and cards. According to this Google-sponsored material (http://csunplugged.org/activities/), those methods are often preferred. Even some computer teachers don’t allow personal laptops as seen in an article about a Dartmouth professor.

If they don’t use laptops now, how will students learn how to manage screen time?
Having more screen time does not teach students how to manage more screen time, because their brains aren’t ready for it. Screen management skills come slowly as the frontal cortex in their brain develops and as kids strengthen their ability to oversee other areas of their lives. Early and excessive screen usage can actually limit and negatively impact the development of those skills. School is a time for establishing lifelong learning habits, exercising face-to-face collaboration and critical deep thinking skills as well as developing social skills.

Research shows that more screen usage works against students’ development cognitively, academically and socially. It’s important to remember that not having personal laptops in the classroom does not mean students won’t be using computers or laptops at all. They will still be using computers as tools for writing papers, doing research, downloading resources and electronically submitting homework, etc. Home use (as opposed to in the classroom) means usage parameters can be managed and supported with parent supervision/family guidelines while not interfering with the primary educational experience and negatively impacting an optimum learning environment.

How will students learn general computer skills?
Tech engineers make sure that screen skills are easy to learn. In contrast, learning necessary life and social skills are much more difficult and require greater levels of work, responsibility, practice and deeper thinking. These skills cannot be replaced or enhanced with screens. Learning computer skills is one of the easiest tasks students will face. This is evidenced in how easily even very young children are able to use devices with no specific device instruction. The tech learning curve is an imaginary hurdle. However managing devices/screens is one of the hardest things they will learn. Ability to manage them comes only with brain development, not with use. General computer skills such as solid typing/keyboarding skills do need to be addressed and taught, along with digital citizenship and email management. Despite mandatory laptops and increased screen use in the classroom, these basics are generally
not being addressed/mastered in school. Since students’ are able to hack through protective school firewalls to get onto open online servers/sites, it’s clear that students are not struggling to learn how to use computers.

**Based on the research, when is the best age to introduce personal laptops into a classroom?** Because of the development of the frontal cortex of the brain (the reasoning, executive functioning center) after puberty is a better than before puberty. However, research suggests that personal devices/laptops in the classroom do not enhance learning at any age.

In-class screen use does not require mandatory personal laptops. In-class screen effectiveness increases when learning objectives are well-defined and have a set beginning/end time and goal. The comfort of your “own device” is shown to be more distracting than working on a school-issued machine for a specific task. When the device is loaned for a joint class exercise and then returned, students have a better chance of receiving the intended benefit with fewer negative risk factors/effects.

Developmentally speaking, 9th and 10th graders are higher risk takers. Responsibility with life management skills/responsibilities at home can be good benchmarks/guidelines for increased screen responsibility/access, but it doesn’t mean it becomes necessary in the classroom via personal devices. Life skills benchmarks like independent cleaning, doing laundry, meal preparation, personal hygiene, self-managed organizational skills and being able to keep up with and remember personal belongings are good indicators of readiness for intentional progress as well. But again, this does not change the negative effects in the classroom.

The overactive brain reorganization and synaptic pruning taking place during the teen years make it very difficult for students to manage/weigh, distraction and temptation, particularly with screens.
What are the takeaways?

✓ To be informed. Understand the research and recommendations from experts. Make informed decisions and weigh the costs/benefits. Ask questions.

✓ Seek to understand how education is/is not improved/enhanced by mandatory 1:1 laptop policies as opposed to school-owned devices or labs for intentional instruction. What research data/evidence were used to form and support a 1:1 technology policy?

✓ Are “optional” laptops on campus but not in classrooms an option? Or can school computer labs be used for last minute school-day submissions? Since everyone in our demographic has access to home computers/laptops for papers/homework and downloading resources, online collaboration, etc., this would allow families to decide whether additional laptops/computers are needed in their home to support multiple students’ needs, but doesn’t have to mean mandatory laptops in the classroom where their effects on learning are counter-productive.

✓ How are laptops in the classroom enhancing and deepening learning? What makes our environment different than those in studies?

✓ How is technology-dependent homework enhancing learning, improving efficiency? If it does, does it have to require a mandatory laptop in the classroom?

✓ Can home computers or school-owned devices be used more effectively as tools for typing papers, electronic assignment submission and/or research and downloading resources than requiring “on-screen” entry/program interaction time and mandatory laptops in the classroom?
References/Research

Research Studies


du/gazette/story/2017/04/over-nearly-80-years-harvard-study-has-been-showing-how-to-live-a-healthy-and-happy-life/.


Laptops in the Classroom


**Handwriting**


Cognitive Load


Tech Execs


American Academy of Pediatrics (includes effects on sleep)


ADHD on the Rise


Books

Additional References specific to notetaking and lectures


