

# The impact of AI on learning

## Debates, evidence and potential responses

Dr Marta Estellés

Dr Andrew Doyle

April, 2026

# AI in education: The debate

## Techno-optimist

AI potential to:

- Increase access to information
- Increase productivity
- Personalised learning
- Offloading of extraneous cognitive load
- Boost performance

More equity

## Techno-sceptical

AI potential to:

- Undermine deep learning and critical thinking
- Cognitive offloading and deskilling
- Assessment authenticity
- Reinforce biases
- Erode teacher-student relationships
- Privacy loss
- Increase tech dependency

Less equity

# Empirical evidence? Mixed results

## Techno-optimist

### Findings:

- Personalised learning: tailored feedback, custom pathways, scaffolding of instruction (Amzil et al., 2023; Wardat et al., 2023; Wei 2023)
- Increased confidence, autonomy and learning efficacy (Chen et al., 2025; Du & Alm, 2024)
- Increased access to information and learning efficacy (Gkintoni et al., 2025)
- Increased productivity for teachers (Ayeni et al., 2024)
- Opportunities for gamification and increased motivation (Abbes et al., 2024)

**Solution:** Learn with AI

## Techno-sceptical

### Findings:

- Reduced cognitive engagement, memory retention and critical thinking (Forsström et al., 2025; Gerlich, 2025; Kosmyna et al., 2025)
- Over-reliance (Seung et al., 2025; Zhai et al., 2024)
- Increase distraction and reduced attention spans (Forsström et al., 2025; Shanmugasundaram & Tamilarasu, 2023)
- Wellbeing risks associated with chatbots (Kurian, 2025)
- Negative effects exacerbated with younger participants (Gerlich, 2025; Shanmugasundaram & Tamilarasu, 2023; Wu & Yu, 2024)
- Increased workloads for teachers (Selwyn et al., 2025; Wang et al., 2026)

**Solution:** Learn without AI

# Point in the middle?



- AI use as inevitable

**Solution:** Learn with AI, but:

- More PDL for teachers
- Premium LLMs
- Policy frameworks for AI use and literacy

How do we make sense of these mixed results  
and contradictory solutions?

**Techno-optimist**

How do we make sense of these mixed results and contradictory responses?

- 1) **Social and economic interests beyond educational**

EDUCATION

# Enhance instruction for all students

Positively impact teaching and learning using AI to streamline class preparation, differentiate content, and gain valuable insights that enable educators to focus on what matters most.





# 2025 AI in Education A Microsoft Special Report

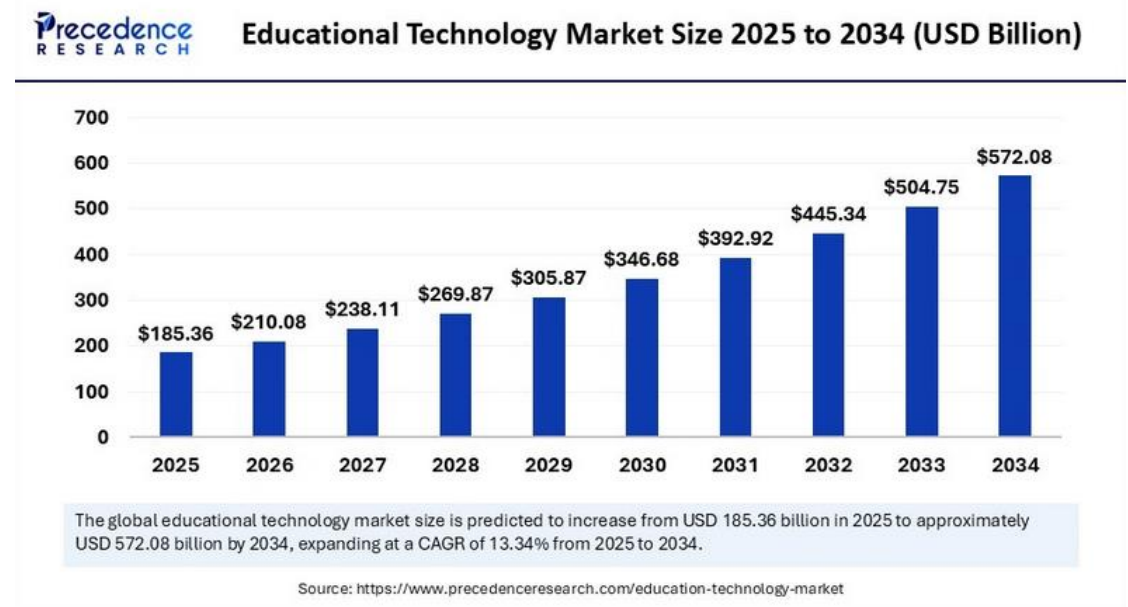
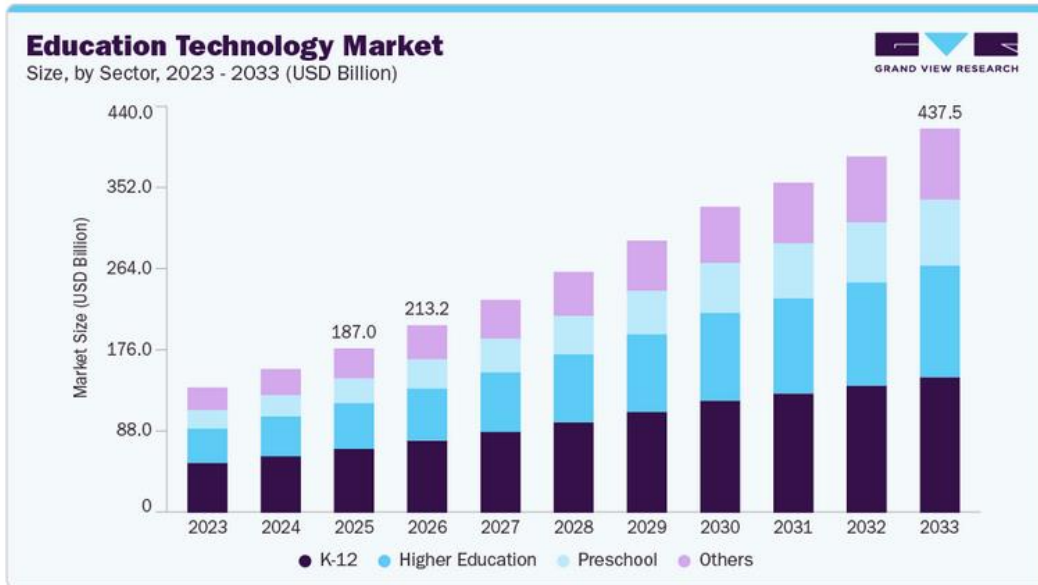
## AI for Students

Students' familiarity, use, and comfort with AI has increased dramatically; they often use it to save time, improve work, and assist with learning.

In a recent study from Australia, university students who used an AI-powered chatbot saw a nearly 10% improvement on their exam grades over peers who weren't using the tech. Predictably, AI use peaked during the weekend before the final exam; after the test, 72% of users stated they would be very disappointed if they couldn't use it again.



# Edtech Market size and estimated growth





# Why education cannot be left behind in New Zealand's AI Journey

INDUSTRY NEWS

the sector's growing strength and resilience.

- **Export remains a major focus**, with **71% of EdTechs exporting**, and **45% earning more than half their revenue from international markets**.
- **K-12 education leads the way**, with **74% of companies providing products or services for primary and secondary learners**, highlighting a strong commitment to supporting early education outcomes.
- **Confidence is high** for the year ahead, with **82% of EdTech businesses expecting revenue to increase or remain steady** in 2024/2025.

To get the full 16 page members report, [become a member of EdTechNZ](#) or get in touch to learn more at [info@edtechnz.org.nz](mailto:info@edtechnz.org.nz).



PRESIDENTIAL ACTIONS

# ADVANCING ARTIFICIAL INTELLIGENCE EDUCATION FOR AMERICAN YOUTH

Executive Orders | April 23, 2025

THE WHITE HOUSE  
WASHINGTON

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered:

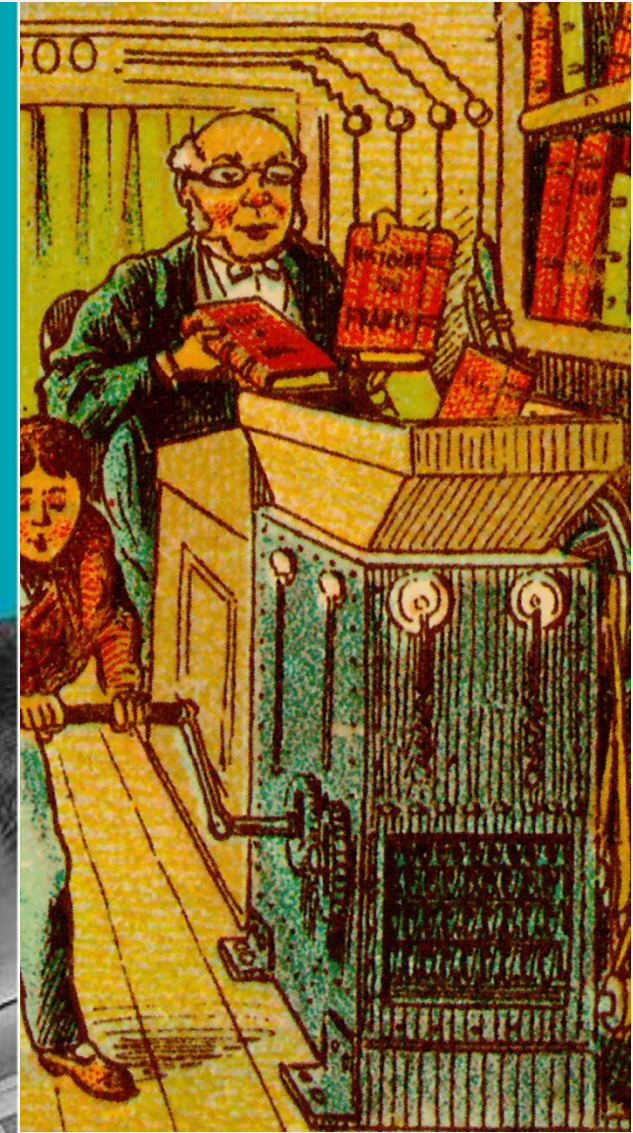
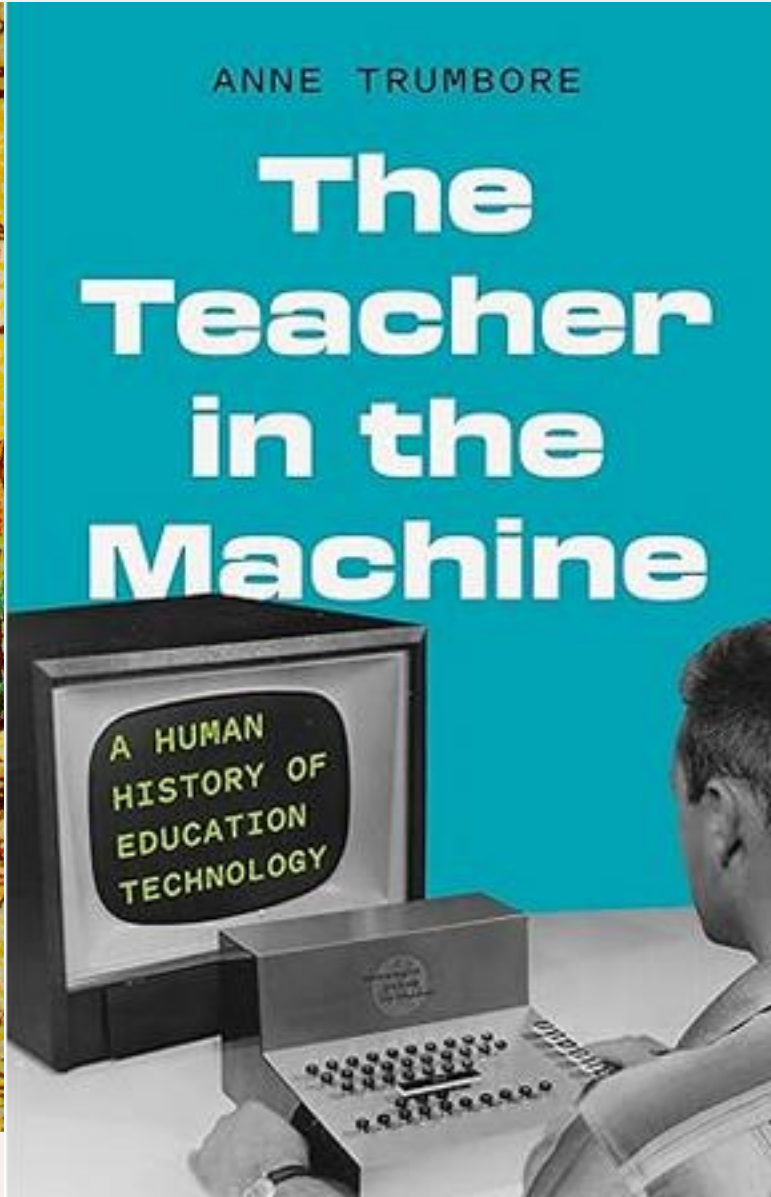
Section 1. Background. Artificial intelligence (AI) is rapidly transforming the modern world, driving innovation across industries, enhancing productivity, and reshaping the way we live and work. To ensure the United States remains a global leader in this technological revolution, we must provide our Nation's youth with opportunities to cultivate the skills and understanding necessary to use and create the next generation of AI technology. By fostering AI competency, we will equip our students with the foundational knowledge and skills necessary to adapt to and thrive in an increasingly digital society. Early learning and exposure to AI concepts not only demystifies this powerful technology but also sparks curiosity and creativity, preparing students to become active and responsible participants in the workforce of the future and nurturing the next generation of American AI innovators to propel our Nation to new heights of scientific and economic achievement.

How do we make sense of these mixed results and contradictory responses?

- 1) Social and economic interests beyond educational
- 2) **The power of technological utopias in education**



Coté, J. M. (1899)



How do we make sense of these mixed results and contradictory responses?

- 1) Social and economic interests beyond learning
- 2) The power of technological utopias in education
- 3) Limitations of techno-optimist educational research about AI



Limitations of ‘techno-optimist’ research on the impact of AI on learning:

- Often conflate performance/outcomes with learning, instruction with education

**FEATURED  
FACULTY**



Hamsa Bastani

**WRITTEN BY**  
Angie Basiouny

**A NEW STUDY LED BY RESEARCHERS** at Wharton and Penn reveals that using generative AI improves student performance, but also makes it harder for students to learn and acquire new skills.

The researchers designed an experiment with nearly 1,000 high school math students in Turkey to determine whether large language models can harm or help their education. One group of students was given GPT Base, a chat interface similar to ChatGPT-4, to help them during practice sessions. A second group was given GPT Tutor, an interface similar to ChatGPT-4 but with safeguards. It includes teacher input and is designed to guide students with hints rather than directly giving answers.

The third group — the control group — had no technology assistance and relied only on traditional resources such as the textbook and notes.

**KEY TAKEAWAYS**

- Students performed better in practice sessions with gen AI, but worse on tests when the software was taken away.
- Tutorial software that guided students with hints instead of direct answers was more beneficial to their learning.
- Students who relied on gen AI were overly optimistic about their abilities.



Limitations of 'techno-optimist' research on the impact of AI on learning:

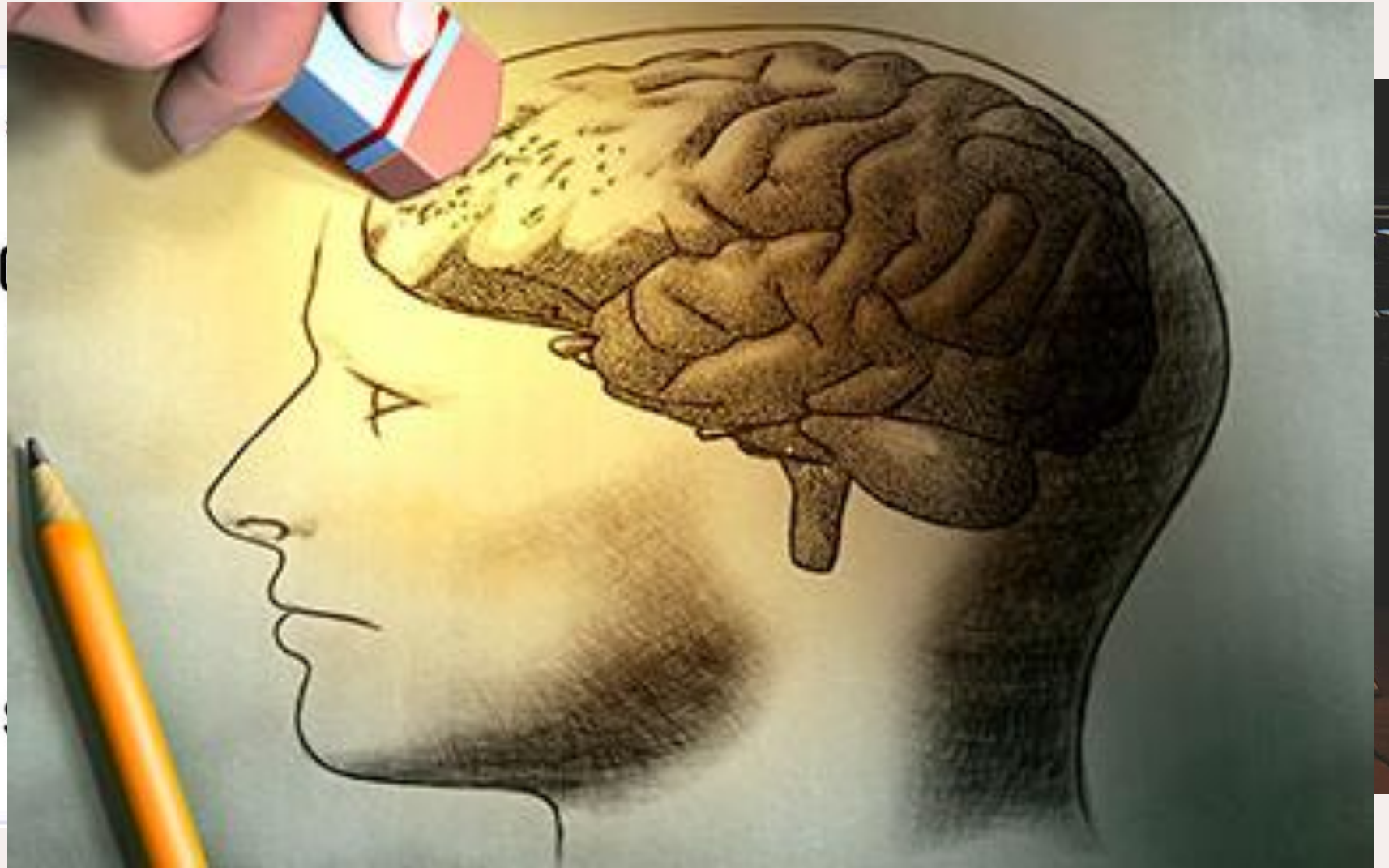
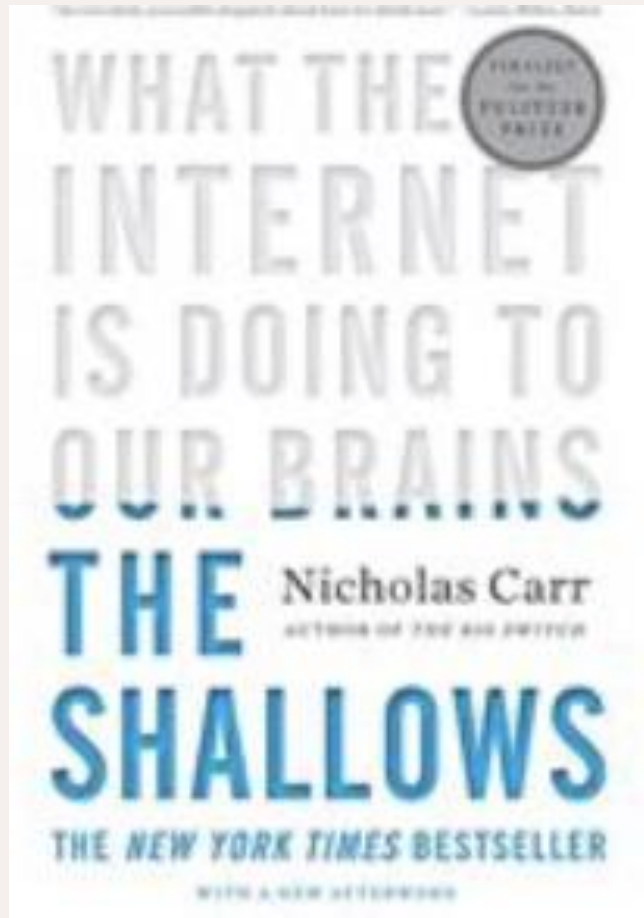
- Often conflate performance/outcomes with learning, instruction with education
- Do not consider socioemotional and relational variables involved in learning
- Exclusive focus on short-term impacts
- Focus on AI as an independent technology

**Solution:** Learn with AI?

Techno-sceptical

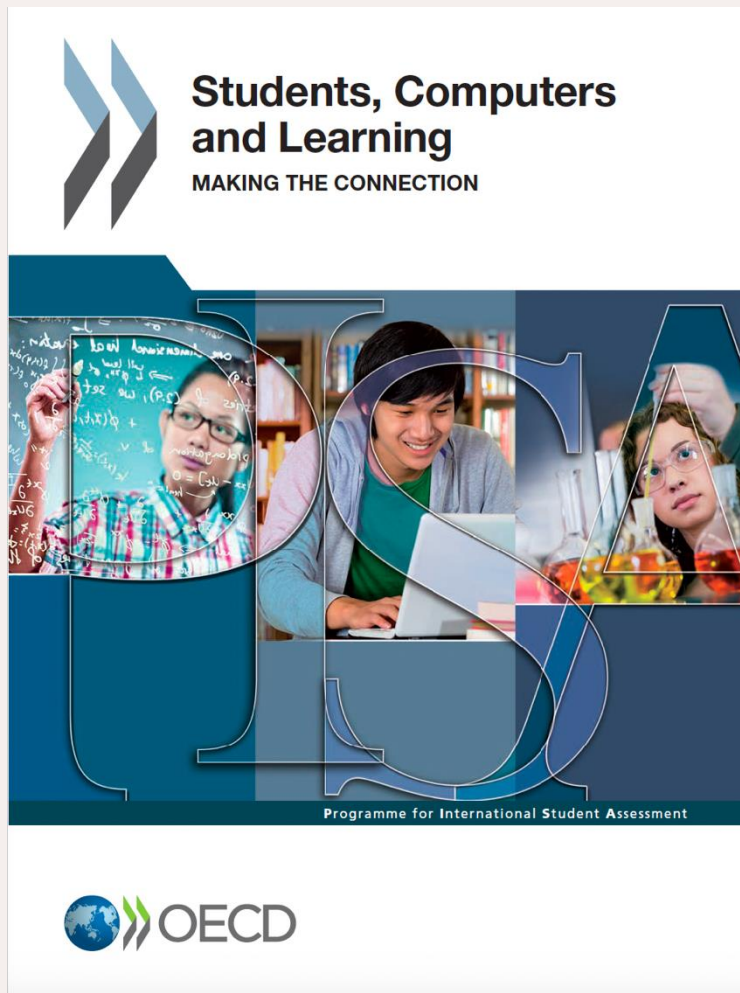
How do we make sense of these mixed results and contradictory responses?

- 1) Increasing critical voices with digital technology in education



How do we make sense of these mixed results and contradictory responses?

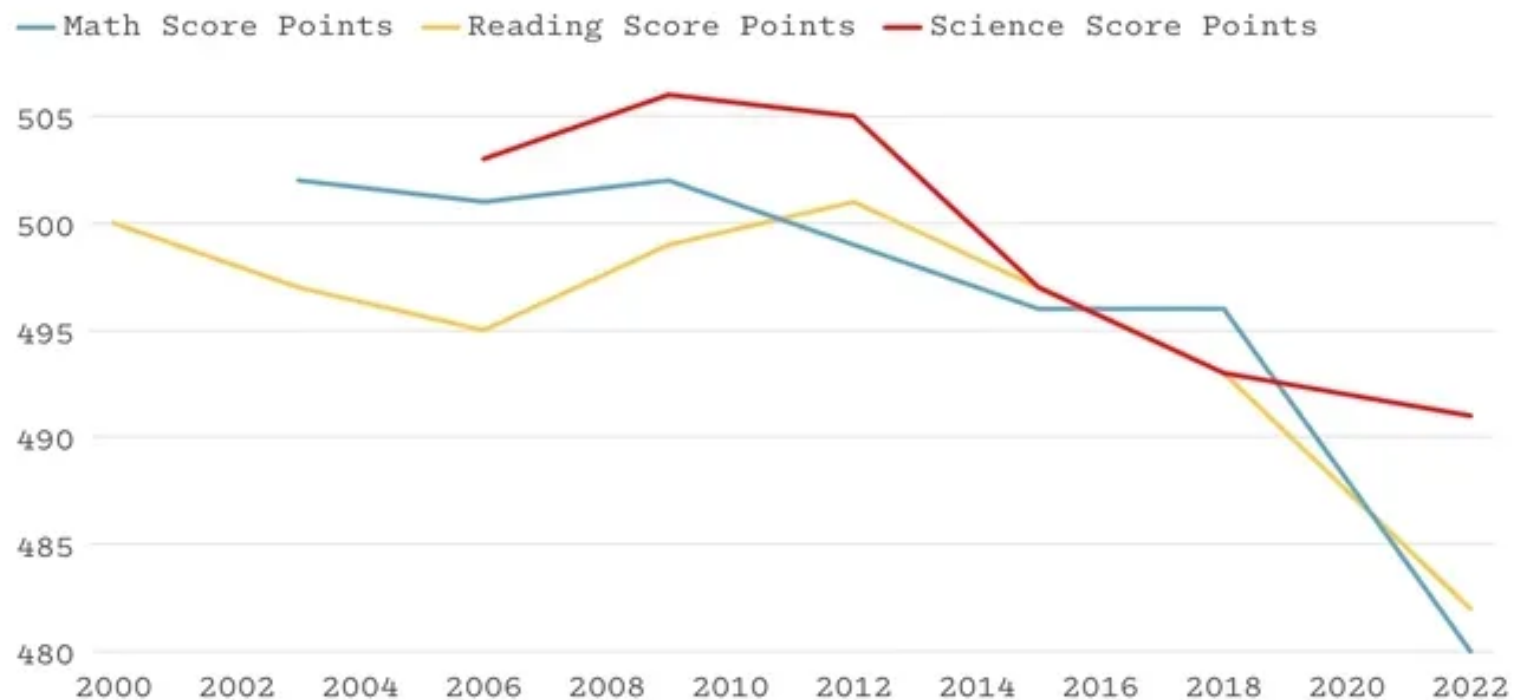
- 1) Increasing critical voices with digital technology in education
- 2) Evidence of digital harm and learning deterioration



“Students who use computers moderately at school tend to have somewhat better learning outcomes than students who use computers rarely. But students who use computers very frequently at school do a lot worse in most learning outcomes, even after accounting for social background and student demographics.

The results also show no appreciable improvements in student achievement in reading, mathematics or science in the countries that had invested heavily in ICT for education. And perhaps the most disappointing finding of the report is that technology is of little help in bridging the skills divide between advantaged and disadvantaged students” (p.3)

# Global PISA Test Scores in Decline



A

**Figure 1.** Declines in math, reading, and science scores averaged across the 38 OECD countries. Image source: [The Atlantic](#), from the OECD.

How do we make sense of these mixed results and contradictory responses?

- 1) Increasing critical voices with digital technology in education
- 2) Evidence of digital harm and learning deterioration
- 3) 'Digital backlash'

## *iPads in Kindergarten, YouTube on Breaks: The School Screen-Time Battle*

Mounting evidence shows that excessive computer use can harm children, so parents are cutting back at home. Now, the debate has shifted to the classroom.

Educacion

Sociedad

Bullying

## No phones, no smartwatches: Private schools crack down

Risks of “bullying, selfharm, negative selfesteem and behavioural problems” prompt schools to go further than the Government’s classroom phone ban, reports Amelia Wade.

SUNDAY STAR TIMES

05 abr. 2026



+7 Historias Similares

Some of Auckland’s wealthiest schools are going further than the Government’s classroom phone ban, banning smartphones and smartwatches from school grounds entirely amid growing concern about addiction, bullying and harm to young people.

King’s College, Kristin School and Diocesan School for Girls have all adopted stricter rules, arguing the move is needed to protect students’ learning, wellbeing and social development.



Universities Students

This article is more than 7 months old

### Big tech has transformed the classroom - and parents are right to be worried

Velislava Hillman



I’ve examined how commercial technologies reshape education - often in ways parents instinctively resist, but are told to ignore

Dr Velislava Hillman is an academic, teacher, writer and consultant on educational technology and policy.

# Join the Movement

## Safe and Intentional Tech in Schools

GET INVOLVED

We are a rapidly growing coalition of parents & educators who support a research-backed approach to technology in schools. The research is clear: EdTech as deployed today is detrimental to learning, exposes kids to inappropriate content, encourages digital distraction and addiction, and infringes on privacy rights.

It's time for school districts to listen to the experts and develop a more intentional, science-backed approach to classroom technology.



## About

Screen Sense Evanston is a group of Evanston parents who are concerned about technology and our kids. We focus on raising awareness about [Wait Until 8th](#) and [Screen Sanity](#), and pursuing conversations about [technology in our schools](#).

**Makes  
sense.**

## Switching off: Sweden says back-to-basics schooling works on paper

Schools minister Lotta Edholm moves students off digital devices and on to books and handwriting, with teachers and experts debating the pros and cons

20 NOVEMBER 2025

## Cell phone ban in schools raising achievement



HON ERICA STANFORD

Education

New research from the Education Review Office (ERO) shows the schools is working and is delivering better student outcomes.

← BACK



### The 'quiet' revolution in schools: more and more countries are locking up phones – Part 1

11 December 2025 (updated on: 15 December 2025) | By: Anna Cristina D'Addio

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Solution: Learn without AI?

Techno-optimist vs. techno-sceptical?  
Expanding the debate

# Expanding the debate



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ORIGINAL ARTICLE

Review of Education BERA

## From safeguarding to critical digital citizenship? A systematic review of approaches to online safety education

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### Correspondence

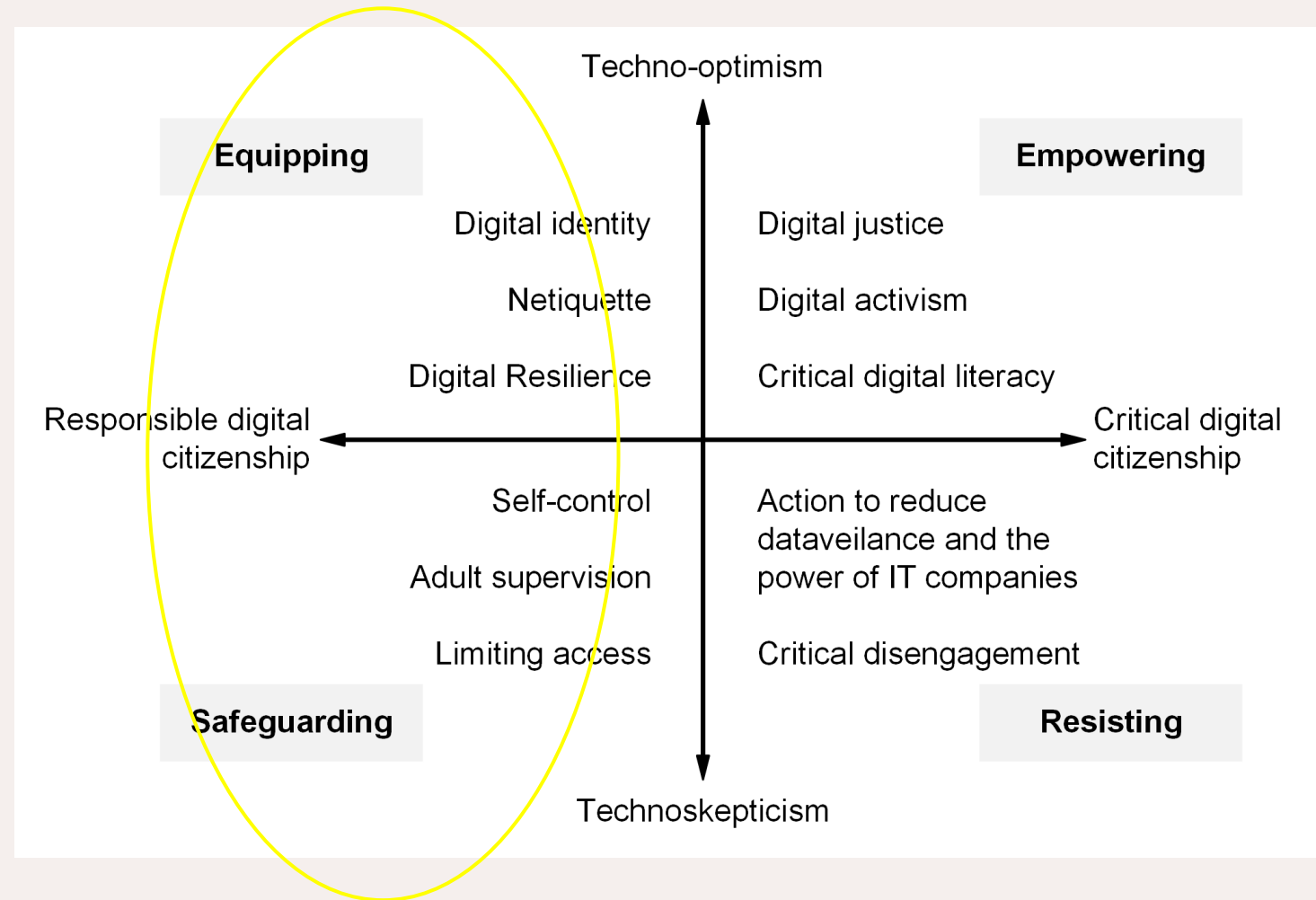
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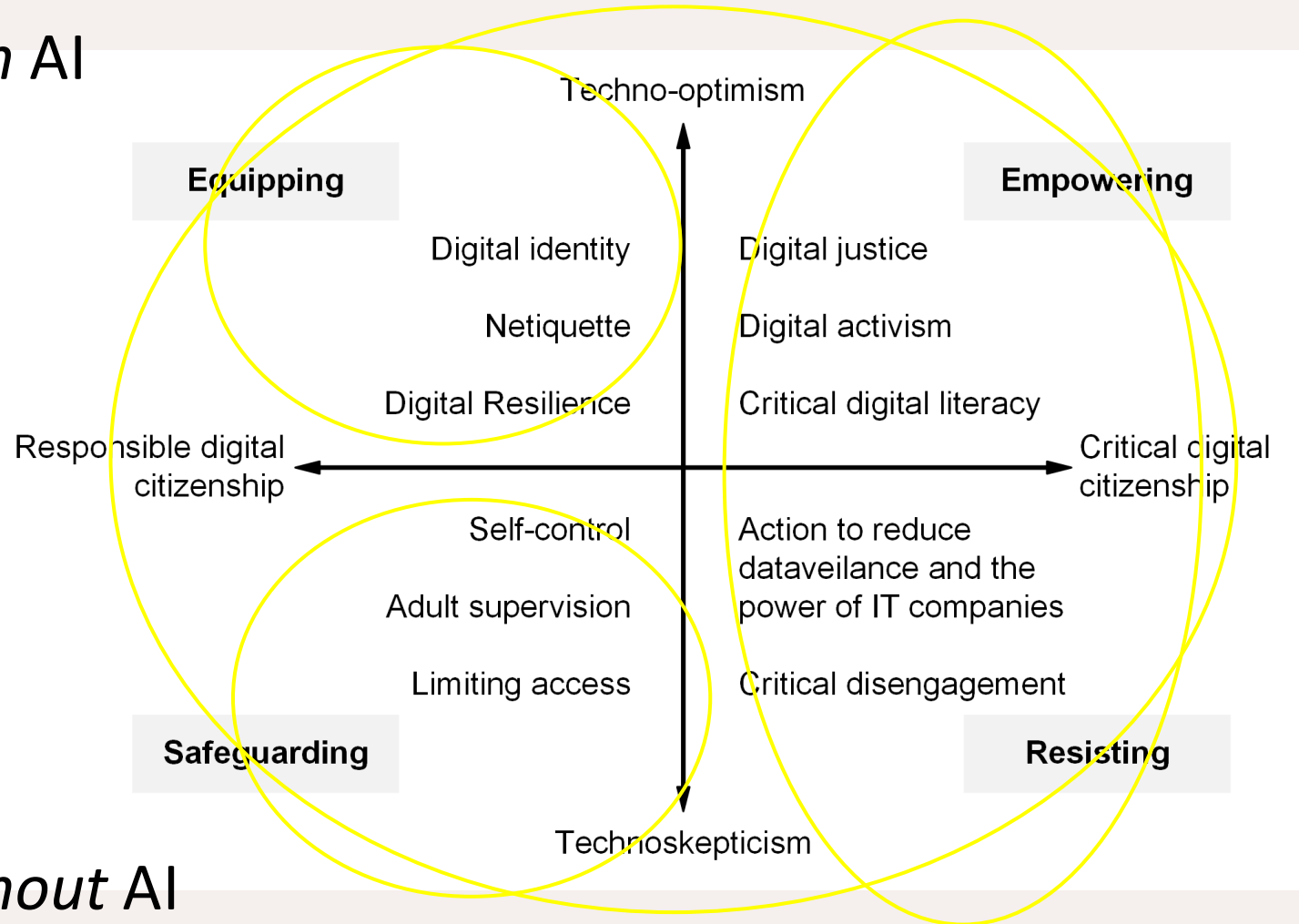
### Abstract

Over the last two decades, online safety education has emerged as a new field of research focusing on concerns about a myriad of cyber risks. These risks range from online sexual exploitation through to the reproduction of social inequalities. The main assumption underlying this field is that online risks can be mitigated via educational interventions, and significant discrepancies can be observed between the proposed approaches to online safety education. In this article, we develop an analytical model based on prevalent concepts of digital citizenship and narratives of technologies to identify four different approaches to online safety education in the academic literature; that is, safeguarding, equipping, empowering and resisting. Each of these approaches draws on different assumptions on what constitutes as 'online risk' and 'digital education'. Through a systematic literature review, we analyse 75 journal articles and examine the approaches to online safety education that these studies adopt. Our analysis reveals a dominance of approaches that adopt limited concepts of digital citizenship and acritical views of technology.



# Important distinction

Learning *with* AI



Learning *about* AI

Learning *without* AI

# A comprehensive response

## Learning *without* AI

- Especially for younger levels
- For *essential cognitive skills* (memory retention, problem-solving, analytical thinking)
- For relationship building

### Which requires:

- Policy frameworks with clear limits
- Possibly regulations (e.g. bans for early years)
- Institutional support for schools

## Learning *with* AI

- When having a clear purpose (e.g. scaffolding, extraneous tasks, prompt learning)
- Content analysis
- Ideally at the end of the learning process

### Which requires:

- PDL for teachers
- Robust ethical frameworks
- Close monitoring of EdTech/LLMs and their privacy practices (e.g. ST4S)

## Learning *about* AI

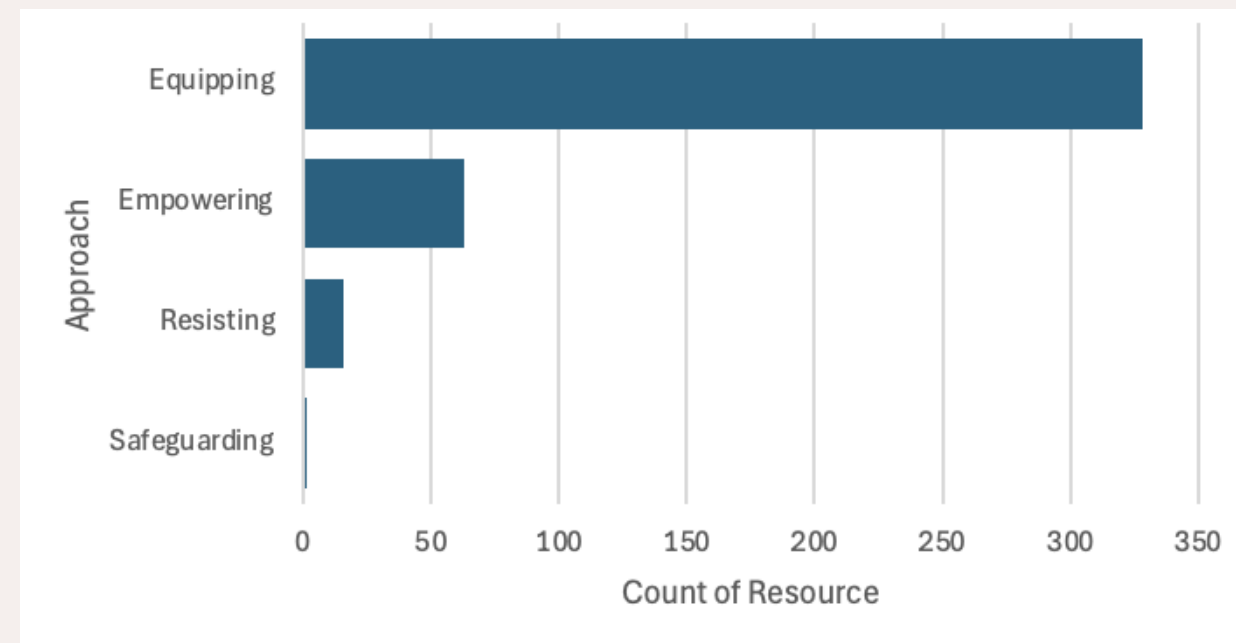
- Designs and limitations
- Socio-economic drivers
- Analysis of cognitive, emotional, social, economic, cultural, political and environmental impacts

### Which requires:

- PDL for teachers
- Critical independent resources

# A warning!

- Who are the ones currently teaching about digital citizenship?
  - Review of 338 resources adopted at a scale from 20 organisations (Estellés, Doyle, Fraser, forthcoming)





GLOBAL EDUCATION MONITORING REPORT

2023

## Technology in education: A TOOL ON WHOSE TERMS?



### KEY MESSAGES

## Good, impartial evidence on the impact of education technology is in short supply.

- **There is little robust evidence on digital technology's added value in education.** Technology evolves faster than it is possible to evaluate it: Education technology products change every 36 months, on average. Most evidence comes from the richest countries. In the United Kingdom, 7% of education technology companies had conducted randomized controlled trials, and 12% had used third-party certification. A survey of teachers and administrators in 17 US states showed that only 11% requested peer-reviewed evidence prior to adoption.
- **A lot of the evidence comes from those trying to sell it.** Pearson funded its own studies, contesting independent analysis that showed its products had no impact.

Why not using AI to reduce class sizes?

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