



The Impact of Technology on Education



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Overview

- Technology and student welfare
- Technology, learning and education
- Technology and the future



"What a school day! The computers broke down and we had to READ!"

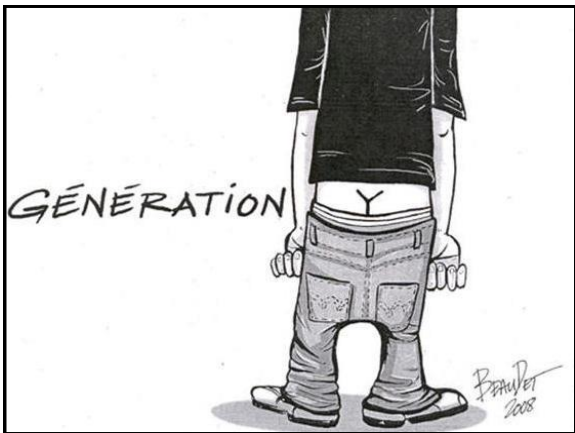
Technology and student welfare

....in loco parentis...

"in the place of a parent"

Teachers and by their association, schools, must act in the place of parents....

Anything we do to, and with, children should be based on the best available evidence....



New People.....NEW Brain!?

Labels


- "Baby Boomers" :(1946 – 1964)
- "Generation X" :(1965 – 1980)
- "Generation Y" :(1981 – 2000)
- Millennials (2000)
- "Gen Y" and Millennials represent 35% of the population- Australian Bureau of Statistics

Can technology have an impact on the brain and behaviour?


Correlation does not prove causation!

However...if you look at various studies across various disciplines you can start to build a strong logical case for causation!

Cause for concern!

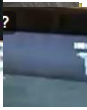


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Editors
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**GROWING UP
FAST AND
FURIOUS**



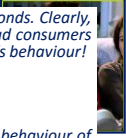
The National Youth the 70 top-sell violence. In 41 perc goals. In 17 percent rated games are ex no trouble buying th

er (2004) reported that of ialf contained serious sary for gamers to achieve the game itself. "Mature" teenage boys who report

"It is disingenous to suggest that because there are no experimental studies that randomly assign children to years of playing violent or nonviolent video games and then measure which group commits the most violent crime, that therefore there are no established negative or anti-social effects."

- Anderson and Warburton 2012, p.62.


Can technology have an impact on the brain and behaviour like this!

A Super Bowl ad costs about \$4 million for 30 seconds. Clearly, advertisers believe that a mere 30 seconds will lead consumers to buy their products...in essence change a person's behaviour!

Moreover...

It is highly likely that visual media impacts on the behaviour of children and adolescents given that each successive generation is spending increasingly longer hours in front of a screen!




The Problematic Use of Technology



1. Overuse



Types of potential overuse

- Checking e-mail
- Checking stocks
- Facebook, Twitter, etc
- Texting
- Multitasking
- News browsing
- Web surfing
- Online gaming
- Online shopping/bidding
- Online simulations
- Chatrooms
- Online gambling
- Online pornography
- Cybersex
- Cyber bullying

2. Changing social dynamics and preoccupation with gadgets



3. Interrupted thought! The truth about multitasking!

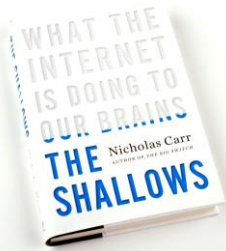


- Shifting mental gears costs time (**Mobiles in cars!!**)
- Time costs are greater with more complex tasks
- Multitasking switching effectively reduces mental efficiency equivalent to a loss of 10 IQ points or losing a night's sleep
- Mental calculations, such as math, are 40% slower during task switching
- MT produces physical stress resulting in release of stress hormones & adrenaline
- Prolonged multitasking seems to interfere with learning to concentrate on single intellectual tasks



Rubenstein, J. S., Meyer, D. E., & Evans, J. E. (2001). Executive control of cognitive processes in task switching. *Journal of Human Experimental Psychology–Human Perception and Performance*, 27(4), 763-797.

Wired for distraction?



- Reading uninterrupted text (i.e. book) results in faster completion and better understanding than those who read text filled with hyperlinks and ads.
- Students who are allowed internet access during class don't recall the lecture nor do they perform as well on a test of the material as those who aren't 'wired' during class.
- Reading develops reflection, critical thinking, problem solving and vocabulary better than online text and visual media.

4. Language and communication issues



History of communication....should we be worried?



1999:
So I just have to tell someone about this thing my cat did today...



2004:
OMG! Cat pictures!



2005:
Moving cat pictures!



2007:
1.00 pm. My cat just sneezed.
1.02 pm. Cat sneezed again!
1.04 pm. Cat hasn't sneezed recently.
Getting worried!

Grammar and Spelling

- A recent study published by Cranfield School of Management in the UK found **language and learning deficits in students who used technology excessively.**
- More than one-third (39.3 percent) of 11- to 18-year-olds in the survey admitted that text shortcuts damaged the quality of their written English, primarily in terms of spelling.
- The study noted that **overuse of technology hinders spelling skills, implicitly encourages plagiarism, and disrupts classroom learning**, and over 84 percent of teens admitted to "copying chunks of information from the internet into their homework or projects".

5. Addictive behaviours



A further consideration...technology is also a major contributor to increased sedentary behaviour...are schools becoming complicit in this????



Technology and learning...

While technology has become very pervasive in our lives, how we learn has not changed much over the millennium....

...this is because it has taken thousands of years for the brain to evolve.



The neurobiology of learning...a simple perspective!



1. Gather information...
2. Make meaning from that information...
3. Create links with previous information and/or create new ideas...
4. Act on that information and those ideas...

A fundamental and critical component of this is 'social interaction'!

Trends in Educational Technology

- In the late 80's a trend emerged that technology was good for students – so that they will be prepared for the technology jobs/skills of the future...from this we have a continued belief that engaging children in technology will leave them behind!
- Current thinking is that technology is an integral vehicle for improved student learning!

The use of technology in education is often premised on the following claims...

1. It (technology) is future oriented.
2. It improves skills.
3. It makes learning interesting.
4. Increases collaboration.
5. Without it, students will be left behind.

Education Apps!

As education grows large, the digital world is estimated to have more than 80,000 apps, many of which are designed for educational purposes.

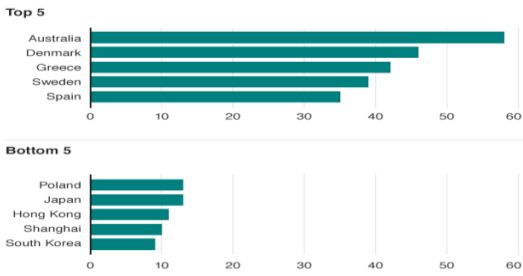
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Evidence based practice!

- Anything we do to, and with, children should be based on the best available evidence. Sometimes, however, evidence suggesting that building deep, conceptual understanding and higher-order thinking requires intensive teacher-student interactions, and technology sometimes distracts from this valuable human engagement.”
- There is a growing body of evidence suggesting that technology and the current use of technology in schools is not enhancing learning or achievement and may in fact be hindering outcomes!



Average daily minutes using internet at school



Overall, the most frequent pattern that emerges in PISA data when computer use is related to students' skills is a **weak or sometimes negative association between investment in ICT use and performance**. While the correlational nature of this finding makes it difficult to draw guidance for policy from it, **the finding is remarkably similar to the emerging consensus in the research literature, based on studies that use more rigorously designed evaluations**. (OECD 2015).

...a continued belief that not engaging children in technology will leave them behind!

What a difference a decade can make!



Children in Indian slums...(1999)

On 26th January (1999), researchers from NIIT (A management training company in India) carved a "hole in the wall" that separated the NIIT premises from the adjoining slum in Kalkaji, New Delhi. Through this hole, a freely accessible computer was put up for use. This computer proved to be an instant hit among the slum dwellers, **especially the children**. With no prior experience, the children learnt to use the computer on their own.



20 first grade aged children in Ethiopia...(2012)

Worked on tablets, "I thought four minutes switching apps per ABC so had hacked our organization and the child,



Anecdotal evidence



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Take-away messages

- Technology is here to stay, with benefits and risks– we need to critically think through its use.
- Technology use exists on a continuum from healthy to dysfunctional use; educators need to observe and guide behaviour....(in loco parentis).
- Some types of excessive technology use does interfere with learning, social relationships, work, mental health, and possibly cognitive development.



6 reasons why we should consider how much technology we use in schools...

1. Every action takes a muscle. Students and young children in particular are still figuring out what fingers do. Moreover writing, more than keyboarding, uses more muscles including the muscle memory systems needed to recall movements and hand-eye coordination. Studies show that the developing brain depends on such activities.
2. We should want children to explore. Yes they could explore colours, letters and apps on an iPad. But those worlds have limits. We should want them to engage with the world around them.
3. Students can learn to use a computer later. There's an argument that children need to use keyboards and screens at an early age so they won't fall behind their peers...no evidence to support this and much evidence to contradict this.
4. Students have a lifetime to spend with a screen. Arguably, most adults don't say, "Gosh, I wish I spent more time in front of a screen." Most of us wish for time away from the computer — pursuing hobbies, exercising or, maybe, playing with our kids. Let children be before the modern world takes over.
5. We should want students to think for themselves first. Harvard professor Howard Gardner differentiates between being "app-dependent," doing what technology says and looking for new technology when problems arise, and being "app-enabled" — people who use tech as a tool but still possess enough independence and creativity to strike out on their own...this takes time in the 'real' world to develop!
6. We don't really know the impact yet. And...Finnish kids top the world in educational achievement, and they don't start formal academics until age 6 or 7. It is unlikely that skipping an iPad app that has students reciting the full alphabet by 30 months of age or being tech savvy before entering formal education will keep them from earning a promotion at age 40.

Technology/apps...must be designed with five important 'Science of Learning' principles in mind!

We have decades of research on the Science of Learning, which has examined how students learn best in an educational context and found that the following are critical...

1. Cognitively Active
2. Engaging
3. Meaningful
4. Socially Interactive
5. In the Service of a Learning Goal

Adapted from the work of Hirsch-Pasek et al, 2015.

1. Cognitively Active

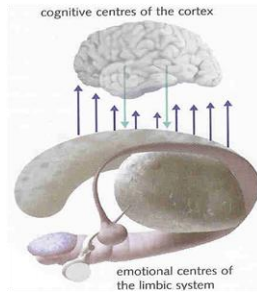
Cognitively active learning implies 'minds-on' (executive functioning of the PFC) involvement during the learning experience, in addition to any physical activity that may be occurring, such as swipes and taps.



2. Engaging

The ability to stay on task and undistracted supports learning...

We only pay attention to what we are interested in or what threatens us!



3. Meaningful

Meaningful learning goes beyond simple memorisation and occurs when children find the meaning in what they are learning and are able to not only connect new material to existing knowledge but expand their current knowledge to create new conceptual understanding.



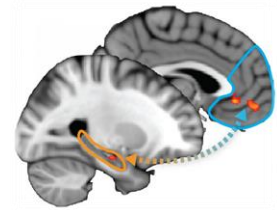
4. Socially Interactive

High-quality interactions (ie. those with knowledgeable social partners or in collaborative learning situations) that are contingent and adaptable to the student.



5. In the Service of a Learning Goal

Whatever is being used must go beyond engagement and 'edutainment' and have a learning goal as the foundation for engagement.



This is simply good pedagogy!

Other options:



"Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important."