



Screen Time, EdTech, and Current Research

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**Not anti-tech,
but pro-learning.**



1:1 Digital Devices in Schools

- 90% of U.S. public schools have enough laptops or tablet devices *for every child* in their school (U.S. Department of Education, 2024).
- The average 8 to 18-year-old in the US spends 450 hours per year learning from a screen (out of approximately 1,000 hours) (Horvath, 2026).
- As many as 71% of educators use tablets in **preschool and kindergarten** classrooms (Dore & Dynia, 2020).
- In an EdWeek Survey (2021), 62% of **elementary** classrooms between 1-4 hours **per day** using digital devices.

Screen Time Recommendations of the American Academy of Pediatrics



**0-18 months
No Screens**



**18-24 months
Less than 1 hour**



**2-5 years
1 hour MAX**



**6 years +
Up to 1.5 hours**

*Unless video chatting ***only via co-viewing
high-quality content**

Correlation and Causation



- When correlations appear **consistently** across contexts (populations, countries, age groups, and independent data sets) there's a clear **pattern**.
- Is there data showing the pattern going in the other direction?
- What does the **convergence of the data** reveal?

Lawsuits (1 of 2)

- **Google/Chromebook:** Collecting and sharing student activity data without explicit consent.
- Shanahan v. **IXL** Learning, Inc.: Collected and monetized student data without parental consent.
- Illuminate/Renaissance Education (**FastBridge, Star, Accelerated Reader**): Data breach that exposing data for over 10 million students.
- Lev Vs. Lower Merion School District (Philadelphia, PA area): Parental rights to make decisions about their children including EdTech and internet access.

Lawsuits (2 of 2)

- KGM vs. Meta Platforms: **purposefully made to be addictive** (\$6 million)
- (States) v. Meta Platforms: violations of the Children's Online Privacy Protection Act (\$17-18 billion and to be monitored by court supervision and independent auditors for children ≤ 13) plus...
 - 2-hour daily time limit with mandatory "productive pauses"
 - Restricted access between 12 am and 6 am
 - No push notifications weekdays between 8:00 am to 3:00 pm
 - Stronger safeguards against potentially harmful content
 - Age verification

Does your school/district offer this?

Laws

- Family Educational Rights and Privacy Act (FERPA)
- Children's Online Privacy and Protection Act (COPPA)
- Federal Trade Commission Amicus Brief (2025)
- Every Student Succeeds Act (ESSA): "implement **evidence-based programs**" (20 U.S.C. § 6301).
- Individuals with Disabilities Education Act (IDEA): "ensure the IEP includes special education and related services "**based on peer-reviewed research**" (34 CFR § 300.306)

M.C. 1 et al. v. Curriculum Associates (iReady)

- Zero random controlled trials of iReady.
- One Q1/Q2 peer-reviewed journal found only a +0.04 standard deviation increase in reading and math (i.e., equivalent to moving the average student from the 50th percentile to about the 51.5th percentile) and the study did not include a treatment and control group comparison.

John Hopkins Study of iReady (2022)

- Reading: *"Results of this study did not show any statistically significant associations between iReady Personalized Instruction usage and SBA ELA achievement."*
- Math: *"iReady improved by 7.8%, while students not using it improved by 7.0%"*

At roughly \$70 per student, that amounts to over \$535,000 spent on iReady to achieve a 0.8% difference in mathematics performance and no measurable change in reading.

Lobbyists

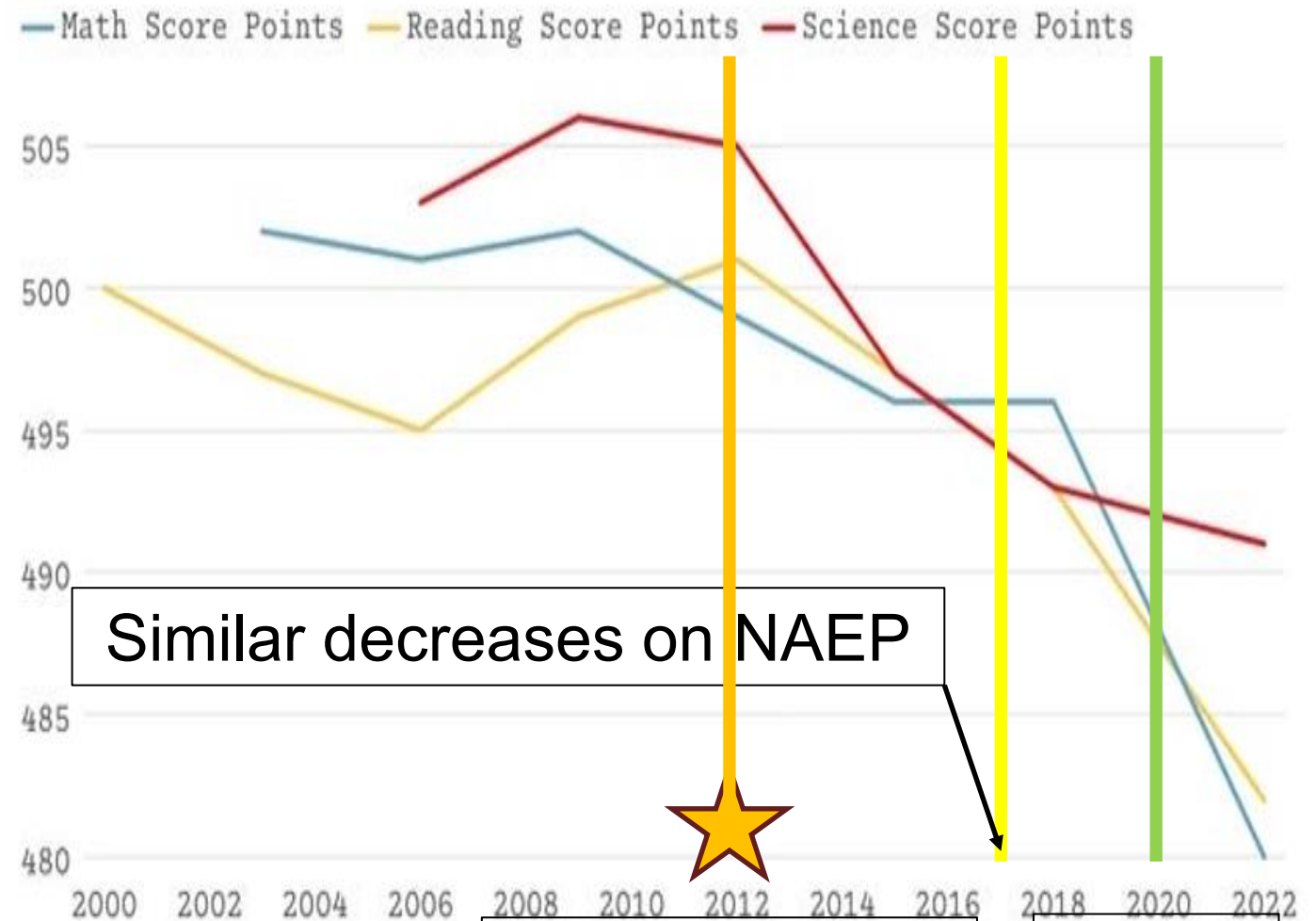
- EdTech spent a combined \$20 million on lobbying in just the first quarter of 2026 - an average of about \$226,000 per day – due to the fall out from lawsuits which have exposed that tech executives **knew their products were harming children online and violated laws.**
- Similar to Decoding Dyslexia, grassroots parent advocacy efforts (i.e., Mothers Against Media Addiction, Wait Until 8th, Children's Screen Time Action Network, and Common Sense Media) are dedicated to protecting kids from harms of Big Tech.

The First Generation Cognitively Less Capable

The generation born between 1997 and 2010 is the very first generation to score lower on general IQ and standardized cognitive tests than their parents across the domains of attention, working memory, literacy, numeracy, executive function, and overall IQ... but only in western countries

(Horvath, 2026).

Global PISA scores in math, science, and reading across 38 countries.



Push Back

At least 17 states have introduced, debated, or enacted legislation to roll back or strictly limit the use of EdTech and classroom screen time

- Iowa: Caps digital instruction at 60 minutes per day for students in K-5th
- Utah: Prohibits 1:1 devices in elementary schools and screen-time caps for grades K-3rd
- Tennessee: Digital device policies for K-5th to minimize unnecessary screen time
- Los Angeles Unified School District (LAUSD): Eliminated instructional screens until 2nd grade and blocked YouTube entirely on school-issued devices

Questions We Should Be Asking

If one of the most widely used tools in American education operates **without an evidence base**, this signals a broader problem with how we evaluate EdTech (Horvath, 2026).

When and **why** did we stop asking...

1. Is it educational?
2. Is it necessary?
3. Is it safe?
4. Is it effective?

Technology should **supplement, not substitute**, traditional instruction
(UNESCO, 2023)

What Is Known About the Effectiveness of Ed Tech

There is clear scientific evidence that digital tools *impair* rather than enhance learning.

(Sweden's Karolinska Institute, 2023)

1:1 digital devices have one of the lowest effect sizes (+0.12) in the entire EdTech literature (Zheng, et al., 2016).

"Effect size 101"

0.20 = small effect on outcomes

0.40 = (expectation) a standard school year of growth

0.50 = medium effect on outcomes

0.80 = large effect on outcomes

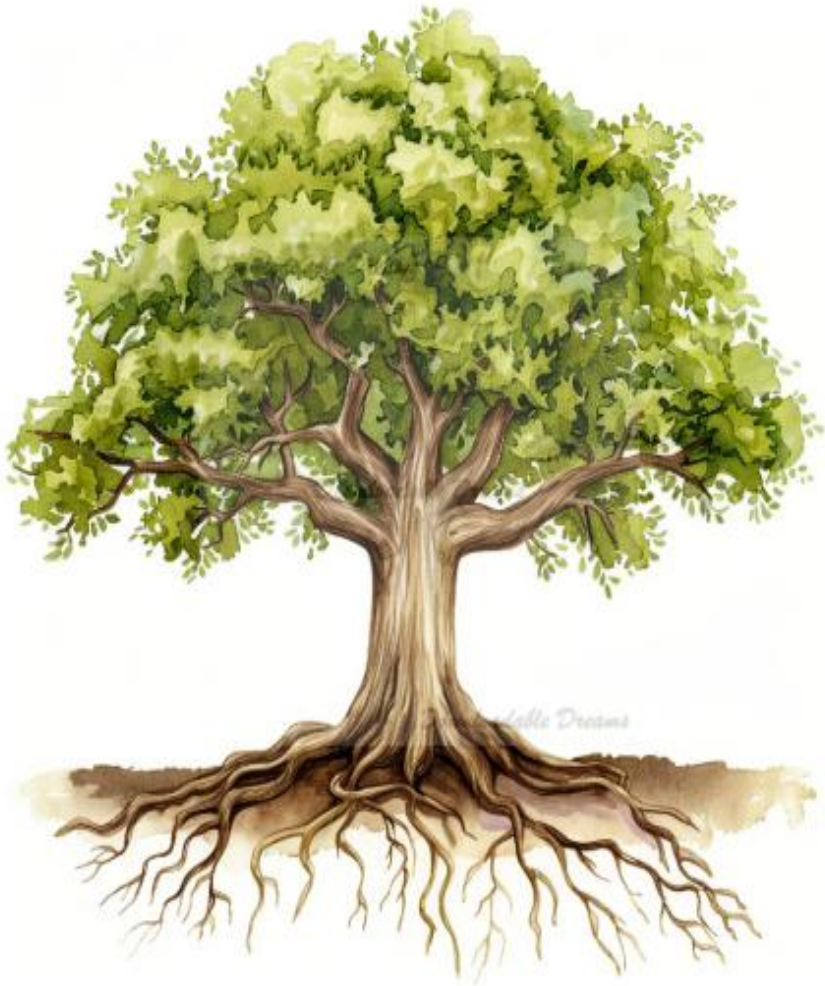
A Decrease in Media Literacy (1 of 2)

Media literacy expands traditional reading and writing to include the skills necessary for living in a digital ecosystem including...

- accessing and producing information digitally,
 - analyzing information from digital sources, as well as
 - evaluating credibility, accuracy, and potential bias.
-
- Computer and device use in classrooms has skyrocketed by over 500% between 2013 and 2023 and spending on educational technology increased from \$12 billion to \$18 billion, yet metrics show that **fewer than 60% of students achieved media literacy benchmarks** despite unprecedented access to technology (Neitzke, 2026).

Why? Because productive struggle IS learning.

Speed and Efficiency vs. Friction and Effort



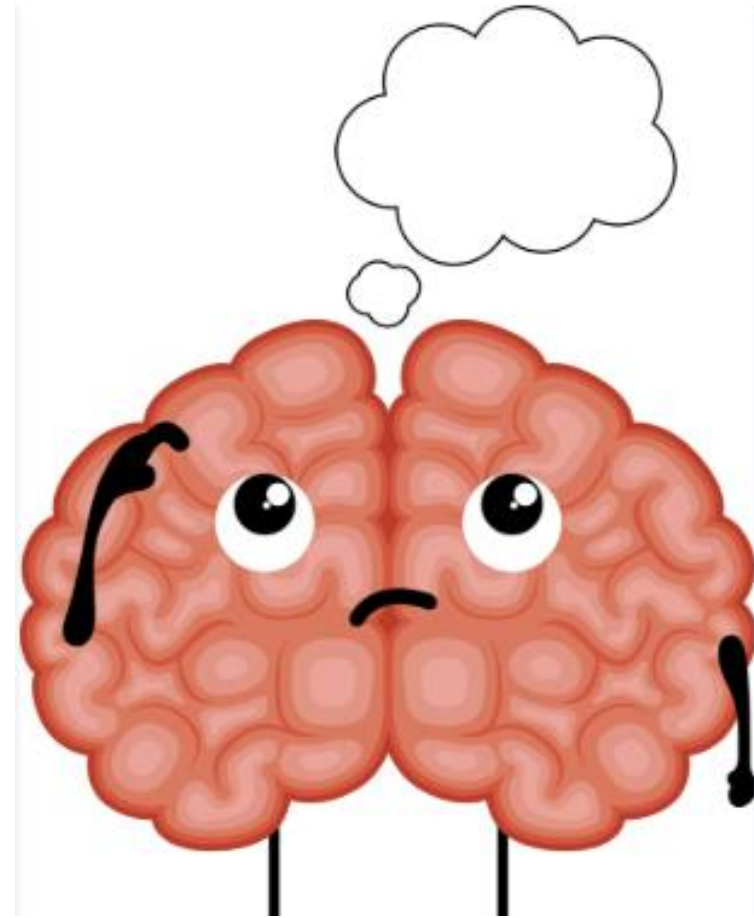
Biosphere 2: A Cautionary Metaphor

Speed and efficiency have never been associated with learning.

Friction, effort, perseverance, resilience, and productive struggle have always been associated with learning.

A Decrease in Media Literacy (2 of 2)

- Every day, the equivalent of an 850-page book per person per second is created. This information overload results in ...
 - decreased critical thinking,
 - blind acceptance of everything, or
 - trust in almost nothing.



Digital Books (1 of 3)

There are no studies that find that comprehension is better reading digital books.

- A meta-analysis of 470,000 students found that reading from a digital device had a negative impact on comprehension for elementary and middle school students whereas *reading books on printed paper could boost comprehension skills six to eight times more than digital reading* (Altamura, Vargus & Salmeron, 2023).



Digital Books (2 of 3)

- About one-third of children entering preschool in 2025 didn't know how to handle a book with most attempting to swipe at pages as if they were a phone or tablet (EdWeek, 2026).
- Reading a book together together creates a strong connection between parent and child, and the physical contact boosts the brain's receptivity to learning.
- The importance of dedicated time together.



Digital Books (3 of 3)

The great benefit of digital books is that they put books in the hands of children who would otherwise not have books read to them, but real books are best.

But...

Do **not** use ***interactive*** digital books.



Handwriting vs. Typing

- Handwriting training has not only been found to **improve spelling accuracy** (Cunningham and Stanovich, 1990) and **better memory and recall** (Longcamp et al., 2006; Smoker et al., 2009; Mueller and Oppenheimer, 2014), but also to **facilitate letter recognition and understanding** (Longcamp et al., 2005, 2008; Li and James, 2016).
- Handwriting forces students to pay attention to what they are doing and the act of forming the letters by hand itself brings about **larger connectivity in the brain and connectivity facilitates learning and memory** (Pfurtscheller & Lopes da Silva, 1999).
- Substitution of handwriting by typewriting could negatively impact the learning process (Van der Weel & Van der Weel, 2024; Alonso, 2015; Mangen and Balsvik, 2016; Arnold et al., 2017).

Neurobiological Evidence

The brain images shared are from a study done by the
Reading & Literacy Discovery Center
of Cincinnati's Children's Hospital (Hutton, 2020).

They are the first studies to provide **neurobiological evidence**
for the potential benefits of reading and the potential
detriments of screen time
on a preschool child's brain development
which is important because the brain is developing the most rapidly
in the first five years.

When is EdTech Helpful/Not Helpful?

Not helpful

(anything less than +0.40 effect size)

- Technology with high school students (+0.30)
- Technology in reading/literacy (+0.29)
- Technology in science (+0.22)

Helpful

- When something is better than nothing
- Additional repetition and practice
 - Technology with learning needs students (+0.44)
 - Must be peer-reviewed as per IDEA and combined with explicit instruction and feedback
 - SWD need specially designed instruction - more instruction, broken into smaller steps, more opportunities for review and feedback
- Application across contexts/modalities
 - When it provides immediate feedback, promotes student collaboration, or helps learners work on their own (+0.54)

Ed Tech vs. Tech Ed

Pedagogy is the method and practice of teaching; the science and art of how educators guide learning and interact with student.

- Ed Tech is any digital tool, platform, software, or app.
 - Ed Tech has replaced what we know about educational pedagogy and how children learn.
 - Students do not need Ed Tech.
- Tech Ed refers to teaching children about technology including how to use it safely and effectively (e.g., media literacy, critical thinking, and safe searching, etc.).
 - Tech Ed is (and should be) part of educational curricula.
 - Students DO need Tech Ed.

Ed Tech vs. Tech Ed Shifts

Teach someone how to use a tool and they've learned how to use *that* tool.
Teach someone how to think and they can use **any** tool.

Shifts:

- Shift from 1:1 devices to computer labs (dedicated rooms for devices).
- Shift from tools controlled by companies to single purpose tools (i.e., dry erase boards)
- Shift from free access to the internet all day, every day to controlled and monitored internet access.
- Shift from digital curricula and materials to books, paper, pencils.
- Shift from individual learning and practice to community-based learning in the context of human relationships.
- Shift from "offloading" to "-----"

Is There a Better Use of EdTech Funds?

- At a cost of \$450 million, what are some **a better ways** to use those funds that have evidence of effectiveness?
 - Response to intervention (+1.29)
 - Collaboration/Collective Teacher Efficacy (+1.33-1.57)
 - Classroom discussion (+0.82)*
 - Interventions for students with learning needs (+0.77)
 - Behavioral intervention programs (+0.62)
 - Play programs (+0.50)*
 - Parental involvement (+0.50)*
 - Return to actual books*
 - Return to print-based assessments*

Dopamine

- Dopamine is related to several functions in the brain including... behavior, motor activity, motivation, reward, humor, anxiety, attention and learning (AAP, 2021) and is meant to serve as a **survival function**.
- Hyperstimulating digital content **floods the brain** with an amount of dopamine that humans have not adapted to.

As a result, there is an increased “want” for more dopamine while producing less dopamine naturally which makes it harder to experience joy from everyday experiences.

Educational Apps **Are** Video Games

The majority of Ed Tech is designed to keep the individual engaged with the tool which increases **dopamine** to levels humans have not adapted to by

- Incentivizing (rewards for levels, tokens, getting a certain desired “object”)
 - Randomizing rewards
 - Decreasing the reward rate over time
 - Punishment (taking away rewards for not playing)
- In 1998, PET scans revealed that playing video games for one hour released **dopamine** at a level commensurate with a shot of amphetamine (Koepp, et al., 1998; Freed, 2025).
 - In 2017, video game playing was associated with **dopamine** release similar in magnitude to those of drugs of abuse (Weinstein et al., 2017).



Educational Apps and Young Children



Between birth – age 3, **all learning** happens through our interactions with other people and the world around us.

Research shows that **screens do not make children learn faster or better than human interaction.**

- The majority of educational apps are not truly educational in that they do not align with the principles of how children learn (Meyer et al., 2021).
- 80% of apps used by 3–5-year-olds contained **manipulative design features** (Radesky et al., 2022).

Gamification of Learning

Gamification occurs when there are rewards for completing the task as opposed to learning a skill which sends a message that if it isn't fun, it's not important or worthwhile.

- There is a need to consider...
 - benefit students ("what's the evidence?")
 - connection and generalization to real-world application
 - completing tasks *without* constant rewards
 - time is spent on the actual skill
 - undermining parents' attempts to address screen time

Engagement is Not the Same Thing as Learning



vs.

The Babbel logo features a white plus sign followed by the word "Babbel" in a white, sans-serif font, all set against a solid orange square background.

Educational Videos

Digital products are not better for children than real-world experiences, but what they create are experiences that are **better than real-world.**

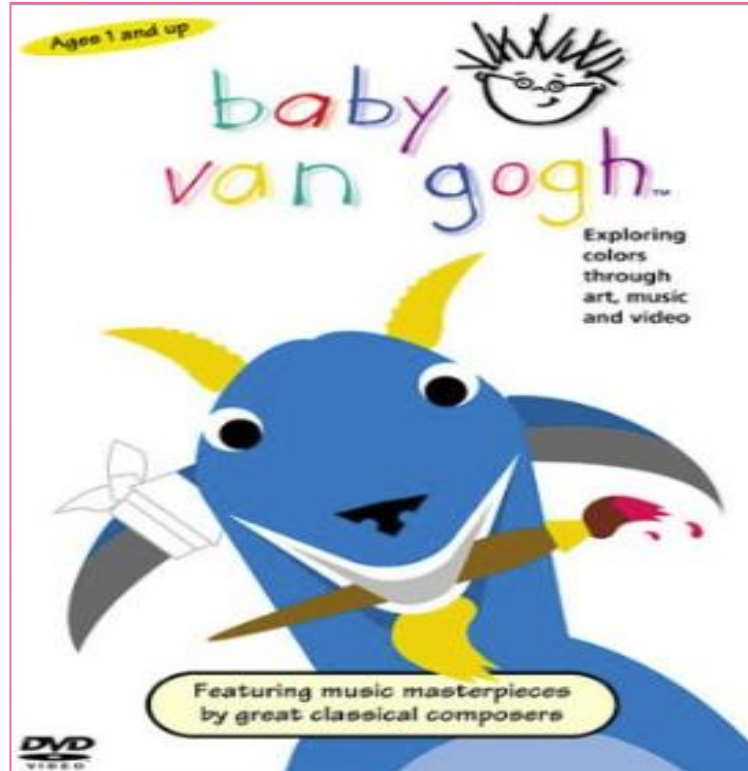
After only 10-20 minutes of watching fast-paced video content, children's executive functions were negatively impacted
(Lillard et al., 2015).



Screen and Scene Changes



Scenes changes every 30 minutes.



Scene changes every 7 seconds (static scene changes allowing for shifts in storyline).



Scene changes every 3 seconds (with constant movement).

“Brain Breaks”

Is it a break for the brain?

What do we gain?

What do we lose?



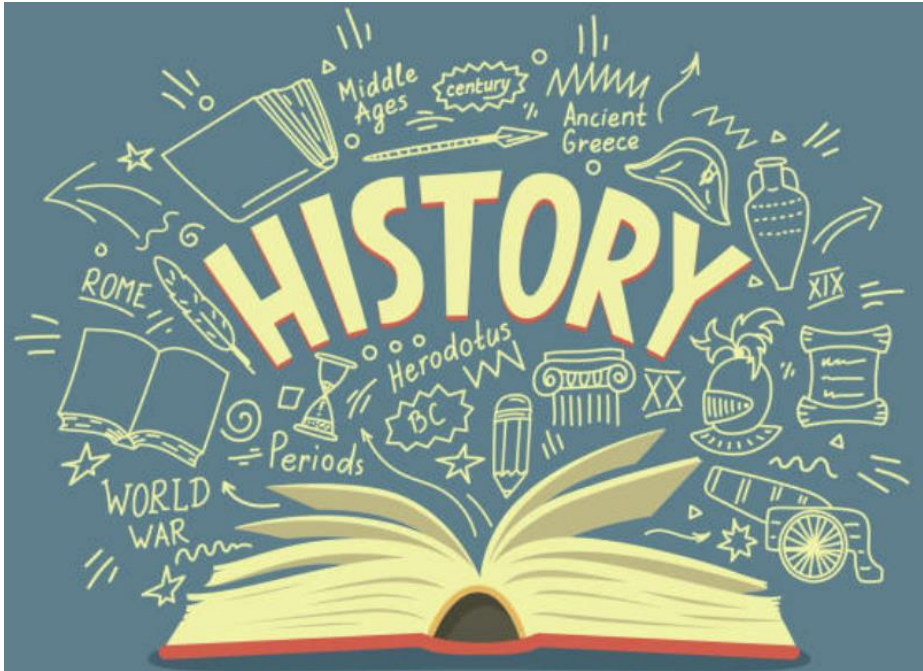
Artificial Intelligence (1 of 3)

- You could ask ChatGPT to answer questions, but you wouldn't be able to...
 - vet the answer
 - explain it
 - apply it
 - ask follow-up questions
 - use the knowledge to infer or predict implications
 - filter the important from less important details
 - compare or contrast it with similar content



Higher order
thinking skills

Artificial Intelligence (2 of 3)



- Individuals with foundational knowledge and skills can immediately recognize an error if AI states that $2+2 = 7$; those without foundational knowledge and skills cannot.
- Using AI to skip the slow, effortful work of learning is not the key to developing critical thinking skills, but it is the surest way to prevent them from developing.

AI serves production, not learning.

Offloading vs. Outsourcing

- **Offloading** is using a tool to do something you *can* do, *but don't want to do* because it is harder or takes more time (the easy button)
 - Example - calculators, word processing, Waze, Ebikes, etc.
- **Outsourcing** is using a tool that you *can't* do and if there is no tool available you have no skills to do so on your own creating dependency on the tool.
 - Examples - Using AI to write a paper, answer questions, summarize reading assignments, drive a car to travel long distances, cranes to lift heavy objects, etc.



Artificial Intelligence (3 of 3)

The use of AI tools for education and learning has outpaced the research needed to understand the impact on children's learning and development
(Institute of Digital Media and Child Development, 2026).

Questions to ask about AI:

- Is the tool *teaching* what you want them to learn?
- Does it scaffold learning and provide feedback?
- Did development of the tool involve educators or developmental researchers?
- Does the tool tell the answer or prompt students with questions that lead to deep thinking and reflection?

Digital Assessments (1 of 2)

- The **Progress in International Reading Literacy Study (PIRLS)** is an international assessment of reading skills for younger children conducted every 5 years. In 2021, the United States administered BOTH versions of the PIRLS. The digital performance was so poor that the US did not release these scores; only the paper results were made public.
- In 2024, **the SAT** switched from paper to digital, but... along with the switch came an overhaul of the reading comprehension section where students were no longer assessed for deep reading. Instead, the test developers refined to task to suit the digital modality.

Digital Assessments (2 of 2)

- Two groups of **5th graders** were taught the same material over the same time period, but one was assessed in a print modality while the other in a digital modality. Students tested on paper *improved* by roughly 14%, while students tested on computers *declined* approximately 5% (Lee, 2025).
- **9th grade students** completed one test on their own computer and another on paper. The questions were categorized as “easy” or “hard”. Students did better on the “easy” questions in the digital modality, but better on the “hard” questions in the paper modality (Pengelley & Rovis-Hermann, 2023).

They didn't fail to learn; the modality of the assessment interfered with how they demonstrated their learning.

Developmental Readiness for EdTech

- Children need to develop the deep reading and writing skills, **stamina, and perseverance** that only comes from reading and writing print, while still being *exposed* to digital content that can *support* certain skills or *complement* certain content.

Only after the age of 10 should students be reading through a digital medium for comprehension (Wolf, 2018).

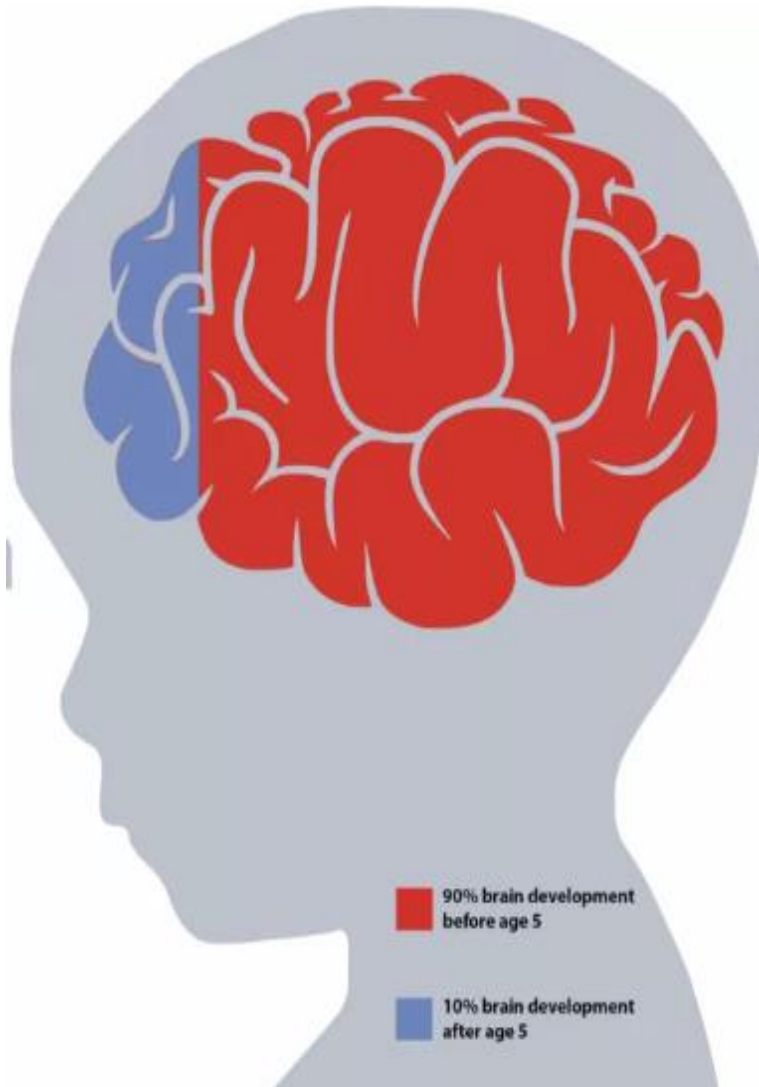
- Technology is most effective when being used by someone with a strong fundamental base of knowledge in the area that a particular technology works to enhance (Clement & Miles, 2018).

Everything Has Changed – Nothing Has Changed

The digital ecosystem has made it increasingly more complex to raise a child to be physically, mentally, and socially healthy, but **children still need the same three things they've always needed** to develop healthy, creative, flexible, problem-solving, socially adept brains that are **ready to learn...**

1. Interacting with parents, siblings, and other humans (Scott & Brito, 2022),
2. Moving within and manipulating the physical world (da Silva & Arida, 2015), and
3. Play (Yogman et al., 2018).

Critical Periods of Development (1 of 2)



A child's brain is 80% developed by age 3.
A child's brain is 90% developed by age 5.

That means every touch, smell, taste, visual image, movement, sound, emotion, and every **experience** from birth to age five either positively or negatively supports the development of a brain that is ready to learn.

Critical Periods of Development (2 of 2)

Greater screen exposure in the 2nd year of life is associate with **delayed communication and problem-solving skills in early childhood**

(Putnick et al., 2023; Zhao et al., 2022) and

higher amounts of screen use beyond recommended levels is linked to

**poor language and educational outcomes
as well as peer relationships in later childhood**

(Brushe et al, 2024; Gold et al., 2021; Gath et al., 2025).

- 85% of parents receive no information of guidance about screen time from health professionals such as midwives, health visitors, general practitioners, or parent educators (Leadsom Foundation, 2026).

Brain Development 101

- The more a child does a certain activity, the better those connections are built.

*Think about how babies are clumsy
when they first learn to walk*

- Connections have a special coating (**myelin**) to make what is learned easy to repeat.

Think about the protective coating around a cord

A well-myelinated brain signal travels over 100 times faster than an unmyelinated brain signal, but.... **the brain cells that produce this coating are easily damaged by the wrong kind and wrong amount of stimulation.**



Increases in SWD – United States

According to the U.S. Department of Education, EdFacts Data Warehouse, in the U.S. from the **2021-22** school year to the **2023-2024** school year...
(two years)

Speech-Language Impairment

- **PreK – 16.32%**
- School Age – 5.50%

Developmental Delay

- **PreK – 21.10%***
- School Age – 11.26%

Autism Spectrum Disorder

- **PreK – 67.45%***
- School Age – 20.51%

•

It is **not** that screens ***cause*** ASD,
but *disproportionate digital interactions as opposed to
human interactions*
during **critical periods of development**
can negatively impact the development of ...
**social communication,
language, and
emotional regulation skills.**

Possible Explanations for Increases in ASD

- Broadened definition of ASD.
- Improved screenings for ASD at wellness visits.
- Increased awareness of ASD.
- Difficulty with differential diagnosis due to overlapping characteristics.
- Diagnosis often serves as eligibility for services, (Mandell et al., 2009) which may contribute to increased rates and supports potential overdiagnosis (Castro et al., 2026).
- Prenatal risks such as advanced parental age, certain medications, gestational diabetes, exposure to toxicants

**... but what about environmental contributors;
the child's actual language and sensory environment?**

Preschool Suspension and Expulsion

The behavior of preschool aged children is often cited as an area of current significance with data revealing that 250 preschoolers nationwide were suspended each day which is **three and a half time greater than that of kindergarten through 12th grade students** (Loomis et al., 2022).

An estimated rate of 6.7 per 1,000 PreK children,
compared to only 2.1 per 1,000 in K-12.

Preschoolers and iPads



A neuroimaging study has shown that young children aged about 3 who are very exposed to screens are **poorer at inhibitory control**, an essential function for the regulation of behavior (Meng et al., 2024).

“We Took Away Childhood Then Called It a Behavior Crisis”

(Stineheart, 2026)

- “A lot of children are just **less practiced at the basic work of being human**”
- “When we clear away play, movement, neighborhood life, boredom, responsibility, mixed-age groups, small risks, and child-led problem solving, we should **expect developmental consequences**”
- “The work ahead must move beyond better behavior management. Instead, we need to **rebuild the conditions** that allow better behavior, deeper learning, stronger relationships, and healthier development to emerge”

Potential Long-Term Impacts

With the increase in preschoolers with a disability as well as an increase in preschool behaviors not addressed through effective intervention resulting in removing children from instruction, what are the possible impacts on reading and math in 3-4 years?

Oral Language is the Foundation for Written Language

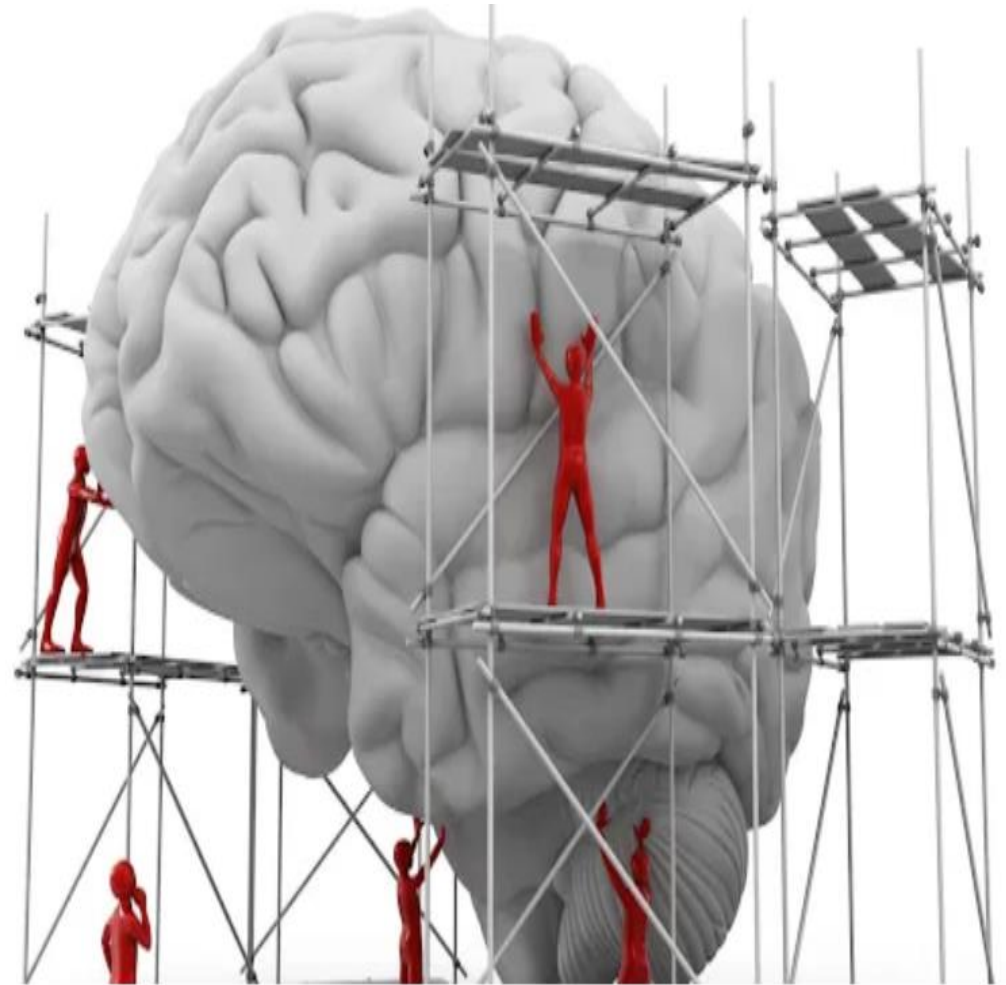
- Many studies have documented a strong relationship between early **oral language** ability and future reading comprehension and writing (Barton-Hulsey et al., 2017; Catts et al., 2006, 2016; Chaney, 1998; Dickinson & Tabors, 2001; Griffin et al., 2004; Language and Reading Research Consortium [LARRC], 2015; LARRC et al., 2019; Lee, 2010).
- Most late-emerging poor readers showed **oral language** weaknesses from kindergarten to second grade (Catts et al., 2012), but if oral language weaknesses had been identified and addressed earlier, it is possible that negative effects on reading development could be **prevented or reduced** (Truckenmiller, 2024) **by up to 70%** through early identification and prevention programs (Lyon, et al., 2001).

Building a Brain that is Ready to Learn

The skills necessary to learn and succeed in school develop **before** children start kindergarten and include skills related to...

- language,
- early literacy,
- early math, and
- social-emotional (executive function)

(Whitehurst & Lonigan, 1998; Curran & Kellogg, 2016; Shonkoff & Phillips, 2000).



Executive Function



It is the early language and executive function skills at age four;
not the early reading and math skills, that positively predict the rate of learning in elementary school
(Pace et al., 2019).

Components of Executive Function

Cognitive Flexibility = Problem Solving and Perspective Taking

- thinking about something in multiple ways and perspective taking (e.g., considering someone else's perspective on a situation or solving a problem in multiple ways).

Working Memory = Multi-Tasking

- keeping information in mind and manipulating it in some way.

Inhibitory Control = Social-Emotional and Impulse Control

- deliberately suppressing attention (and subsequent response) to something such as ignoring a distraction, stopping an impulsive utterance or action, or overcoming a highly learned response.

Why Is Executive Function Important in PreK?

Predictive Indicators (NEGP, 1995):

Physical/Motor Development:

- **Executive functioning**, Visual-spatial skills, Precision in movement

Social and Emotional Development:

- **Executive functioning**

Approaches to Play and Learning:

- **Executive Functioning**, Emotional regulation, Temperament

Language:

- **Executive functioning**, Phoneme isolation, Letter naming, Vocabulary

General Knowledge/Cognitive Development:

- **Executive functioning**, Number identification, Subitizing, Ordinality

Which of These Do Students Struggle with the Most?

Cognitive Flexibility = Problem Solving and Perspective Taking

Working Memory = Multi-Tasking

Inhibitory Control = Social-Emotional and Impulse Control

Inhibitory control has a very steep developmental slope
between 3 and 5 years of age

(Rosas et. al., 2019; Best et al., 2009; Best & Miller, 2010).

A Decrease in the Development of Executive Function

- A recent longitudinal study of 3,000 children ages 3 to 11 from 2018 to 2023 found an average decrease of 7.5 points or half a standard deviation across all levels of SES using the Minnesota Executive Function Scale (age two-adult) (Jones et al., 2026).
- Increases in screen time are one of the many environmental changes children experienced during this time that may have affected EF development (Eales et al., 2021; Hendry et al., 2022).
- The development of EF begins with experiences in early childhood, **between the ages of 3 to 6**, when there is rapid growth of the pre-frontal cortex.

How We **Learn** to Get to Neutral

- Pacifiers and thumb sucking are tools babies use to calm themselves until they *learn how to do so without them*, but digital devices have become the “new pacifier”, and they do not teach children **HOW** to calm.
- The way children learn to calm themselves is by watching how adults calm themselves and by being taught **HOW** to calm by noticing how their body feels, labeling the feeling or emotion, using a strategy to get back to neutral.
- 1 out of 10 babies fall asleep with a screen (Leadsom Foundation, 2026).



Executive Function and Behavior

The self-reflection necessary
to formulate the appropriate response.

- **Perspective taking** including **thinking about your own thinking**.
- **Inhibiting** the first (likely emotional) response.
- Thinking about the situation **while inhibiting response**, overcoming a learned/practiced response, sorting feelings and a list of appropriate responses (a.k.a., **working memory**).
- Delayed gratification: tolerating short-term disappointment for long-term gains.
- The **language** to express feelings appropriately.

EF and Reading

A recent meta-analysis found that each of the three areas of EF were significantly associated with reading (Zhou et al., 2026)

- Working memory had the strongest relationship with reading with verbal working memory being of particular importance for both word reading **and** reading comprehension.
- Cognitive flexibility had moderate to strong associations with *word reading, reading fluency*, and reading comprehension.
- Inhibitory control varied depending on the assessment though self-regulation is what *allows* readers to consciously coordinate the various processes necessary for successful reading (Duke & Cartwright, 2021; Iowa Center for Reading Research, 2023).

Executive Function and the Role of Adults

Children are not born with Executive Function skills – they are born with **the potential to develop them.**

Adults play a critical role in the development of Executive Function skills through play...
first by helping them complete challenging tasks,
then by gradually stepping back to let them
manage the process independently
and then by allowing them to learn from their mistakes
(Center on the Developing Child at Harvard, University, 2014).

Attention (1 of 2)

***“Get on this app for 20 minutes to practice math facts,
now let’s learn about science for 45 minutes”***

- The average attention span on a digital device was approximately 150 seconds in 2004. In 2012, it was 75 seconds. In 2023, it was 47 seconds (Mark, 2023).
- The very features that keep students glued to a screen are the same ones that make **deep thinking** (and deep reading) impossible (Horvath, 2026).
- Consider neuroplasticity and the structural adaptation to an environment that rewards speed and skimming over depth and understanding (Simarata, 2025).

Attention (2 of 2)

When studying on a screen, the average student lasts less than six minutes before drifting into unrelated digital distractions and when using a laptop in class, students spend an average of 24-38 minutes of every hour off-task.

Hyperstimulating content,
overexaggerated features,
short videos,
short reading passages,
constant rewards

VS.

Time to reflect,
sustained focus,
deliberate effort,
perseverance

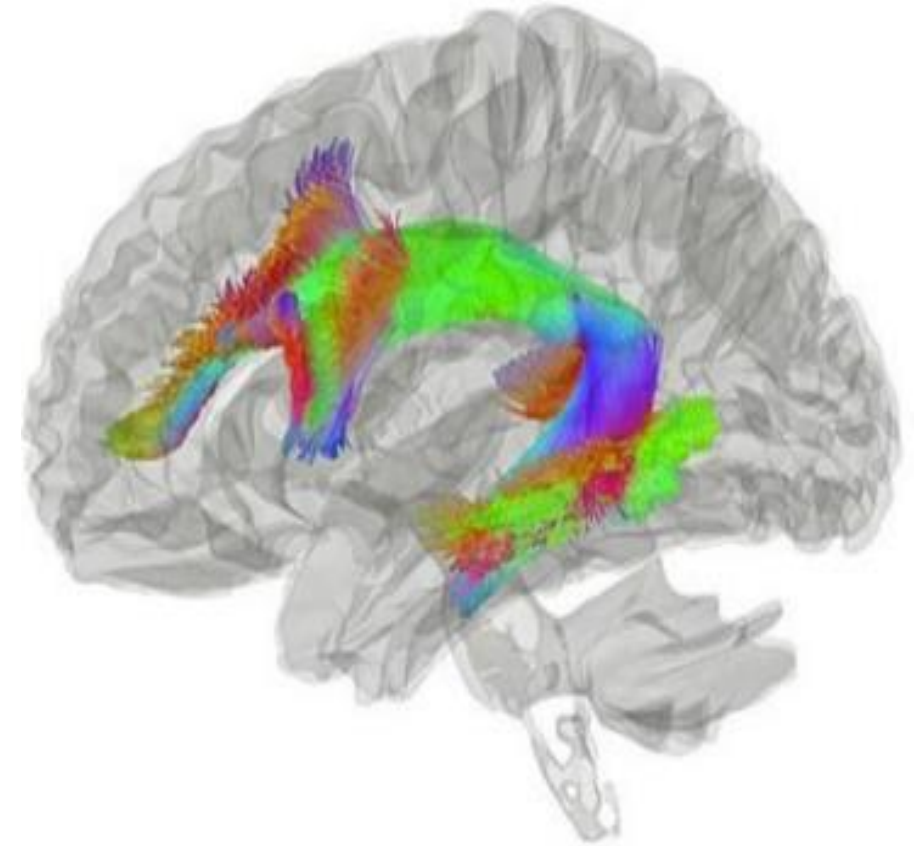
Oral Language is the Foundation for Written Language (Revisited)

Reading is not primarily
a visual skill –
It is a language skill.

The parts of the brain we use for **reading**
are the same as the language areas.

How do children acquire oral language?

Through conversation!



“Conversation is the Secret Sauce”

The important thing is not just to talk *to* children,
but to talk *with* children.

- Rethinking Language-Rich Environments
- Interactive, back-and-forth conversational dialogue is roughly **six times more potent than one-on-one reading** input by itself (Zimmerman et al., 2009).
- Passive speech exposure - the total number of adult words heard - has little direct correlation with development in the language areas of the brain or vocabulary growth (Romeo, 2018).



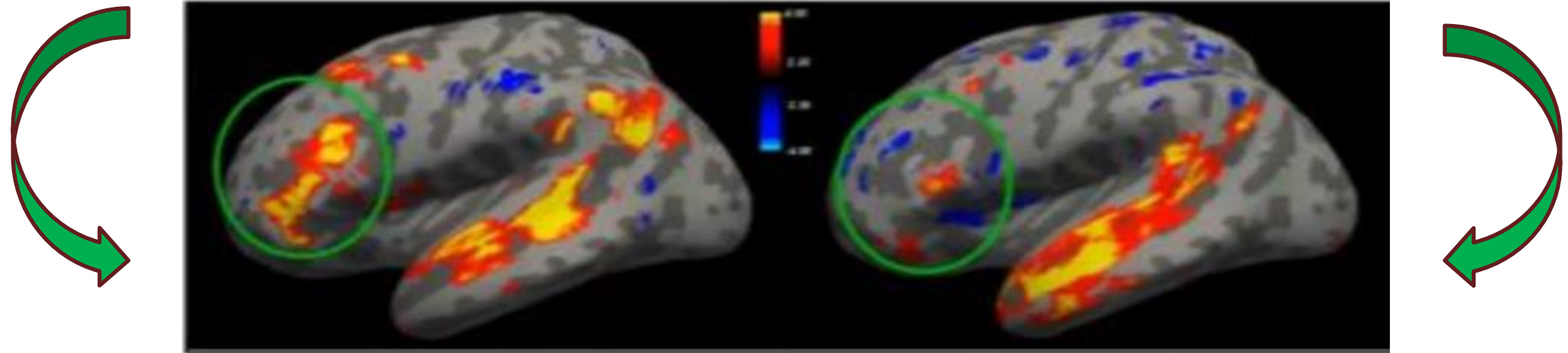
It's Not the Number of Words Heard – It's the Amount of Conversation

1,220 turns per day

Verbal score = 121

580 turns per day

Verbal score = 90



Children who had more conversations
with their caregivers had stronger development
in the areas of the brain that support comprehension.

The greater the conversational turns, the greater the verbal abilities
regardless of socio-economic status or the volume of adult speech

(Romeo, 2018).

Play

“Play is not just an item on the childhood checklist.

It is where many skills converge and overlap. For example,

Self-regulation, because frustration is built in.

Social skills, because other children are gloriously inconvenient.

Independence, because no adult is telling them the next step.

Resilience, because games fall apart and have to be rebuilt.

Executive function, because they have to remember the plan, adjust the plan, control impulses, and keep going.

Play is a massive part of the growing environment”

(Stineheart, 2026).

Play-Based vs. Phone-Based Childhoods

Children's environments have shifted from a
“play-based” childhood
(play, problem solving, sensory stimulating, etc.)
to a **“phone-based” childhood**
(decrease in physical play, social interactions,
and experiences)(Haidt, 2024).

If children do not get what they need from
their relationships with other people
as well as their environments,
skill development can be seriously
delayed or impaired
(Harvard University, 2011).



Research Related to a “Phone-Based” Childhood (1 of 5)

Cognitive

Screen use among pre-kindergarten children *that exceeded the American Academy of Pediatrics guidelines* was associated with decreased myelination in the of areas of the brain that support language and emergent literary skills as well as corresponding cognitive assessments (Hutton et. al., 2020).



Research Related to a “Phone-Based” Childhood (2 of 5)

Communication/Language

Screen time diminishes the quantity and quality of interactions between children and their parents, resulting in fewer opportunities for the child to practice and develop language (Mustonen, Torppa, & Stolt, 2022).



Research Related to a “Phone-Based” Childhood (3 of 5)

Fine Motor, Gross Motor, Sensory Processing

- Children exposed to excessive screen time were more likely to suffer from problems with fine motor development and gross motor development (Bedford et al., 2016; Pagani et al., 2013; Howie et al., 2017).
- Toddlers who experienced **any** screen time at **12 months** had a 105% greater likelihood of exhibiting **a**typical sensory behaviors at 33 months... for each additional hour of daily screen time at **18 months** there was a 23% increased risk of exhibiting sensation-avoiding behaviors, at **24 months** there was a 20% increased risk of sensation-seeking, sensory sensitivity, and sensation-avoiding at 33 months (Heffler et al., 2024).

Research Related to a “Phone-Based” Childhood (4 of 5)

Behavior/Self Regulation

Child tablet use at age 3.5 years was associated with more expressions of anger and frustration by the age of 4.5 years.

Child proneness to anger/frustration at age 4.5 years was then associated with *more use of tablets* by age 5.5 years

which suggest that early-childhood tablet use may contribute to a cycle that is deleterious for emotional regulation (Fitzpatrick et al., 2024).

Research Related to a “Phone-Based” Childhood (4 of 5)

Social

Screen time at age 1, 1 ½, and 3 years of age predicted non-social behavioral traits at age 4 ½ demonstrating a clear connection between increased screen time in early childhood to poorer social skills and atypical behaviors later (Ramkumar et al., 2022).

The Importance of Play According to the People We Trust Most with Child Development

Developmentally appropriate play is the singular opportunity
to promote the social-emotional,
cognitive, language, and self-regulation skills
that build executive function
and a prosocial brain
that is ready for academic learning

(American Academy of Pediatrics, 2018).

Play and Perseverance

- Physical play is where children test themselves, increase and refine their abilities through practice, and build self-confidence. In fact, trying tasks again and again is a pattern repeated throughout life.

Reading – **AT EVERY AGE** – requires perseverance.



- Few facts that a child learns in the first few years will persist in a meaningful way into their school years and beyond as much as ...
 - a fearless willingness to meet challenges,
 - to solve problems and work with others,
 - to be persistent, imagine, and create something new (Rich, 2024).

Mental Imagery and Screens

Little brains need to be able to create mental pictures.

It's a key factor for all learning.

Screens rob them of that opportunity.

Screens provide *pre-made* images.

They do not allow the brain to generate their own.

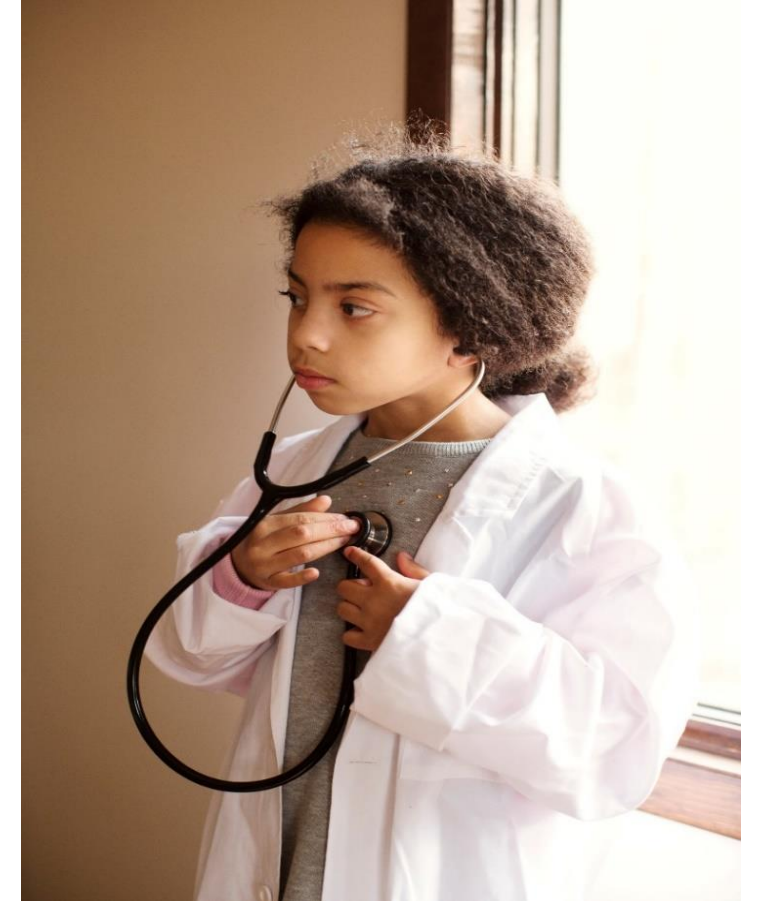
(Sumpter, 2024)



Play and Mental Imagery

Substituting one object for another requires a mental models/mental imagery

- Age 3: more dependent on real objects as play centers around common themes (taking care of a baby, driving cars, cooking, etc.)
- Age 4: less dependent on real objects and create what they need from anything that is at hand (e.g., a bowl becomes a ship, a stick becomes a sword, etc.)
- Age 5: play without props using mental models or mental imagery to imagine a vet's office, house, castle, restaurant, a phone, a steering wheel, etc.



Play and Working Memory

Children's working memory starts developing
in the earliest stages of life
through play
as they structure play in real time.
They make decisions,
develop rules,
adhere to and modify rules
and it is where they are free to fail
and start all over,
take risks,
and try new things (Rich, 2024).



Motor Development

Kids need **opportunities** to develop their motor skills.

- Ball play develops hand-eye coordination.
- Drawing with crayons helps develop feedback about the amount of pressure to use when writing.
- Pinching an object with the thumb and pointer finger is foundational to the tripod grasp for holding a pencil.
- Playing with Play-Doh or squirting a water bottle develops hand strength.
- Drawing, painting, coloring on vertical surfaces (e.g., easel or wall), helps strengthen the shoulder and wrist.

Sensory Development

- Children need opportunities to build up their sensory development.
- Without sensory opportunities (sensory deprivation), children often experience sensory processing issues.
- Sensory deprivation leads to behavioral meltdowns, anxiety, and learning difficulties as well as being overly sensitive (avoiding textures, noise) or undersensitive (constantly seeking movement, rough play, crashing into walls).



The Importance of Being Present

Being on a device in front of a child creates a "**still face**" effect.

Twenty-one studies involving 14,900 participants from 10 countries found significant negative associations between parental technology use in the child's presence and child development (Toledo-Vargus et al., 2025).

Splitting attention comes at a cost.



Displacement/Opportunity Cost

- Developmental risks associated with screen use appear partly related to screens **displacing** caregiver talk, joint attention, play, and hands-on exploration (Golds et al., 2021; Samuelsson et al., 2022; Wan et al., 2021).
- Several studies report associations between higher early-screen exposure and prolonged use with higher levels of **ASD-like behaviors** and social-communication difficulties in young children (Dikkla et al., 2022; Melchoir et al., 2022; Chakhunashvili & Chakhunashvili, 2025) which is not to imply causation but to **suggest relevancy when there is displacement of parent-child interactions** (Heffer et al., 2020).

“... But It Keeps Them So Calm” (1 of 4)

What does it mean to be “calm”?



Entertained is not the same thing as calm.

“... But It Keeps Them So Calm” (2 of 4)

The reason why screens **seem** to calm children is because their brain is having to work extra hard to focus on what they see.



- The **visual system** begins developing at age 2 but is not fully developed until around age 8-9. That means young children from birth to 9 are not yet able to follow hyperstimulating content they see on screens.
- The visual system is closely linked with the **vestibular system** which is related to our mood.



“... But It Keeps Them So Calm” (3 of 4)

Hyperstimulating visual content puts the brain in hyper-focus, and it is difficult to look away from.

Then, as soon as it is removed
the **visual** system is now super **UN**focused,
and the **vestibular** (mood) system is **UN**locked.



“... But It Keeps Them So Calm” (4 of 4)

To rebalance, children need to do something physically active immediately after screen use

Heavy work

- pushing
- pulling
- squeezing
- chewing
- climbing
- lifting
- carrying
- jumping



WALL PUSH-UPS



JUMPING ON A
TRAMPOLINE



CARRYING SOMETHING



ANIMAL WALKS

Using Devices to “Calm”

Child tablet use at age 3.5 years was associated with more expressions of anger and frustration by the age of 4.5 years.

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which suggest that early-childhood tablet use may contribute to a cycle that is deleterious for emotional regulation (Fitzpatrick et al., 2024).

Technoference and Behavior

Excessive amounts of screen use by the child and/or the parent has a negative impact on play-based and other activities that enhance cognitive and social-emotional skills necessary for kindergarten readiness (Sigman, A., 2017; Pagani et al., 2010).

- Parental technoference can interfere with children's health and development, specifically **predicting behavioral problems** (McDaniel & Radesky, 2018; Elias et al, 2020).
- Parent's specific use of digital media **to calm** young children may be particularly disruptive to children's development of self-regulation skills (Coyne et al., 2021).

“... But They Need it to be Safe”

“The most common reason parents give children smartphones – concerns about safety, but let’s be honest, giving a child a smartphone for the rare chance they may need you also gives them access to:

- Thousands of local predators
- Unlimited pornography
- Sextortion criminals
- Human traffickers and drug dealers
- Scammers and cyberbullies
- Explicit content algorithms designed to keep them scrolling

That’s not increasing safety.

That’s opening the front door to dangers most parents never see coming.

As a police officer, I rarely deal with children who were harmed because they didn’t have a smartphone. I regularly deal with children who were harmed because they did.”



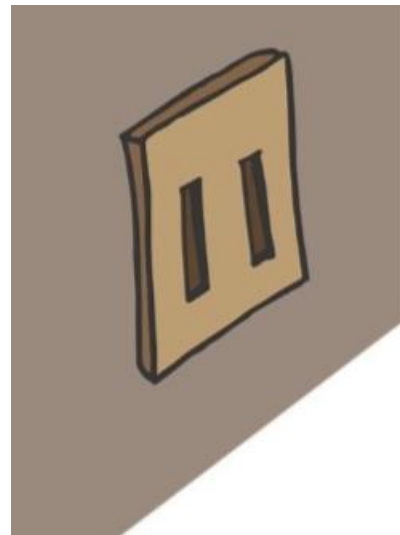
EdTech “T.L.D.R.”

“We know our children will use technology for work and life in adulthood.
We just want to ensure they have a childhood first.”

(Cherkin, January 2026 Congressional testimony)

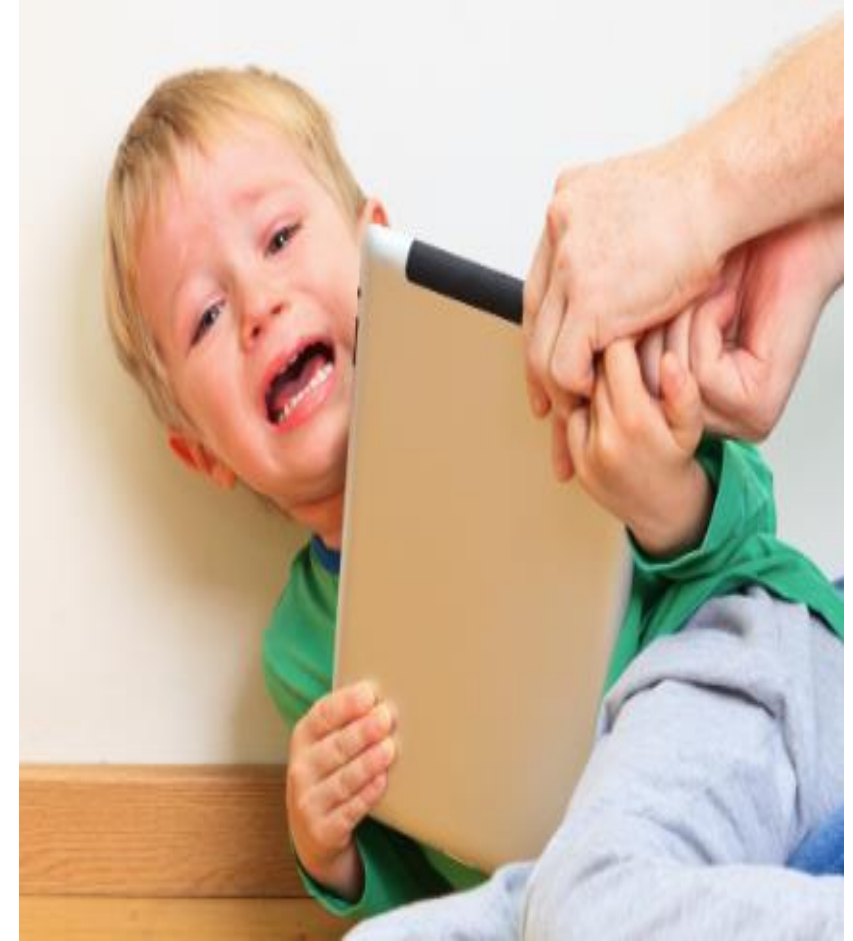
The best preparation for a digital future is an analog childhood.

1. Less is best.
2. Later is better.
3. Skills before screens.



Signs That Screens May Be A Concern

1. Getting angry when asked to turn off or put away screens
2. Unable to calm themselves without a screen
3. Increasingly poor behavior, social interactions, and irritability when not on a screen
4. Spending time off screens thinking about how and when they will get back on a screen
5. Negative impacts on **sleep**, eating, development, or education.



Conversation as an Intervention

Because the areas of the brain that we use for reading are the same as the language areas, early intervention programs aiming to close the achievement gap should focus on increasing children's conversational turn taking (Deckner, et al., 2006).

Language shapes thought, emotion regulation, and social interaction such that deficits in language skills often predict later behavioral problems.

LENA is an early childhood intervention program targeting conversation has 200+ peer-reviewed research studies demonstrating that this program improves child outcomes in cognitive development, language development, social-emotional (behavior) skills, and literacy skills.

Play as an Intervention

Play is so powerful it can be used as an **intervention to close gaps** for children between the ages of 3 to 6
(Parker & Thomsen, 2019).

Why?

Dramatic play is how children make sense of events in their lives, better understand themselves, and to explore the emotions and perspectives of others which supports the development of emotional regulation, executive function, social competence, and empathy.

Top 5: Screen Time Tips for Families



1. Teach screen time manners, expectations, and consequences from “day one” and update often .
2. Create screen free and screen possible times of day and locations.
3. Have a **family** plan for tech use (including parent/caregiver device use).
4. **Change the device setting from color to grayscale.**
5. No unsupervised use of tech.

Top 5: Screen Time Tips for Classrooms

1. If there must be devices in the classroom, change the setting to “black and white” or “grayscale”.
2. Ask for evidence of effectiveness.
3. Ask for data and privacy related data (for students and teachers).
4. Ensure that any use of devices is connected to real world application.
5. If the same activity can be completed on “in the real world” as on a device – do not choose the device.

Top 5: Screen Time Tips for Schools/Districts

(Cherkin, 2026)

1. Audit all EdTech products used for evidence of effectiveness.
2. Do not use, implement, or adopt any AI chatbot or GenAI-embedded product until it has been thoroughly tested and vetted for safety.
3. Do not use products that lack a data privacy agreement. **Ever.** If the technology will collect, sell, or share any child's data with third parties, do not contract with them.
4. Publicly post all the EdTech products used (teacher- and student-facing) with a link each product's privacy policy.
5. Obtain informed **parental consent** for **each** EdTech product.

Do the best you can until
you know better.

Then when you know better,
do better.

-Maya Angelou



Thank you for your time,
attention,
attendance, and
for what you do
for children every day!

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