Is Technology Changing Our Brains? An Update

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Previous thoughts…early 2016

- Digital technology changing our brains (neuroplasticity) and our identities (replace ‘true self’ with ‘exaggerated, ideal self’)
- In 1934, ‘machine age natives’ were discussed as those who had lost connection with nature and tradition…and who were divorce prone
- Fears of becoming shallow, knee-jerk thinkers?
- Inability to communicate in person?

Some possible additional trends

- The Internet is our external hard drive
- Children's curriculum is slightly less rote memory focused
- We struggle to give anything our full attention and concentration may be suffering
- Remembering is overrated
- We may be becoming better information finders
- Constantly seeking out incoming information
- Creative thinking may suffer

Some possible trends

- Attention span has dropped from 12 to 8 seconds; goldfish attention span 9 seconds
- We are more distracted
- We might be better task switchers (i.e., ‘multitasking’)
- We are obsessed with technology
- Our social interaction capabilities may be impaired

Ancient brains in a modern world

- Two primary aspects of our brains
  - To sense
  - To respond
- Cognitive control
  - Attention
  - Short-term memory
  - Goal management
- Limitations
  - Susceptible to distractions (internal and external)
  - Limited capacity
  - Interference

Rapid technology adoption

- Consumer research suggests when technology is adopted by 50 million people, it has penetrated society
  - Television and phones… adoption by 50 million took more than a decade
  - Internet…4 years
  - Myspace…2 years
  - YouTube…1 year
  - Angry Birds…35 days
  - PokemonGo…10 days

- Distractions
  - In one study, more than 80% of students had active accounts on 6 social media sites
  - Another study showed young adults unlocked their phone on average 56 times a day, approximately every 15 minutes with a total of 220 (over 3.5 hours) minute screen time
- 'Multi-tasking'
  - 2008 study revealed young adults felt confident they could complete 70% of multitasking tasks (i.e., studying and listening to music), older generation felt confident at 50%
  - 2014 follow up study revealed young adults felt confident they could complete 87% of the same list of multitasking tasks (including reading and watching a movie clip)
  - Feeling pressure, responsibility and anxiety to connect and respond

Information butterflies

- Unique to the human brain, we are able to create meaning in an abstract manner based on information, experiences and context
  - Build beliefs, values, ethics, and identities
  - Break out of the current reactions to the world to reflect, pause, and create meaning (internal attention)
  - Meaning making is hijacked when constantly in response and react mode to incoming stimuli (external attention)
  - Greater externally focused attention correlated with fixed mindset
  - Greater internally focused attention correlated with growth mindset
  - Specific research focused on children
- Is it only children who are affected by this hijacking for meaningful thinking?

Strategies to combat potential negative effects of technology

- Metacognition
  - Do our students know what actions they are taking to impede their studying?
    - On average, students spent 9 out of 15 minutes studying when given freedom to do so
- Define outcomes
  - How can you integrate technology so it is optimally positions to help students achieve their goals?
    - Be aware of socioeconomic influences (i.e., lower economic status suggests higher levels of digital consumption versus digital production)

Strategies to combat potential negative effects of technology

- Mental Health
  - Anxiety to connect, be appreciated, 'liked,' plentiful throughout the technology and the brain discussion
  - Studies have linked the use of social media to depression, anxiety, poorer sleep quality, lower self-esteem, inattention, and hyperactivity — often in teens and adolescents
  - 2015 study linked the nature of teens having >300 friends on Facebook to higher levels of cortisol
    - Teens liking what friends posted or sending friends words of encouragement lowered cortisol
    - Some studies link high cortisol levels in 13 year-olds with increased risk of depression at 16 by 37%
  - 2018 study suggested possible causal link with social media use and negative effects on well-being

Strategies to combat potential negative effects of technology

- Exercise
  - 2004 Meta-analyses of correlational and experimental studies revealed positive effects of exercise across entire population
  - Significant benefits in subjects with elevated level of anxiety and depression
  - 15-30 minutes, a minimum of three times a week

Strategies to combat potential negative effects of technology

- Mindfulness/Meditation
  - Decreased stress, improved emotion regulation
  - Lowered heart rate
  - Lowered blood pressure
  - Lower anxiety levels
  - Increased awareness, attention, and focus

Strategies to combat potential negative effects of technology

- Yoga
  - Parts of the brain associated with emotion regulation, self-awareness and attention control are strengthened through intentional breathing and deliberate movement
  - The amygdala, associated with fear and anxiety, is reduced
  - New neural paths can be formed
  - Thought and emotional patterns can be broken that no longer serve a person's well-being
  - Vagus nerve can more appropriately adjust our physiological response