

This is your brain online: The impact of technology on mental health



Be SAFE
Safe, Affirming & Fair Environments

This is your brain online
The impact of digital technology on mental health

December 10, 2015
Michigan State University Extension
Health and Nutrition Programs
Social and Emotional Health and Well-Being



Be SAFE
Safe, Affirming & Fair Environments

Janet Olsen – olsenj@msu.edu
Karen Pace – pace1@msu.edu

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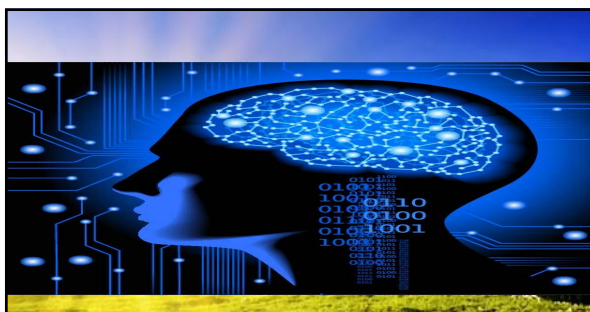
Be SAFE Initiative Goals

- Promote social and emotional learning and development
- Address and reduce bullying
- Prevent bullying behaviors by tapping the wisdom and assets of youth and adults
- Develop positive relationships with peers and adults



Scott Becker, Ph.D.





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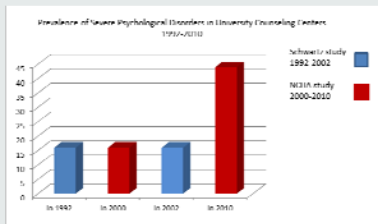
MSU Extension webinar, December 10, 2015
Scott Becker, Ph.D., Director
MSU Counseling Center

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Overview

- Increased Media Exposure
- Sleep
- Attention, Memory & Learning
- Anxiety
- Addiction to Technology
- Depression
- Emotion Regulation
- Identity & Relationships
- Empathy & Narcissism
- Implications

Paradigm Shift in University Mental Health



National Trends

- **Increased acuity** of presenting concerns at university counseling centers:
 - Prevalence of severe psychological disorders has nearly *tripled*
 - Increase in high-risk behaviors such as harm to self and others
 - Increase in psychiatric medication
 - Increase in hospitalizations
- **Increased demand** for services was reported by **93%** of university counseling center directors (AUCCD, 2012)
 - Staff of UCCs have, on average, not grown in the past 15 years
 - MSUCC: increase of **79%** in students seen in direct service from 2006-2013

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Presenting Concerns in Counseling: MSUCC in comparison to National Averages

Percentages of Students in Treatment with each Condition (MSU=3,000)			
Condition	National	MSUCC	% Diff.
Anxiety	42	58	+16
Depression	36	61	+25
Relationship issues	36	25	-11
Psychotropic medication	24	28	+4
Suicidal thoughts	16	36	+20
Significant prior treatment	14	23	+9
Alcohol abuse/dependence	10	20	+10
ADHD	9	8	-1
Sexual/physical assault	9	17	+8
Self-injurious behavior	9	15	+6
Eating disorders	6	11	+5
Oppression (racism, sexism, homophobia)	6	9	+3

Source: AUCCCD survey, 2012

Possible Explanations

- Availability of mental health treatment for children and adolescents
- Changes in parenting (anxiety → over-protection)
- Socioeconomic stressors
 - Financial stressors
 - Competition for grades, internships, jobs post-graduation
- Collective/cultural anxiety (9/11, Virginia Tech)
- Recognition and reporting of trauma, including childhood sexual abuse and sexual assault
- De-stigmatizing of mental health treatment; increased help-seeking
- Over-use of social media, video games, and other digital technology

Scope of the Problem: Neuroplasticity and Technology

"...one vital fact I have learnt is that the brain is not the unchanging organ that we might imagine. [The brain is] substantially shaped by what we do to it and by the experience of daily life. When I say "shaped", I'm not talking figuratively or metaphorically; I'm talking literally. At a microcellular level, the infinitely complex network of nerve cells that make up the constituent parts of the brain actually change in response to certain experiences and stimuli."

"Already, it's pretty clear that the screen-based, two dimensional world that so many teenagers - and a growing number of adults - choose to inhabit is producing changes in behaviour. Attention spans are shorter, personal communication skills are reduced and there's a marked reduction in the ability to think abstractly."

"This is an issue as important and unprecedented as climate change."
- Susan Greenfield, Professor of Pharmacology, Oxford University

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Changes occur very quickly

- In a UCLA study, experienced web users displayed fundamentally different neural structures in the pre-frontal cortex
- Novice users displayed similar changes after only five hours of internet use over the course of one week
- "The naïve subjects had already rewired their brains."

Gray matter atrophy

- "Multiple studies have shown atrophy (shrinkage or loss of tissue volume) in gray matter areas (where "processing" occurs) in internet/gaming addiction. Areas affected included:
 - the frontal lobe, which governs executive functions, such as planning, planning, prioritizing, organizing, and impulse control.
 - Volume loss was also seen in the striatum, which is involved in reward pathways and the suppression of socially unacceptable impulses.
 - A finding of particular concern was damage to an area known as the insula, which is involved in our capacity to develop empathy and compassion for others and our ability to integrate physical signals with emotion. Aside from the obvious link to violent behavior, these skills dictate the depth and quality of personal relationships."

Digital Dementia

- Researchers in South Korea and Germany have identified a significant pattern of right-brain deficits (atrophy) among frequent users
- 'Over-use of smartphones and game devices hampers the balanced development of the brain,' Byun Gi-won, MD, the Balance Brain Centre in Seoul, South Korea
- "The more you train kids with computer games, the more attention deficit you get." – Manfred Spitzer
- "The more time you spend with screen media ... the less your social skills will be." – Manfred Spitzer

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Behavioral Correlates

- "Taken together, [studies show] internet addiction is associated with structural and functional changes in brain regions involving emotional processing, executive attention, decision making, and cognitive control."
 - research authors summarizing neuro-imaging findings in internet and gaming addiction (Lin & Zhou et al, 2012)
- "As a practitioner, I observe that many of the children I see suffer from sensory overload, lack of restorative sleep, and a hyperaroused nervous system, regardless of diagnosis—what I call electronic screen syndrome. These children are impulsive, moody, and can't pay attention --much like the description in the quote above describing damage seen in scans."
 - Victoria Dunckley, M.D., integrative child and adolescent psychiatrist specializing in treating children with complex diagnoses and/or treatment-resistant conditions

Increased Exposure to Media



Advent of social media

Friendster	2002
MySpace	2003
Facebook*	2004
YouTube	2005
Twitter	2006

*Facebook membership doubled from 300 million to 600 million users from 2009 to 2011

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Social media: "Alone together"



Linked in, checked out...

http://www.filmsforaction.org/watch/i_forgot_my_phone/#_UmerVF8yTMq.facebook

Increased media exposure

- almost **50%** of American Internet users have online social profiles (2010)
- time spent social networking was **up 82%** from previous years (2009)
- More than **100 million** people access Facebook with their cell phones (2010)
- more Americans now than ever before report using television and the Internet **simultaneously** [i.e. **multitasking**] (2009)
- About **87 percent** of American adults own a cell phone (2012). About **44 percent** of those are smartphones. (**9% increase** in smartphone usage in one year.)

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Increased media exposure

- **29.9%** of television-owning households in the United States now contain **at least four televisions** (2010)
- In 2010, television viewing reached an all-time high
- the average American is exposed to a **350% increase in total information outside of work** than the average amount they experienced only 30 years ago (2010)
- "The amount of data humanity will collect while you're reading [a book] is five times greater than the amount that exists in the entire Library of Congress. Anyone reading it will take in as much information today as Shakespeare took in over a lifetime."

Increased media exposure among children and teens

- "8- to 18-year-olds spend more time with media than in any other activity besides (maybe) sleeping"
- 2005: 6 hrs., 30 min. per day
 - 8 hrs, 33 min. of media content (with multitasking)
- 2010: 7 hours, 30 min. per day, seven days/week
 - **10 hours, 45 minutes** of media content (with multitasking) per day, seven days/week
 - an **increase of almost 2¼ hours** of media exposure per day over the past five years

Media exposure among youth of color

- A report from Northwestern University reveals that youth of color 8- to 18-years old consume an average of **4.5 more hours of media per day** than their white counterparts.
 - White: 8-1/2 hours
 - Black, Latino and Asian: 13 hours
- During the past decade, black youths have doubled their daily media use, and Latino youths have quadrupled theirs, according to Ellen Wartella, co-author of the study.

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Texting among teens

- 2009: "the average American teen now sends and receives around **1,500** text messages per month"
- 2010: "a Nielson study reported that the average teen sends **over three thousand** text messages a month."
- 2012: Newsweek reported that "The average teen processes an astonishing **3,700** texts a month."
- Therefore, from 2009-2012, texting among teens increased by **147%**

Sleep



Rensselaer sleep study



(Image from the Lighting Research Center at RPI)

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Sleep study: Rensselaer Polytechnic

- "...a two-hour exposure to light from self-luminous electronic displays can suppress melatonin by about 22 percent."
- "To produce white light, these electronic devices must emit light at short wavelengths, which makes them potential sources for suppressing or delaying the onset of melatonin in the evening, reducing sleep duration and disrupting sleep. "This is particularly worrisome in populations such as young adults and adolescents, who already tend to be night owls."
- "the glow of screens from TVs, computers, phones and tablets could be stopping us sleeping at night. ...devices should not be used for more than an hour, and screens should be dimmed."

Effect of wireless on sleep

- The radio frequency wave energy [884 MHz] that comes from mobile phones leads to enhanced insomnia, headaches and concentration difficulties.
- The researchers concluded that those who were exposed to the radio frequency took longer to fall asleep and did not sleep as well throughout the night.

Where are our phones when we sleep?

- 68% next to bed / within reach
- 13% in a different room
- 16% in bedroom but out of reach
- 1% in the car
- 2% other

Source: 2012 Time/Qualcomm poll

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Attention, Memory, and Learning



Digital Dementia

- The right side of the brain supports cognitive function, such as **memory, attention, thinking, emotions, and processing of ideas**. On the other hand, the left hemisphere of the brain is linked to logic and reasoning.
- According to Byun Gi-won, due to overuse of digital devices, the left brain tends to get overworked, while the right brain is hardly utilized. This under utilization of specific regions of the brain over time can cause **memory problems, leading to symptoms of digital dementia**.

UCLA study on memory and attention

- "Another study conducted by researchers at the University of California, Los Angeles (UCLA) asserts that the excessive use of texting services and long hours of computer viewing are factors responsible for causing poor memory and faltering focus."

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Attention and Concentration

- "Researchers in the new field of interruption science have found that it takes an average of twenty-five minutes to recover from a phone call. Yet such interruptions come every eleven minutes —which means we're never caught up with our lives."
- The average American attention span has decreased from 12 seconds (in the year 2000) to 8 seconds (in 2013). This is one second shorter than the attention span of a goldfish.

Multitasking during homework

"Although the students had been told at the outset that they should "study something important, including homework, an upcoming examination or project, or reading a book for a course," it wasn't long before their attention drifted: **Students' "on-task behavior" started declining around the two-minute mark** as they began responding to arriving texts or checking their Facebook feeds. By the time the 15 minutes were up, they had spent only about **65 percent of the [time] actually doing their schoolwork.**"

Multitasking and learning

- ...the assignment takes **longer to complete**, because of the time spent on distracting activities and because, upon returning to the assignment, the student has to refamiliarize himself with the material.
- mental fatigue leads to **more mistakes**.
 - Cost is especially high when students alternate between tasks that call for different sets of expressive "rules"—the formal, precise language required for an English essay, for example, and the casual, friendly tone of an email to a friend.
- Third, students' subsequent **memory** of what they're working on **will be impaired if their attention is divided**.
- Students who multitask on laptops in class distract not just themselves but **also their peers** who see what they're doing.

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The "biliterate brain"

- "Neuroscience, in fact, has revealed that humans use different parts of the brain when reading from a piece of paper or from a screen. So the more you read on screens, the more your mind shifts towards "non-linear" reading — a practice that involves things like skimming a screen or having your eyes dart around a web page."
 - T.J. Raphael
- "The reading circuit's very plasticity is also its Achilles' heel. It can be fully fashioned over time and fully implemented when we read, or it can be **short-circuited**—either early on in its formation period or later, after its formation, in the execution of **only part of its potentially available cognitive resources.**"
 - Maryanne Wolf, Tufts University



The "biliterate brain"

- "Humans, [cognitive neuroscientists] warn, seem to be developing digital brains with new circuits for skimming through the torrent of information online. This alternative way of reading is competing with traditional deep reading circuitry developed over several millennia."
- "[Maryanne] Wolf, one of the world's foremost experts on the study of reading, was startled last year to discover her brain was apparently adapting, too. After a day of scrolling through the Web and hundreds of e-mails, she sat down one evening to read Hermann Hesse's *The Glass Bead Game*. 'I'm not kidding: I couldn't do it,' she said. 'It was torture getting through the first page. I **couldn't force myself to slow down so that I wasn't skimming, picking out key words, organizing my eye movements to generate the most information at the highest speed.** I was so disgusted with myself.'"

"Nonlinear reading"

- "The Internet is different. With so much information, hyperlinked text, videos alongside words and interactivity everywhere, **our brains form shortcuts to deal with it all** — scanning, searching for key words, scrolling up and down quickly. This is nonlinear reading, and it has been documented in academic studies. Some researchers believe that for many people, **this style of reading is beginning to invade when dealing with other mediums as well.**"

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Deep vs. shallow reading

- "The omnipresence of multiple distractions for attention—and the brain's own natural attraction to novelty—contribute to a mindset toward reading that seeks to reduce information to its lowest conceptual denominator. Sound bites, text bites, and mind bites are a reflection of a culture that has forgotten or become too distracted by and too drawn to the next piece of new information to allow itself time to think."

- Maryanne Wolf, "Our 'Deep Reading' Brain"

Addiction to Technology

Addiction

- "I clearly am addicted and the dependency is sickening."
- "Media is my drug."
 - Students in an "Unplugged" study at the University of Maryland
- "I am unable to focus on anything in a deep and detailed manner. The only thing my mind wants to do...is plug back into that distracted, frenzied blitz of online information." This despite the fact that "the happiest and most fulfilled times of my life involved a prolonged separation from the internet."
 - College senior writing to Nicholas Carr, author of *The Shallows: What the Internet is Doing to Our Brains*

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Addiction

- According to an article in Time magazine:
 - 1 in 4 people check [their cell phones] every 30 minutes
 - 1 in 5 [check] every 10 minutes
 - "A third of respondents admitted that being without their mobile for even short periods leaves them feeling anxious."

"iDisorder"

- 750 teens and adults were studied
- Most respondents check text messages, email or social media "every 15 minutes" or "all the time."
- Exceptions: people over 50

fMRIs of Internet addiction

- "New brain scan technology shows that our brains are being rewired. Heavy web users have fundamentally altered prefrontal cortexes. The brains of Internet addicts, it turns out, look like the brains of drug and alcohol addicts."
 - Newsweek, July 2012

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Dopamine

Judith Domath in *Scientific American* notes that the intermittent reward of checking messages leads to a dose of dopamine: "These rewards serve as jolts of energy that recharge the compulsion engine, much like the frisson a gambler receives as a new card hits the table. Cumulatively, the effect is potent and hard to resist."

Cravings and impaired dopamine function:

Research on video games have shown dopamine (implicated in reward processing and addiction) is released during gaming and that craving or urges for gaming produces brain changes that are similar to drug cravings. Other findings in internet addiction include reduced numbers of dopamine receptors and transporters.

Identity and Relationships



Image: mayoclinic.org

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Impact of social media and cell phones

- Reduced emotional intimacy
 - Turkle study of cell phones in sight during a conversation
- Reduced time in face-to-face conversation
- Increased social anxiety
- Fragmentation and diffusion of identity
- False sense of social connection – “friends” versus actual friends

Fear of intimacy

“These days, insecure in our relationships and anxious about intimacy, we look to technology for ways to be in relationships and protect ourselves from them at the same time.”

“We bend to the inanimate with new solicitude. We fear the risks and disappointments of relationships with our fellow humans. We expect more from technology and less from each other.”

—Turkle, *Alone Together*, p. xii

Identity: virtual reality

“The advertising for Second Life, a virtual world here you get to build an avatar, a house, a family, and a social life, basically says, ‘Finally, a place to love your body, love your friends, and love your life.’”

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Escapism

"Doug, a Midwestern college student, played four avatars, distributed across three different online worlds. He always had these worlds open as windows on his computer screen along with his schoolwork, e-mail program, and favorite games. He cycled easily through them. He told me that RL 'is just one more window.' And, he added, 'it's not usually my best one.' Where was this leading?" (from a 1995 anthropology study)

Empathy



Decreased empathy

- ...college students' self-reported empathy levels (as measured by the Interpersonal Reactivity Index...have been in steady decline over the past three decades...
- A particularly pronounced slump has been observed over the past 10 years. "College kids today are about 40 percent lower in empathy than their counterparts of 20 or 30 years ago," Konrath reports.
- More worrisome still, according to Jean Twenge, a professor of psychology at San Diego State University, is that, during this same period, students' self-reported narcissism levels have shot through the roof.
- "Many people see the current group of college students, sometimes called 'Generation Me,'" Konrath continues, "as one of the most self-centered, narcissistic, competitive, confident, and individualistic in recent history."

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Atrophy of the *insula*

- "A finding of particular concern was damage to an area known as the *insula*, which is involved in our capacity to develop empathy and compassion for others and our ability to integrate physical signals with emotion. Aside from the obvious link to violent behavior, these skills dictate the depth and quality of personal relationships."
 - Victoria Dunckley, 2014

USC study: Processing speed and empathy

- "...higher emotions emerge from neural processes that 'are inherently slow.'"
- Empathy for physical pain is almost instantaneous.
- Empathy for emotional suffering "unfolds much more slowly."
- "The more distracted we become, the less able we are to experience the subtlest, most distinctively human forms of empathy, compassion, and other emotions."
- "If things are happening too fast, you may not ever fully experience emotions about other people's psychological states."

Talking about ourselves

- "On average, people spend 60% of conversations talking about themselves—and this figure jumps to 80% when communicating via social media platforms such as Twitter or Facebook."
- "Social media activates self-related thoughts in the medial prefrontal cortex (MPFC)"
- Also activates parts of the mesolimbic dopamine system.
 - "These newly implicated areas of the brain are generally associated with reward, and have been linked to the pleasurable feelings and motivational states associated with stimuli such as sex, cocaine, and good food."
- "people may be motivated to talk about themselves more than other topics (no matter how interesting or important these non-self topics may be)."
(from Scientific American, "The neuroscience of everybody's favorite topic – themselves")

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Case study: Attempted suicide at the University of Guelph

- Male undergraduate student attempted suicide while live-streaming the event on 4Chan to 200 viewers (the maximum allowed on the site); hundreds more were queued up to watch
- Many were complaining about the lighting
- Some were suggesting more effective methods – e.g. using a toaster in the bathtub
- None of the viewers called emergency responders
- Hundreds of individuals cyberbullied him on Facebook afterward.

University of Guelph suicide post

- "This is it. Tonight I will be ending my own life. I've been spending the last hour making the preparations and I'm ready to go through with it. As [a longtime member] who's been on 4chan since 2004, I thought I would finally give back to the community in the best way possible: I am willing to an hero [commit suicide] on cam for you all. All that I request is for you guys to link me to a site where I am able to stream it for you guys, then I will gladly fulfill my promise."

University of Winnipeg:
The "shallowing hypothesis"

- "those who texted more than 100 times a day were **30 per cent** less likely to feel strongly that leading an ethical, principled life was important to them, compared to those who kept their texting to 50 times a day or less."
- "heavy texting was also associated with **higher levels of ethnic prejudice**".
- "new information and social media technologies may be **displacing and discouraging reflective thought**," said Dr. Paul Trapnell.

Implications

Those affected tend to avoid:

- Direct interpersonal contact, including:
 - Eye contact
 - Phone conversations
 - Emotional intimacy
 - Conflict (e.g. break-ups via texting)
 - Help-seeking
- Thoughtful reflection (considering alternative actions, reasons for their own behavior or the behavior of others, pausing to ask "why")
- Putting on the emotional brakes – de-escalate, relax, calm down, self-soothe

Those affected are more likely to feel:

- restless, agitated, or bored
- lonely, isolated, invisible, ignored (i.e., a lack of social support or caring from others)
- depressed or hopeless
- tense, stressed, overwhelmed
- socially anxious and avoidant
- self-centered or narcissistic
- a lack of empathy or compassion toward others
- a lack respect for rules, limits, and authority

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Those affected are more likely to engage in:

- impulsive behavior (online spending, gambling, "Tweeting")
- reckless or thrill-seeking behavior (speeding, couch-burning)
- impersonal or casual sexual encounters (sexting, Tinder, Grindr, #AfterSex, Lulu, Hot or Not, OkCupid, MSU ap for "hook-ups")
- use of illicit or prescription drugs to alter their mood
- self-injurious behavior such as cutting and burning
- suicidal behavior
- aggressive or homicidal behavior, including online bullying

3 Generations: Nature Valley Commercial

- <https://www.youtube.com/watch?v=is5W6GxAl3c>

Tips for Parents

- Self-reflection and modeling behaviors – walk the walk
- Boundaries – the 16-hour day, the working vacation, distracted parenting
 - Masculine gender roles
- Dialogue – talk about their experience, your experience, struggles, successes
- Education – examine the digital, media-saturated world in which we live; become aware

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Tips for Parents (continued)

- Acknowledge addictive elements – patience, understanding, compassion
- Find alternatives
- Find other families, groups, communities who want to unplug
- School-based advocacy – talk to your kids’ teachers, principals, school boards
- Devices are not babysitters
- Encourage boredom

Tips (continued)

- Don’t use digital distractions from the emotions of everyday living
- Ask about cyberbullying
- Encourage old-fashioned play

What you can do:
Suggested strategies for unplugging

- Find a small group of like-minded people
- Stop using your devices 1-2 hours before sleep
 - Use a dimmer setting on your device (e.g., Twilight ap)
- Sleep away from your phone
- Work/study away from your phone
- Turn off your email when studying
- Turn off alert messages on your devices
- Schedule specific times to check messages
- Take breaks – stand up every 30 minutes, stretch, move your body

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Tips for Educators

- Unplug
- Teach literacy offline
- Encourage awareness of and reflection on the digital world
- Creativity includes both hemispheres
 - Dialogue
 - Empathy
 - Deep memory
 - Synthesis (not just analysis)
- Imagination (dreams, fantasies, lateral thinking, crystallized insights, e.g., Oliver Sacks research)

Tips for Educators

- Don't assume computer literacy (ease of use does not equal understanding or expertise)
- Teach research skills beyond Google and cut-and-paste
 - Analysis of the source (authority vs. popularity)
 - Hypothesis formation
 - Confirming and disconfirming evidence
 - Multiple ways of knowing
- Encourage boredom
- Teach active listening (eye contact, reflection, empathy, compassion, perspective-taking)

Tips for Educators

- Value of non-technical knowledge
 - Arts, humanities
- Teach the value of emotion, frustration, struggle, failure, compassion, community, sensation, perception, the body, patience, reflection, dialogue, downtime, nature, passive receptivity, sitting still, meditation, mindfulness

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Bibliography

- Konrath, S.H., O'Brien, E.H., & Hsing, C. (2011). Changes in dispositional empathy in American college students over time: A meta-analysis. *Personality and Social Psychology Review*, 15(2), 180-198.
- Konrath, S., Bushman, B.J., & Campbell, W.K. (2006). Attenuating the link between threatened egotism and aggression. *Psychological Science* 17(11), 995-1001.
- <http://chronicle.com/article/The-Psychopath-Makeover/131360/>
- Dutton, K. (2012). Psychopathy's double edge. *The Chronicle Review*, October 22, 2012.
- Paul, A.M. (2013). You'll Never Learn! Students can't resist multitasking, and it's impairing their memory. *Slate*. Friday, May 3, 2013. http://www.slate.com/articles/health_and_science/science/2013/05/multitasking_while_studying_divided_attention_and_technological_gadgets.html

Bibliography continued

- <http://www.medscape.com/viewarticle/738383>
- Carr, N. (2011). *The shallows: What the internet is doing to our brains*. NY: W.W. Norton & Co.
- Drew Dzwonkowski, 04/14/13, *The State News*
<http://statenews.com/article/2013/04/put-down-your-ing-phone>
- Gibson, S. (2013). University of Winnipeg study links hard-core texting with shallow behaviour. *Metro News*, April 11, 2013
<http://metronews.ca/news/winnipeg/630243/university-of-winnipeg-study-links-hard-core-texting-with-shallow-behaviour/>
- http://www.nami.org/Content/NavigationMenu/Find_Support/NA_ML_on_Campus/collegereport.pdf


Bibliography continued

- Rideout, V.J., Foehr, U.G., & Roberts, D.F. (2010). *Generation M-squared: Media in the lives of 8- to 18-year-olds*. A Kaiser Family Foundation Study, January 2010. <http://kaiserfamilyfoundation.files.wordpress.com/2013/04/8010.pdf>
- [resentation](#)
- Fields, R.D. (2008). White matter. *Scientific American*. March 2008.
- Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. NY: Basic Books.
- <http://www.neontommy.com/news/2013/03/can-cell-phones-affect-sleep>

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Bibliography continued

- "Sight" a short film <http://vimeo.com/46304267>
- Greenfield, S. (2013). Modern technology is changing the way our brains work, says neuroscientist. Daily Mail, June 11, 2013. Adapted from *ID: The Quest For Identity In The 21st Century* by Susan Greenfield, to be published by Sceptre
- Patoine, B. (2008). Brain Development in a Hyper-Tech World. Dana Foundation. <http://www.dana.org/media/detail.aspx?id=13126>
- Kieffer, A.K. (2013). Technology and brain development. Southern Oregon University. <https://sites.google.com/a/sou.edu/amykatharine/p>



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Janet Olsen – olseni@msu.edu
Karen Pace – pace1@msu.edu

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To learn more, go to:
http://msue.anr.msu.edu/program/info/be_safe

Be SAFE: Safe, Affirming & Fair Environments curriculum

Be SAFE community workshops

Be SAFE workshops for parents and caregivers

Be SAFE webinars on timely topics

December 16, 2015: *Mindfulness and Adolescence: Windows of Opportunity to Enhance Health and Well-Being*
<http://events.anr.msu.edu/event.cfm?folder=BeSAFEMindWebinar>



Prize winners!

Alone Together: Why We Expect More from Technology and Less from Each Other

Be SAFE: Safe, Affirming and Fair Environments



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