

**Zone?**

## Healthy Technology Balance in Children



## Agenda

1. Review screen usage stats and expert guidelines.
2. Identify 4 critical factors for optimizing child development, behavior, and learning.
3. Evaluate research on impact of technology on children in four domains: physical, social, mental, cognitive.
4. Implement *Balanced Technology Management* strategies in school environments.

Research references are located on website [zonein.ca](http://zonein.ca) under **Fact Sheet** section.

## New Millennium Children *Are they Sustainable?*



- No experience of life without technology.
- 3D reality → 2D virtual.
- Hard wired for high speed.
- Isolated from family, peers.
- Exposed to high levels of media violence.
- Largely sedentary.
- First generation that may not outlive their parents.

Small 2008, Mangen 2008, Anderson 2008, Tremblay 2011, New England Journal of Medicine 2012

## Epidemic of Child Disorders

- Developmental delay 1 in 3 at school entry.
- Obesity 1 in 4.
- Depression/anxiety 1 in 6.
- Suicide rate doubled over past 5 years in males.
- Autism 1 in 65.
- Adhd 1 in 5 for boys, 1 in 11 for girls.
- Sleep deprivation 73%.
- Tech addiction 10 (research) - 50% (self-report)
- Learning disabilities 1 in 3.

HELP EDI Mapping 2009/13, WHO 2015, CDC 2016, Waddel 2007, National Sleep Foundation 2017, Gentile 2011, Common Sense Media 2017, BCTF 2016

## Tech Usage Stats and Expert Recs

## Usage Statistics

- Infants 0-2 years watch 2.5 hours per day.
- Toddlers 2-5 years use 4.5 hours per day.
- Children 6-12 years use 7.5 hours per day.
- Teens 13-18 use 9.0 hours per day.
- Adults use 11 hours per day.
- Smartphones most commonly used device for children 0-8 years.

*These technology usage statistics reflect entertainment technology only, and do not include passive watching or educational use.*

Christakis 2004, Hamilton 2006, Anderson 2007, Kaiser Foundation 2010, Pagani 2010, Common Sense Media 2013/15, Innis 2014, Barr 2014

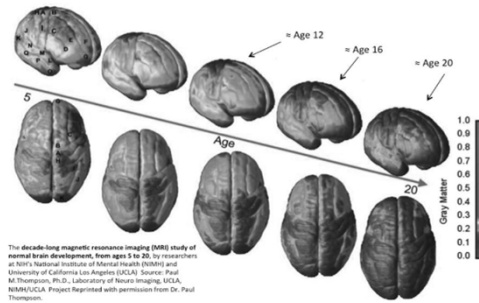
## Expert Recommendations

- 0-2 years should not be exposed to ANY technology (including passive watching).
- 3-5 yrs not use more than 1 hour TOTAL screens/day.
- 6-12 yrs not use more than 2 hrs/day.
- 13-18 yrs not more than 3 hrs/day.
- < 6 yrs should not watch ANY violent media content.
- Only 10% of children meet expert guidelines.



American Academy of Pediatrics  
2002/13/15/16,  
Canadian Pediatric Society 2010/17

## Rapid Pruning 0 - 10 Years



The decade-long magnetic resonance imaging (MRI) study of normal brain development, from ages 5 to 20, by researchers at MIT's National Institute of Mental Health (NIMH) and University of California Los Angeles (UCLA). Source: Paul M. Thompson, Ph.D., Laboratory of Neuro Imaging, UCLA, NIMH/UCLA Project. Reprinted with permission from Dr. Paul Thompson.

## Brain Hard Wired by Age 20

## Every Child is Different!

### *Differential susceptibility*

to the effects of technology overuse, is essential in all research paradigms:

- Individual characteristics
- Family dynamics
- Age of 1<sup>st</sup> exposure
- Content
- Context
- Duration



## Balanced Technology Management

Critical factors for growth and success:

- movement
- touch
- human connection
- nature



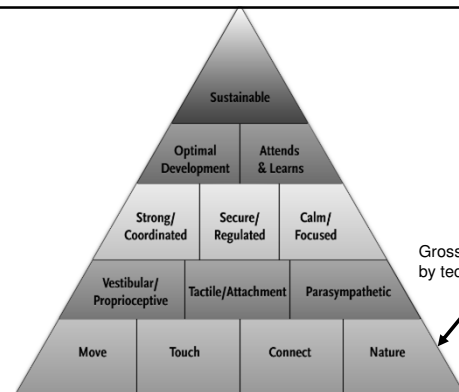
Technology Use



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## Enhancing Development and Learning

*Move Touch Connect Nature*



## Movement

***Give a child a device and they sit;  
take it away and they move.***

## Canada Movement Guidelines

**GUIDELINES**  
For optimal health benefits, children and youth (aged 5-17 years) should achieve high levels of physical activity, low levels of sedentary behaviour, and sufficient sleep each day.

A healthy 24 hours includes:

- < 13% of children meet the *Canadian Movement Guidelines*.
- Effects of sedentary lifestyle costs Canada \$70 billion per/year in healthcare costs.

Canadian Society for Exercise Physiology  
2018, National Institute of Health 2018

Increasing sufficient sleep, reducing sedentary time for outdoor time, and increasing voluntary behaviours and light physical activity with additional moderate to vigorous physical activity can provide greater health benefits.

**GUIDELINES**  
For optimal health benefits, children and youth (aged 5-17 years) should achieve high levels of physical activity, low levels of sedentary behaviour, and sufficient sleep each day.

A healthy 24 hours includes:

**SWEAT**  
MODERATE TO VIGOROUS PHYSICAL ACTIVITY  
An accumulation of at least 60 minutes per day of moderate to vigorous physical activity involving a variety of aerobic activities, and muscle and bone strengthening activities should each be incorporated at least 3 days per week.

**STEP**  
LIGHT PHYSICAL ACTIVITY  
Several hours of a variety of structured and unstructured light physical activities.

**SLEEP**  
Uninterrupted 9 to 11 hours of sleep per night for those aged 5-13 years and 8 to 10 hours per night for those aged 14-17 years, with consistent bed and wake-up times.

**SIT**  
SEDEDNTARY BEHAVIOUR  
No more than 2 hours per day of recreational screen time.

## Movement Benefits

- Cardiovascular
  - Obesity/diabetes
  - Stroke/heart attack
- Builds strong core
- Motor coordination
  - Right/left
  - Upper/lower
  - Eye/hand for printing
  - Eye/eye for reading
- Spatial for math
- Attention/learning
- Mental health Ratey 2008

## Brains are Designed to Move

BRAIN AFTER SITTING QUIETLY

BRAIN AFTER 20 MINUTE WALK

Research/scan compliments of Dr. Chuck Hillman University of Illinois

## Off Centre Movement- *Vestibular System*

Stimulates a set of 3 canals located on each side of the brain; controls posture, coordination and arousal...enhancing literacy, attention, learning.

Solon 2007, Scaff 2007, Braswell, 2006, Rine 2004

## Heavy Work Movement – *Proprioceptive System*



- Located in the joints and muscles.
- Activate with heavy resistance or work e.g. push, pull, lift and carry.
- Refines movement patterns for literacy, sports.
- 'Prop' is often very calming and relaxing, great for anger/energy release.

Ratey 2008

## Double Down on Recess

### Rules

- No longer than one hour in classroom.
- Everyday an outside day.
- Lots of "loose parts" as fixed equipment gets boring
- 3 recesses:
  - Instructional recess: everyone goes out, organized sports.
  - Traditional recess: 15 min. eat, 15 min. outside.
  - Free time recess: all ok

### Results

- Attention improved.
- Less homework.
- Grades increased.
- Less class body/brain breaks.

Paul McKay, principal Quebec Elem School, CBC Radio *The Current* Feb. 27, 2019

## Touch

*Device use deprives children of touch.*

## Touch Benefits

- Touch is a biological necessity.
- Without early touch, infants die (orphanages).
- Adequate touch produces secure, gentle, relaxed infants and toddlers.
- Inadequate touch results in fearful, anxious and agitated infants and toddlers.



Hopper 1957, Montagu 1978

## Touch

*Counteracts sympathetic charge*

- Skin is the largest and oldest organ in the body; 20 sq. ft. in adults, 12% total body weight.
- Touch lowers cortisol, adrenalin, regurgitation, promotes development.
- When the need for touch isn't satisfied, abnormal behavior will result.



Bigelow, 2006, Montagu 1978




TCU Institute for Child Development – Touch, 5 min

## Connection

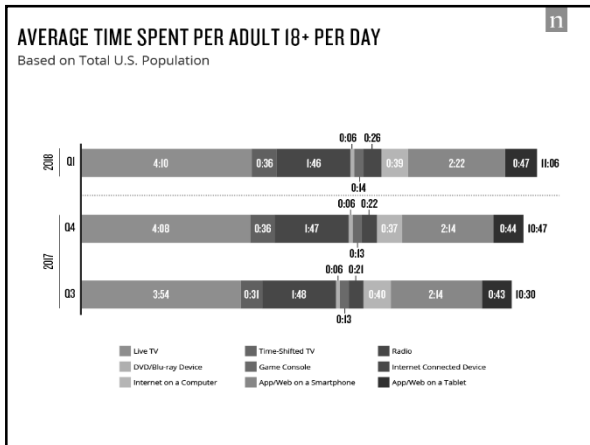
*The origin of child mental wellness*

### Attachment Benefits

- Attachment is a biological need without which we die.
- Failure of attachment is #1 causal factor for mental illness.
- Attachment is the foundation for all relational behavior.
- Teachers role model healthy relationships.




Montagu 1978, Insel 2001, Waddell 2007, Houtrow 2014, Crittenden 2015




### Attachment to Devices

- In the absence of an attentive teacher or parent, children are detaching from humans and attaching to devices at an alarming rate.
- A child should never prefer a device to loving attention from a human.
- Detached children cannot self regulate or learn.
- Need to detach from tech, and reattach to our students.



### Detachment and Autism

- Critical period for socialization 6-18 mo.
- Increased screen time (phone, tablet)...combined with decreased parent connection...
- ...results in increased incidence of PDD and oppositional defiance.
- By 2025 autism will be 1 in 2 for males, 1 in 5 females.



Still Face Experiment Youtube 2 min.

Heffler 2015, Chonchaiya 2011/15, Numata-Uematsu 2019, CDC 2018, MIT 2015

## Social Media Guard


## Nature

*When did nature become unsafe?*

## Nature Benefits

- Backpackers scored 50 percent better on a creativity test after spending 4 days in nature screen-free.
- Students showed improved cognitive memory and affect (anxiety) after 50 min. rural walk.
- 20 min per day access to 'green space' significantly reduces adhd and improves attention and behavior.

Strayer 2012, Bratman 2015, Faber-Taylor 2004




Penelakut School Nature Trail 2019

## Reassessing Risk - Schools

- PE teachers are gone.
- Balls and equipment are often locked away.
- Student recess management easier with screens.
- Bullying happens when kids are bored.
- Students need challenge.
- Risk reduces injuries!


(see *No Rule Schools*)



## 7 Components of Play (why kids love recess and hate gym)

Play and building with hands as a child increases success as an adult; those in jail had neither.

1. Purposeless
2. Voluntary
3. Inherent attraction
4. Freedom from time
5. Diminished consciousness of self
6. Improvisational potential
7. Continuation desire




## Double Down on Recess

Rules	Results
<ul style="list-style-type: none"> <li>• No longer than one hour in classroom.</li> <li>• Everyday an outside day.</li> <li>• Lots of "loose parts" as fixed equipment gets boring</li> <li>• 3 recesses:                             <ul style="list-style-type: none"> <li>• Instructional recess: everyone goes out, organized sports.</li> <li>• Traditional recess: 15 min. eat, 15 min. outside.</li> <li>• Free time recess: all ok</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Attention improved.</li> <li>• Less homework.</li> <li>• Grades increased.</li> <li>• Less class body/brain breaks.</li> </ul> <p style="font-size: small;">Paul McKay, principal Quebec Elem School, CBC Radio <i>The Current</i> Feb. 27, 2019</p>

## Prevent Injury

- Data doesn't support current injury prevention practices.
- Can't get data on lawsuits but can on injuries.
- Can't eliminate risk, but can prevent injuries:
  - Ensure CSA achieved.
  - Establish "Tool Rules".
  - Yearly playground safety training.
  - Adequate surfacing (> 6").




Canadian Standards Association

## Screen Research


**Physical Social Mental Academic**

- ### Check for the Red Flags
- ✓ Developmental delay – speech, motor, cognition
  - ✓ Sleep deprivation/disorders – tired in day, nitemares
  - ✓ Social phobias – no friends, dislikes outings
  - ✓ Behavior problems – controlling, defiant
  - ✓ Self-regulation issues – can't wait turn, tantrums
  - ✓ Disinterest in activities - other than tech
  - ✓ Dependency – needs help, requires reminders
  - ✓ Emotional problems - depression, anxiety, obsession
  - ✓ Attention deficit – distracted, learn difficulties,
  - ✓ School performance – low grades, wants to drop out




### Physical Development

*Technology is a restraint*



### Brain Atrophy

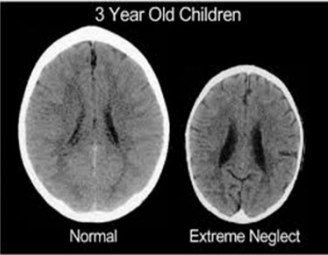
- Brain triples in size first 2 years.
- The brain remakes and rewires itself based on what we do.
- Technology overuse is pruning tracks to frontal lobes with grey and white matter atrophy.
- Due to pruning, by death, only 30% of neurons are left.
- Impacts executive functions of attention, learning, impulsivity...



Christakis TED TALK 2011, Small G 2008, Lin F 2011, Weng 2012, 2013, Dunckley 2014

### Brain Growth & Environment

- Parents use > 11 hrs/day of entertainment technology.
- Relationships affect brain development.
- Brains develop in conjunction to environmental stimuli (or lack thereof).



• Neilsen Company 2018, Christakis TED TALK 2011, B Perry 2012

### Developmental Delay: 1 in 3-6

- 30% of Canadian & 15% U.S. children enter school developmentally vulnerable/delayed.
- Past decade shows 28.4% increase in developmental and mental disorders in affluent families.
- TV and video game use is associated with delays in fine/gross motor and speech development.
- France and Australia have restricted 'Baby TV' due to negative impact on child development.

HELP EDI Mapping 2009/13, Houtrow 2014, CDC 2008 Christakis 2004, APA 2004, CBC 2009

## Obesity: 1 in 3-4

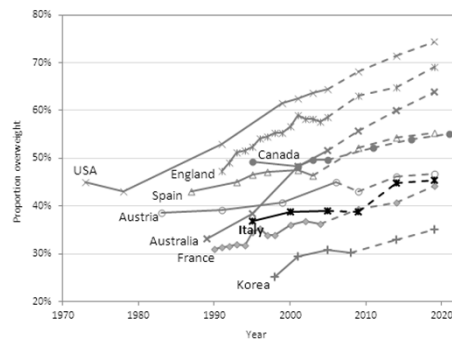
- 25% of Canadian & 31.8% U.S children are obese or overweight.
- Diabetes – 30% of obese children.
- Cardiovascular disease – 60% of obese children.
- Obesity increases by 6% for every hour of TV watched per day, 31% if have a TV in bedroom.
- Health and education interventions for obesity need to include technology reduction!



WHO 2015, Ogden 2014, CDC 2013, Christakis 2005, Thompson 2005, Jackson 2009, Manios 2009, Epstein 2008, Anderson 2010

## Projected Child Obesity

Organization for Economic Co-operation and Development 2015

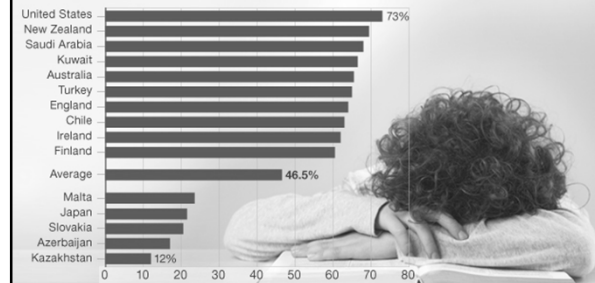


## Sympathetic Stress State



## 73% Children Sleep Deprived

Sleep deprivation in pupils taking maths and science tests, aged 9-10



Percentage of pupils in class where learning suffers from lack of sleep, according to teachers, out of 50 countries

Source: Boston College

Thinkstock

## Sleep Deprivation

- 73% of Canadian children are sleep deprived.
- Light from tech suppresses melatonin; 96% of teens have tech in bedroom.
- Sleep deprivation associated with increased obesity, depression, risk taking, attention deficit, asocial.
- Insufficient sleep considered a public health epidemic.

Czeisler 2013, Center for Disease Control and Prevention 2014, National Sleep Foundation 2016



## 2-D Myopia

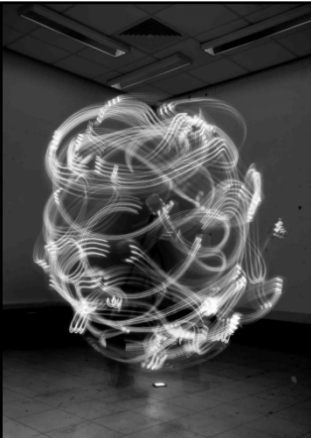
- 42% increased myopia in US, 30% in Canada citing technology as causal factor.
- Onset age now 4 yrs, used to be 14-16 yrs.
- 2-D, fixed distance, early technology device use harms eye development.
- Myopia is irreversible.

Sherwin, American Academy of Ophthalmology 2012, Liu 2014





## Wifi Radiation




Cell phone in wifi mode. Red shows highest radiation, blue lowest.

Luis Hernan used a DSLR camera mounted on a tripod, long exposure with Arduino based Kirlian device a WiFi sensor connected to a simple processor connected to an LED strip.



## Wifi & Cancer Research

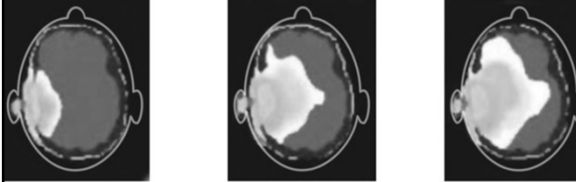
- WHO categorized WiFi as a possible Group 2B carcinogen.
- Experimental animal studies by NIH/NTP show tumors at 2 yrs.
- Epidemiology studies show:
  - acoustic neuromas and brain gliomas in cell phone users after 20 years.
  - sperm DNA fragmentation and decreased sperm motility in laptop users at 20 years.
- Incidence studies show marked increase in cancer:
  - 1 in 2 people will get cancer and 1 in 4 adults will die from cancer in our lifetime.
  - 25% increase in teen cancers past 30 yrs



WHO 2011, National Toxicology Program 2016/18, Pall 2013, Emre 2010, Khurana 2009, Avendano 2011, Hardell 2013, Burkhamer 2017, Canadian Cancer Society 2018

## Children High Risk

Penetration of cell phone radiation into human skull




adult skull                      10 year old                      5 year old

Tests conducted by researchers Gandhi, Lazzi and Furse, 1996 - used with permission.

Thinner skulls, more aqueous bodies/brains, higher cell turnover. AAP 2014

## Pediatric Cancer Research


- Incidence of pediatric cancer increased 2001-2014 across sex, age, race/ethnicity, region, economic status, and rural/urban status.
- For lymphoma, thyroid, brain, kidney and liver representing 98.8% of population.
- Brain cancer highest in 0-4 yr. population.



Center for Disease Control 2018, Baby Safe Project

## Why Aren't We Being Warned?

- Exposure is universal.
- No control group.
- Warnings about cancer from smoking took 30 years.
- Technology companies producing 'backlash' research to counter valid data.
- Industry says "we never said wifi was safe". Dr. Martin Pall




June 2017 educational video on zonein.ca



**Social Development**  
*Asocial, antisocial*

### Social Skills

- Who we are is determined by what we do.
- Identity formation is relevant to how we spend our time.
- Social confidence and social engagement come from social interaction.
- Social skill perception low with high users of tech.



Elkind 1988, Turkle 2015


### Self Regulation

- Co-regulation with parents and school staff lead to self-regulation.
- Virtual world doesn't teach human coping skills for real world.
- Can control virtual...not reality.
- Early and high duration screens:
  - Difficulty soothing self when upset.
  - Tantrums, meltdowns.
  - Unable to wait turn.
  - Can't listen.
  - Can't pay attention; distracted.



### Inarticulate Speech


- Mouth is muscles – use it or lose it.
- Audible television decreases adult words by 89%, impacting on infant vocalizations and conversational turns.
- Baby TV results in delayed speech and cognition.
- FTC forced Disney to refund Baby Einstein DVD's due to "false advertising".



Christakis 2009, 2007, CBC 2009

### Teen Social Phobias

- Virtual reality replaces real relationships.
- Males: relationship phobic, addicted to video games &/or porn. Females: addicted to social media.
- Rising incidence of anxiety, depression, obsession, agoraphobia, suicide.



Gentile 2009, Bristol University 2011

### The Great Social Divide

<p><b>MALES</b> <b>Videogames, Porn</b> <i>Heavily researched</i></p> <p><b>Desire competence.</b></p> <p>36% U.S. and 48% Canadian 18-30 year old males live with their parents; not working; not in school.</p> <p><small>Stats Canada 2012, U.S. Census Bureau 2012</small></p>	<p><b>FEMALES</b> <b>Social Media</b> <i>Poverty of research</i></p> <p><b>Desire social acceptance.</b></p> <p>Canadian Association of Mental Health reports &gt;50% of teen girls report significant depression and anxiety; cited social media as causal factor.</p> <p><small>CAMH 2018</small></p>
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## VG & SM Persuasive Design *Manipulation and Coercion*

- Motivators
  - Girls – desire for social acceptance
  - Boys – desire for competence
- Triggers
  - Incessant notifications
  - FOMO
  - Intermittent rewards
- Ability
  - Don't make them think too hard



Freed R 2019

## Content Designed for Addiction

- Novelty – Fortnite varies skill ability, characters
- Reward-based
- Social
- Content positioned between anxiety and boredom.
- Multitask to distract.
- Persuasive/Addictive:
  - Auto play (Netflix, YouTube)
  - 24/7 (Snap Chat streaks)
  - 'Likes' (Instagram, Facebook)




## Social Media *All Breadth, No Depth*

*Looking for love in all the wrong places...*

- Instagram – rated “worst app” for mental illness.
- Facebook – promotes envy, exclusion, depression
- Snap Chat – streaks constant monitoring; pic never dies.

Feeds off the need to be liked.



## Video Games → Aggression

Video game overuse (> 1-2 hrs/day teens) results in:

- increased activity in amygdala
- increased visual/auditory hypersensitivity
- decreased activity in frontal lobes

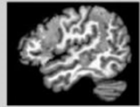
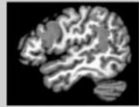
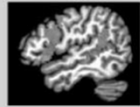
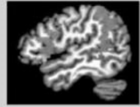
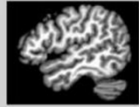
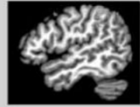
Media violence exposure is the salient causal factor for rise in child/youth aggression. American Academy of Pediatrics in 2009 categorized media violence as a Public Health Risk.

Anderson 2010 (meta-analysis), Doan 2015, Markman 2010, Huesman 2013



## Gaming Changes the Brain

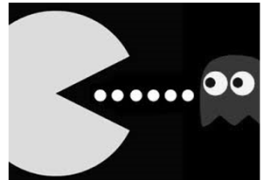
### Your Brain on Games: Experimental Evidence

	Before Training	After 1 Week	After 2 Weeks
Control Group (No Video Games)			
2-Week Video Game Group			


**LOSING TOUCH** Young adult males who played a violent video game extensively for 2 weeks had lower activity in important brain areas while attempting to control behavior, compared to those who played no video games.

## Video Game Progression

From This



To This



40% of 8 year olds have played GTA which includes physical and sexual violence including torture.


## Safer Schools - Video Game Montage



## Gaming Duration Effects

**Moderate Gamers: 3-4hr/day**

- Increased risky behaviors (sex, reckless driving, drugs/alcohol, smoking).
- Increased defiance.
- Decreased executive function (attention, concentration, memory).



**Heavy gamers: > 4 hrs/day**  
have 4-5 times increased incidence of effects noted above.

Jay Hull 2015


## Fortnite...the New Drug *Saving the World from your Couch*



- Intermittent rewards
- *loot boxes – gambling*
- Immersive
- "killer" graphics
- Novel
- *change modes wkly*
- Personalized
- Competitive
- Social
- *Talk to other players*

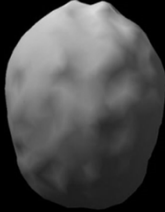
## Elementary Porn

- 42% of children aged ten use internet pornography.
- Iceland, Scotland, England banned internet porn due to increased sexual assault of children by children.
- Most active pornography users are aged 12-17 years.
- Porn results in disinterest in relationships; erectile dysfunction. Ybarra 2005, Wolack 2007, Woda 2014, Freeman-Long 2000, DeAngelis 2007, [www.yourbrainonporn.com](http://www.yourbrainonporn.com), Sapolsky 2013, CNN 2013

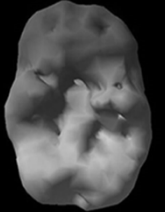


## Porn Changes the Brain

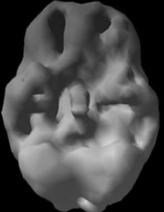
HERE'S YOUR BRAIN



HERE'S YOUR BRAIN ON HEROIN



HERE'S YOUR BRAIN ON PORN



www.ConquerSeries.com

SPECT Imaging - Public Domain Jan. '18

## Minecraft Sex



**National Online Safety**

**ALERT – Momo Suicide Challenge**

- Suicide challenge infiltrated Facebook, YouTube, WhatsApp, Minecraft...
- Unsupervised teens and children are not safe online.
- Adults must warn children of this threat

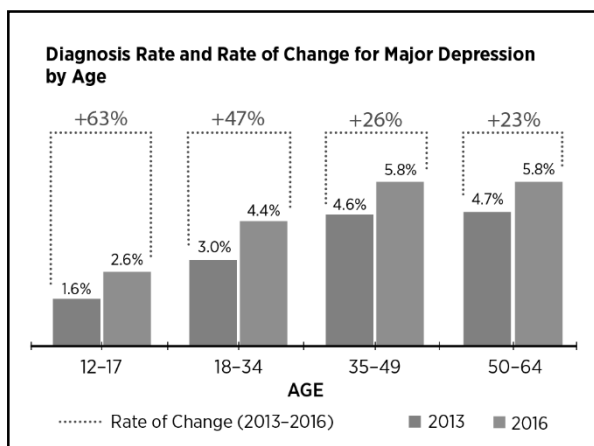
**Mental Development**

*Isolated, neglected, bullied*

**Mental Illness: 1 in 5-7**

- 14.3% of Canadian & up to 20% of American children have a diagnosed mental illness.
- US reports 28.4% rise in incidence of developmental disorders in children from *high income* families.
- Child depression, anxiety, adhd, autism, developmental disorders, learning disorders are associated with technology overuse.
- Detached parents/teachers/clinicians are not available to form healthy attachments with their children, and in default of the parent, children attach to technology.

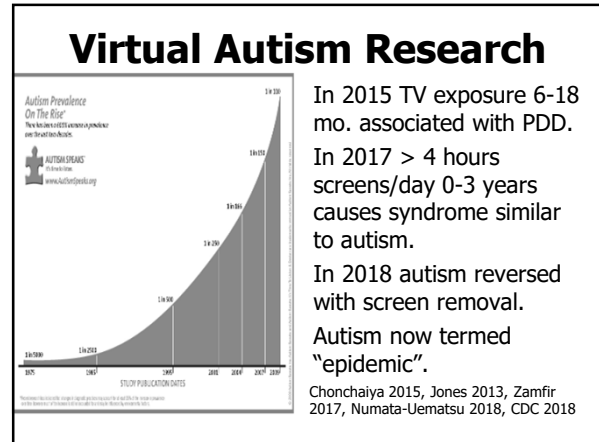
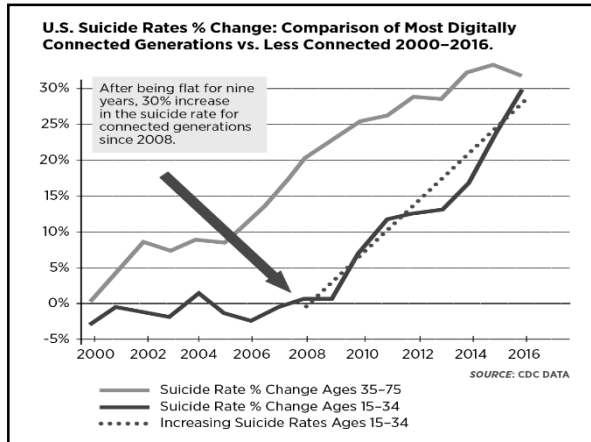
CDC 2013, Waddell 2007, Houtrow 2014, Robinson 2008, Mukkades 2002, Rowan 2008, CBC News 2007



**Anxiety and Depression 2007 - 2015**

- Teens who use > 7 hours total screens/day have double the rate of anxiety and depression.
- From 2007 to 2015 suicide rates doubled for females and increased by 30% for males.

Twenge, 2018



### World Health Organization gaming addiction as a mental health disorder

Decreases in Psychological Well-Being Among American Adolescents After 2012 and Links to Screen Time During the Rise of Smartphone Technology. Jean Twenge

### ICD – 11 Gaming Disorder

WHO's International Classification of Diseases

A pattern of gaming behaviour characterized by:

1. Impaired control over gaming.
2. Increasing priority given to gaming over other activities.
3. Continuation or escalation of gaming despite negative consequences.
4. Significant life problems (personal, family, social, education, occupational).

Pontes 2019

### Arousal Addiction

*Different than Substance Addiction*

Brain adapts to rapid stimulation. Fright Flight Flight is triggered.

1. Dopamine addiction feedback loop.
2. High adrenalin.
3. Hyperarousal state.

Seeks stimulation. Can't focus, concentrate, perform work.

### Detachment and Addiction

- For the first time ever children have addictions; enormous costs to health and education.
- Detached parents model tech addiction.
  - Boys – video games, porn.
  - Girls – social media, Netflix.
- Studies show 1 in 11 children between ages 8 -18 years have a tech addiction.
- 50% of teens report addiction.

Flores 2009, Gentile 2011, Common Sense Media 2018

### Addiction Changes the Brain

Functional Changes

Healthy Brain

Addicted Brain

Dunckley 2014

### Cyberbullying Prevalence

- 42% of grade 4-8 students had been electronically bullied and 56% never told their parents.
- Half of the electronic bully victims reported not knowing the perpetrator's identity.
- Youth who reported being harassed online, were 8 times more likely to carry a weapon to school in the past 30 days.

Intel 2014, US Department of Health 2012, Kowalski 2007, Ybarra 2007

### Look Up

### Cognitive Development

*Attention deficit, learning impaired*

### Real vs. Virtual Learning

REAL	VIRTUAL
<b>3D Constructed</b>	<b>2D Memorized</b>
Blocks, paper, pencil, scissors.	Apps, tablets, phones, games.
Creative and imaginative.	Passive; told what to do.
Established concepts.	Memorizing symbols.
Inquisitive, interactive.	Rote memory only.
"Thick" learning.	"Thin" learning.

### Sponge' Blobs'

- 9 minute exposure to Spongebob cartoon resulted in a significant reduction in executive function in 4 year old children:
  - Decreased memory
  - Decreased attention
  - Increased distractibility
- Fast paced, violent cartoons as harmful as video games.

Christakis 2011, Gentile D 2009

## Learning or Entertainment?



- 97% of time spent on devices at home is for entertainment; 3% is for learning (13 min/day).
- 98% of population cannot multitask.

Common Sense Media 2018, Strayer 2018

## Multitasking a Myth

- Partial tasking results in progressive distraction.
- 3 sec. distraction doubles mistakes.
- Multitasking associated with depression/anxiety.

Braswell 2011 , Becker 2012



## Multitasking Results

### Cognitive deficits:

- decreased filtering of irrelevant data, memory, top down attention, sustained attention
- increased distractibility, attention lapses, mind wandering

### Neural changes:

- decreased grey matter in frontal lobe, connectivity

### Psychosocial domain:

- decreased self control
- increased impulsivity, depression, anxiety

Heavy media multitaskers have difficulty *reorienting* attention.

Melinda Uncapher 2015, Anthony Wagner 2009 Meta-analysis

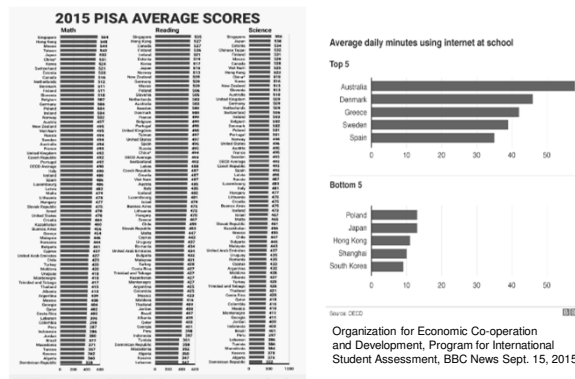
## PISA Shows Declining Academic Performance

- Program for International Student Assessment (PISA) tests reading, math, science in 15 yr olds X 72 countries every 3 yrs.
- Canada dropped out of top ten to 13<sup>th</sup> declining in all 3 subjects.
- U.S. ranked 27<sup>th</sup> with no improvement in 3 subjects.



www.oecd.org

## OECD PISA Score & Internet



## Device Management Issues



- Cannot use same device for entertainment and school work.
- Adults can't manage their own devices!
- Common mgt issues:
  - Inappropriate content
  - Excessive duration
  - Early use
  - Addiction



## Behavior Management Issues

### Screens as External Reinforcers

- The conspiracy of 'quiet'
- Control, behavior mgt.
- Short-term gain...LT pain.
- Feeds "The Beast".
- Passive
- Not transferrable

### Choose Internal Motivators

- Learning is not easy and should never be entertaining.
- Challenge, engage; learning is interactive and should be noisy.
- Active
- Relate, Collaborate.

## EdTech Cannot Achieve Foundations for Literacy

- Printing
  - Foundation for reading.
  - *If we're still doing it, better be teaching it!*
- Math
  - 3D spatial concepts
- Reading
  - Slow = comprehension
  - Slow = memory
  - Slow = critical thinking



## Paper, Digital, Animated

Parents reads the following:

- Paper book
- Digital book
- Animated book

Which did the child like the best?

Which did the child learn the most from?



M Wolfe 2018

## Screens vs. Paper

Attention: clicking and scrolling disrupt attention and disturb mental appreciation; media switches cause increased distraction and mistakes.

Comprehension: reader lacks both completeness and constituent parts.

Memory: change in physical surroundings has a negative effect on memory; multitasking decreases test performance.

Learning: doesn't allow required time and mental exertion.

Meaning: isn't a physical dimension, loss of totality.

Vision: not as acute as text.

**Ask them! 92% of teens reported they preferred print to screens due to improved concentration.**

Magnen 2008, Brasel 2011, Ghose 2013, Sana 2013, Naomi Baron 2015, Virginia Clinton, 2019

## Screen vs. Paper Reading Meta-analysis

- 2008-2018 review of 33 studies on screen vs. paper reading.
- Paper reading showed increased reading comprehension, metacognition, and efficiency.
- Brain connectivity is increased by time spent reading books and decreased by length of exposure to screen-based media.

Journal of Research in Reading UKLA  
Journal of Research in Reading, 42(1), 1-12  
 March 2019, Vol. 42, No. 1, pp. 1-12

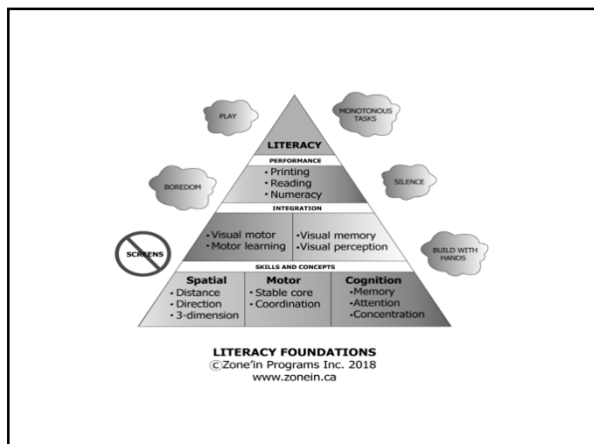
Clinton 2019, Wolfe 2018, Horowitz-Kraus 2017

Reading from paper compared to screens: A systematic review and meta-analysis

Virginia Clinton ©  
 University of North Carolina, Grand Forks, ND, USA

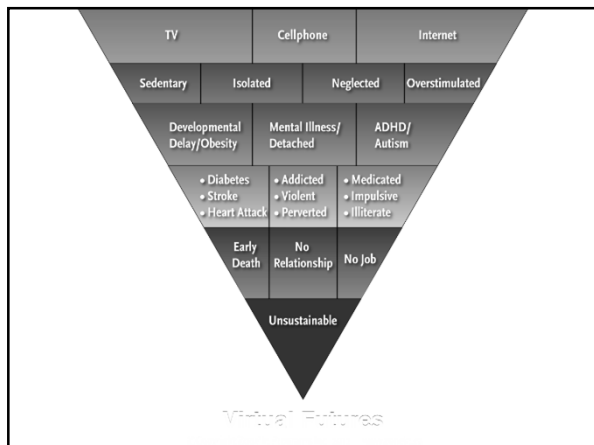
## Build Biliterate Brain

- Early years ages 0-5; no screens
  - Build language and motor areas of brain
- Primary grd K-3; no screens
  - Establish literacy foundations
  - Printing precursor to reading
  - 3D spatial concepts for math
- Elementary grd 4-8
  - Use screen media to enhance teaching
- High school grd 9-12
  - Expand into media literacy programs



## Data Privacy Breach, Data Mining, Student Surveillance

- Infiltration of tech industry into schools.
  - Class Dojo, Classcraft, Summit Learning...
  - ...harvest student grades, tests, attendance records, all teacher, student, parent correspondence...
  - ...sold to the highest bidder.
- EdTech rife with:
- Conflict of interest.
  - No valid evidence.
  - Industry driven and fraudulent research.
  - 'Backlash' research to discredit valid studies.
  - Use of ghost writers 'teacher ambassadors'.



## Balanced Technology Management

### Prevention and Intervention Initiatives for Schools

## Do No Harm

- Education gov't should team with Health gov't to develop *best practice standards* to keep students safe.
- Determine screen policy based on what we know, not what we want.
- Determine present edtech usage stats.
- Are they reasonable, safe?



## 5 Step 'General' Plan

1. Educate - provide information, ask/answer questions; students/teachers can't do what they don't know.
2. Quantify - usage rates and content (Tech Screen, tracker apps); compare to expert guidelines.
3. Red Flags - identify problems; adhd, autism, addiction, severe behavior, aggression, violence.
4. Tech Rules – determine goals for everyone: duration, content, device, age; make goals relevant to severity of problem.
5. Get Help – talk with parents, counsellor, behavior consultant, pastor, RCMP.

## Give...Don't Take Away

- Tech management is not something you DO to a student or teacher, it's something you decide on together as a classroom/school/district.
- Foster children, divorced families, abuse, trauma, neglected children...all are struggling with real life and find comfort in the virtual world.
- Increase engagement in favored activities first, tech reduction will automatically follow.

## Democratic Environments

*Create the conditions where students will thrive*

- Self-regulation salient skill for success...
- ...so teaching should be relational, not just instructional.
- Focus first on foundations for creativity and literacy.
- Let students be a part of the solution.

## Raise the Tech Question

*What does technology actually 'do'?*

**Where is the evidence that technology is...**

- Educational?
- Promotes literacy?
- Improves motor skill?
- Long term success?
- Safe?
- Productive?

**Risk vs. Benefit**

**Risks:** sedentary, overstimulating, isolating, anxiety provoking, addictive, factoid based, passive, displaces basics, socially detached

**Benefits:** easy, cheap, effortless, **entertaining**, occupies time, soother

## Conscious Tech Integration

- Screens should supplement good teaching, not displace or replace it.
- Reassign learning and therapy back to teacher/therapist.
- Don't ask "What can tech do?", and leave rest for teacher.
- Ask "What can the teacher do?", and leave rest to tech.
- Ensure literacy prior to tech.
- Never use screens as rewards!



Carr 2014

## Use Only Evidence-Based Educational Content

- Carefully consider all entertainment content.
- Ensure educational tech research is evidenced-based, not 'industry-driven'.
- Don't use tech as a reward.
- Switch from 'tech breaks' to 'body breaks'.



## Follow the Leaders

*IT Executives are Lo-Tech Parents*

- No tablets or phones until age 12.
- No devices in bedrooms, ever.
- No screens during week, and 30 min. to 2 hours per day on weekend, depending on age.



Steve Jobs, Bill Gates - NY Times 2014



### Screens in Schools

***Industry is liable, schools are culpable***

1. Not evidence based; highest performing schools use least amount of tech (OECD PISA 2015).
2. Industry driven (Facebook sued for \$15 billion).
3. Privacy breached, data and identity harvested.
4. Decreased comprehension and memory compared to books (Clinton 2009). Students prefer paper and books.
5. 50% of students report screen addiction; Common Sense Media 2018; tech-centric teachers may be addicted.
6. Proven harm to student health; 0% of edtech corporations concerned about student health (Marachi 2018).

### Screens in Schools

***What Others Are Doing***

- Maryland approved Bill HB1110 for education and health govt's to work together to determine optimum health and safety practices for screens in schools.
- Ontario, California and France grossly restricted or banned cell phones in schools.
- What will you do?

### Safe Schools Policy

***Best practice standards for screens and radiation***

1. Ban cell phones: including all personal devices.
2. Go wired: cable all wireless devices (routers, tablets, cell phones, laptops with Ethernet or fiberoptics).
3. Ensure literacy: no screens till after grade 3.
4. EdTech evidenced: only use research evidenced edtech.
5. Move outside: balance edtech with outdoor movement.

*Sent to all Canadian Education and Health Gov't and BC School Boards March 2017; located on [www.movingtolearn.ca](http://www.movingtolearn.ca)*

### Safe Schools Considerations


1. Set your policies in line with your school vision.
2. Determine what are your measurements for success:
  - Old school: grades, productivity, compliance or...
  - New school: engagement, social skills, creativity?
3. Set maximum screen limits per class/day.
4. Lunch, recess, PE should be screen-free.
5. Online use MUST BE SUPERVISED.
6. One screen-free day per week (teachers too)!

## Classrooms

### Classroom 'Tech Talk'


*Technology Guidelines for Teachers HO*

- Survey usage rates; provide usage stats.
- Profile expert guidelines.
- Survey sleep rates and device in bedroom; provide sleep stats.
- Determine 5 things to do other than tech.
- Survey interest for school 'tech unplug'.



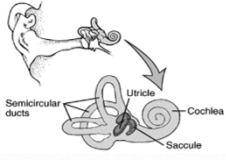



### Train Grade 6/7 - Screenbusters Program

- Train peer models to do weekly Tech Talks.
- Children color "Zombie Kid" while learning about 5 key tech impact areas.
- Lots of discussion, questions, debate.
- End with 24 hour Survivor Unplugged Challenge.







### Off Centre Movement Tools

*Builds strong core, wakes them up!*







### Isometric Movement Tools

*Dumps energy, calms them down!*

### Isometric Techniques

*push/pull /lift/carry*

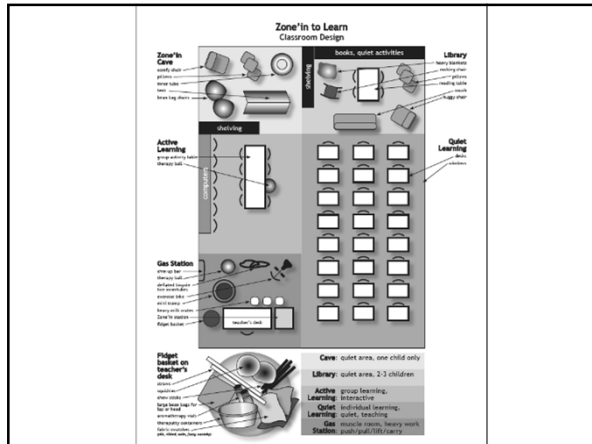
### Deep Pressure Touch

*Lowers adrenalin, anxiety*







### Outdoor Classrooms

- 20 min/day access to green space significantly improves attention, learning and behavior.
- One class per day outside?
- Outdoor schools?



### Gyms

### Crash-N-Bump

- Early intervention initiative in First Nations communities.
- Enhancing sensory, motor, and attachment development.
- 8 stations: earth, mountain, river, ocean, lake, sun, earth, and store.
- One full day per week of rough-n-tumble play!



### Crash-N-Bump

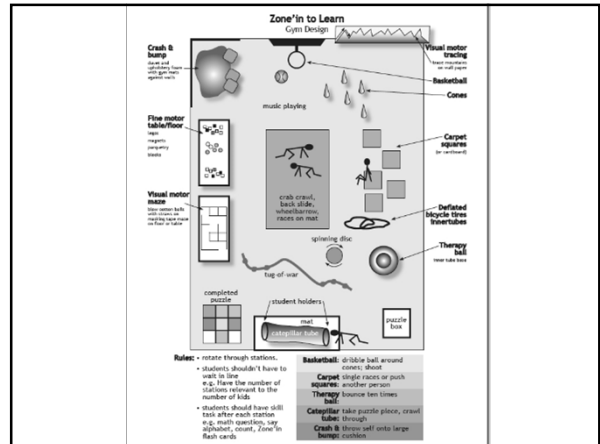
*Heiltsuk First Nation, Bella Bella*



### Swing



## Scooter Board, Tunnel



## School/Home Exercise Gym



Home Garage Gym. 2 min.

## Exercise Rooms

*Squaila & Prophet River Schools, BC*



## Teen Garage Gym

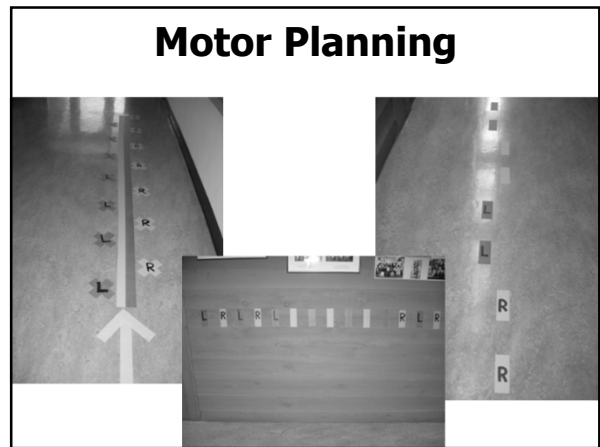
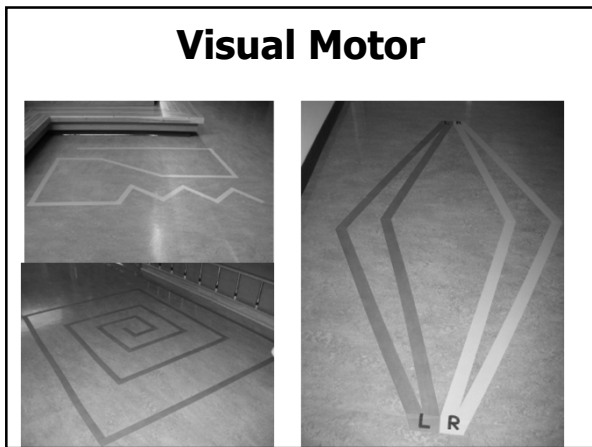
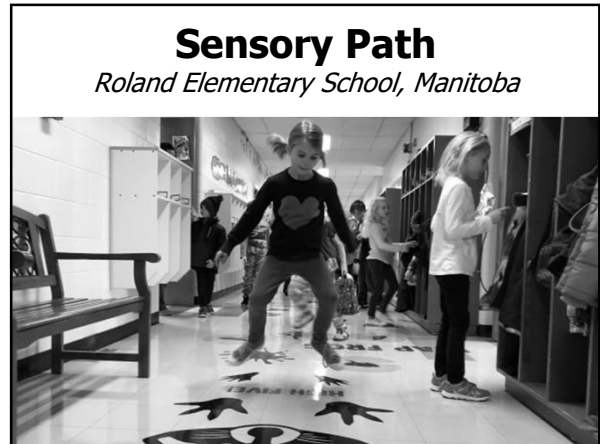
*Sechelt First Nation*



## Convert Classroom to Gym



# Hallways





## Playgrounds

*The epicentre for child development and learning*

## I Can't Believe We Made It



## Playgrounds

*Dilapidated, in disrepair*



## Safe and Boring

*for children > 6 years*



## Off Centre Movement

**Builds core and motor coordination!**

Swinging - traditional, inner tube, tire, hammock, platform, spring rocker, zip line.

Running - treadmill, walk over uneven surfaces.

Spinning - disc spinners, wobble boards, frog, GymSpin.

Up/down - trampoline, stair climber.



## Isometric Movement

**Strengthens muscles and "dumps" energy**

Climbing devices - ropes, cargo net, frames, climbing mounts on walls, jungle gym, climbing trees. Parallel bars, chin-up bars.

Tug-Of-War rope - "Tug Off" for fighting!

Chores - chopping wood, taking out garbage, bringing in groceries, washing car.



### **Kids Need Fun**



### **Most Favorite Playground Device... Swings**



### **Zip Lines, Surge Swings**



### **Kids Need Challenge**



### **Fly Wheel**



### **Kids Need to Spin**



### Friends? Need Multi-User



### Kids Need to Climb



### Ensure Safety with Sufficient Surfacing

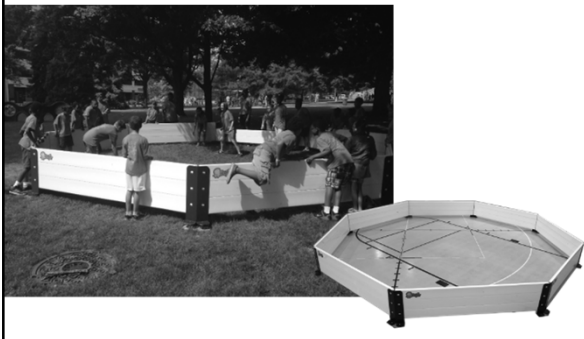


- 97% of playground injuries are attributed to inadequate surfacing.
- Need at least 6" of mulch or pea gravel, or padding; 8" under swings.
- Consult Canadian Standards Assoc.

### Organize Sports and Games

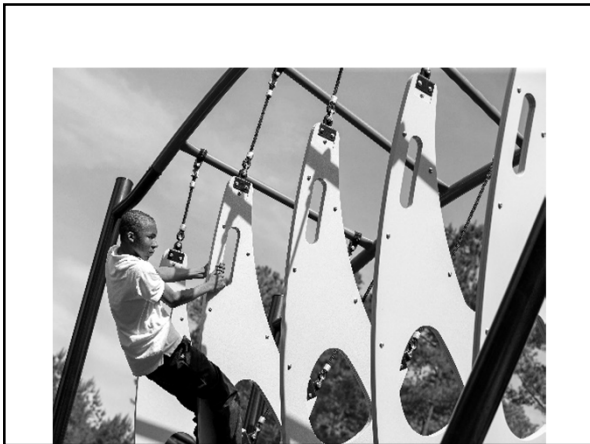


### Gaga Ball in Octopits



### Obstacle Courses

## Teen Obstacle Course



## Create a Plan...Tell a Story



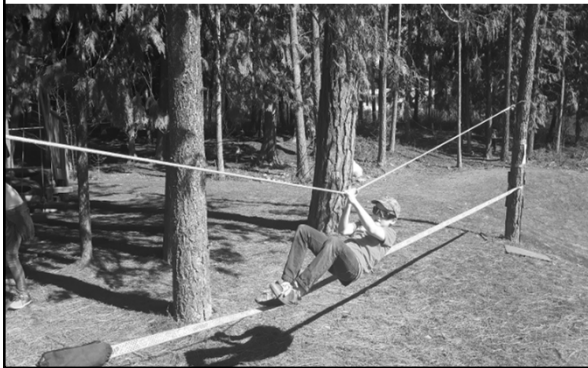
### Simple...



### Log Rounds



### Slack Line



### Truck Tires



### Custom Obstacle Course *Stuzuminus Community*



### Innovative



### **Tough Mudder**



### **Pile of Downed Trees** *Stzuminus Primary*



### **Build Forts** *A favorite activity for all!*



### **Fort Platforms** *Yaqa Nuiky*



### **Tire Swing** *Yaqa Nuiky*



### **Rope Line** *Yaqa Nukiy*



### Slack Line Mount



### Story Trails *Ditidaht School*

- Kids build bush trails.
- Construct obstacle course components along the way.
- Destination tree house at the end of trail.



### Cacoon Hanging Tent



### Teen Barstarzz



### Teen Parkour



### Teens...Parents, Staff?



## Get Whole School Outside!

*Cedar Grove Elementary, BC*



## Break Out the Bikes

- Have RCMP or police help run safety rules summer bike camps.
- Get grd 10-12 to run bike maintenance shop.
- Get donations from local businesses for bikes and helmets.
- Build bike trails, BMX or anti-gravity courses.



## Up North...Fat Tire Bikes



## Tandem Bikes

*Blow off energy with Barry Krangle, Principal Cedar Grove Elementary*



## Tech Tool Kit

**Zone'in**

**Unplug'in**




*'Must read' information for everyone who loves their children.*

**Zone'in**  
Addressing the effects of technology on child development

© Zone'in Programs Inc. 2008



# Mandatory Technology Screen



**Technology Screen**  
For use by health and education professionals Date: \_\_\_\_\_

This is a screen for parents to report on their child's technology use. It is not a test. It is a tool to help you understand your child's technology use and to help you make decisions about their technology use.

The screen has been designed to give you a quick and accurate picture of the child's technology use. It is not a test. It is a tool to help you understand your child's technology use and to help you make decisions about their technology use.

**How to use this screen:**

1. Fill in the information about your child's technology use.

2. The screen will calculate the child's technology use score.

3. The screen will provide you with a list of recommendations.

4. The screen will provide you with a list of resources.

5. The screen will provide you with a list of support services.

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# Technology Schedule & Contract




**WOW!**  
If you have problems in these areas, you should not use more than one hour per day of TV, videogames or internet!


**PAST**



**PRESENT**



**FUTURE**



**Why not do this!**

- lose your skills
- lose a job
- be artistic
- waste
- lose a lot of sleep
- lose to music
- look stupid
- get closer as a family
- play cards
- play a board game
- invest your own gains
- get on together
- read a book
- play a sport
- have a hobby


**Your Technology Schedule**  
Pick your favorite TV program, videogame or internet activities, and write them in the box. Post this on your fridge as a reminder.

Name	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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Remember, no more than one hour every day!  
Now...go and enjoy your life!!!

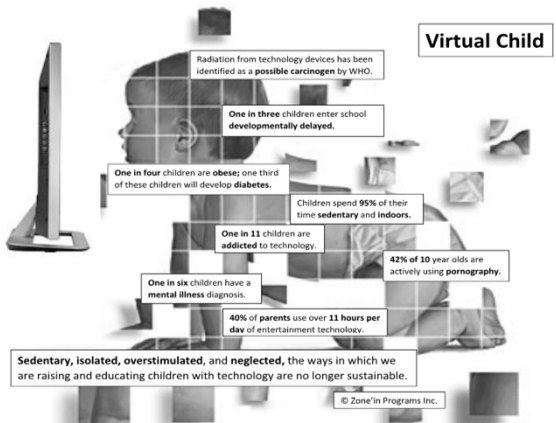
# Summary

## Technology and Children Tip of the "Tectonic" Iceberg



- Health and education systems haven't even begun to detect, much less understand the profound ramifications of child technology overuse.
- Secondary effects are yet to come.
- Need to proceed with caution.

## Virtual Child




- Radiation from technology devices has been identified as a possible carcinogen by WHO.
- One in three children enter school developmentally delayed.
- One in four children are obese; one third of these children will develop diabetes.
- Children spend 95% of their time sedentary and indoors.
- One in 11 children are addicted to technology.
- 42% of 10 year olds are actively using pornography.
- One in six children have a mental illness diagnosis.
- 40% of parents use over 11 hours per day of entertainment technology.

Sedentary, isolated, overstimulated, and neglected, the ways in which we are raising and educating children with technology are no longer sustainable.

© Zone In Programs Inc.

## Technology Train



- Don't know where it's going, what the long term effects are, yet are moving full steam ahead.
- Children are falling off.
- Need to stop, bring the train back to the station and adequately research the long term impact of technology on the developing child.
- Proceed with caution.

## Screen Overuse Weblinks

- Zone'in Programs [www.zonein.ca](http://www.zonein.ca)
- Families Managing Media [www.familiesmanagingmedia.org](http://www.familiesmanagingmedia.org)
- Common Sense Media [www.commonsensemedia.org](http://www.commonsensemedia.org)
- American Academy of Pediatrics [www.aap.org/healthtopics/mediateuse.cfm](http://www.aap.org/healthtopics/mediateuse.cfm)
- Center of Media and Child Health [www.cmch.tv](http://www.cmch.tv)
- Center for Screen Time Awareness [www.screentime.org](http://www.screentime.org)
- Center for Successful Parenting [www.sosparents.org](http://www.sosparents.org)

## Playground Weblinks

- Henderson Play [www.hendersonplay.ca](http://www.hendersonplay.ca)  
 Landscape Structures [www.playlsi.com](http://www.playlsi.com)  
 Holistic Playgrounds [www.holisticplaygrounds.com](http://www.holisticplaygrounds.com)  
 National Institute for Play [www.nifplay.org](http://www.nifplay.org)  
 ABC Recreation Ltd [www.playIsi.com](http://www.playIsi.com)  
 Southpaw Enterprises [www.southpawenterprises.com](http://www.southpawenterprises.com)  
 Rainy Day Playgrounds [www.theraplaytoys.com](http://www.theraplaytoys.com)  
 Canadian Playsystems Ltd. [www.playgrounds.ca](http://www.playgrounds.ca)

## Zone'in Resources

- Website
- Programs
- Workshops
- Training
- Consultation



## Website [www.zonein.ca](http://www.zonein.ca)

- Research Fact Sheet
- Newsletter
- Blog - [movingtolearn.ca](http://movingtolearn.ca)
- Free Handouts
- Book Reviews
- Tech Addiction Resources
- Video/Audio Clips
- Media Kit
- Slide shows
- Balanced Technology Management
- Parents, teachers, health providers, gov't, research, technology production corporations
- Child Health Policy Initiatives
- Unplug – Don't Drug
- Creating Sustainable Futures
- Linking Corporations to Communities

## Zone'in Programs

- Zone'in – sensory processing
- Move'in – motor development
- Unplug'in – build performance skills
- Live'in – resource guide
- Virtual Child - book



## Live'in Resource Guide

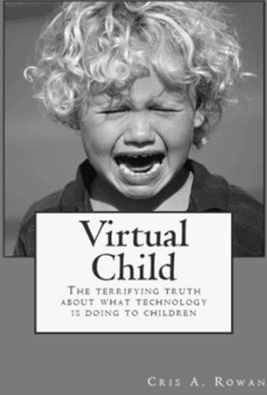


**UN plugin Game**  
**Helps children develop skills to unplug from technology!**



**Virtual Child book by Cris Rowan**

[www.virtualchild.ca](http://www.virtualchild.ca)  
[www.amazon.com](http://www.amazon.com)



**Zone<sup>n</sup>**  
**Workshops and Webinars**

*sensory processing*  
*motor development*  
*addictions and attachment*  
*technology balance*  
*science of attention and learning*  
*successful schools*  
*early intervention*  
*generational healing*  
*human productivity*

**Tech Talks**


**Tech Talks for Families**

- 10 sessions/10 hours/10 weeks/\$100.
- Comes with *Tech Tool Kit*.
- Part 1: increase healthy activities.
- Part 2: tech impact info.
- Part 3: tech management strategies.

**Tech Talks for Therapists**

- 5 sessions/5 hours/\$100.
- University course with Cris Rowan and Dr. Chantelle Bernier.
- How to assess and treat tech overuse.
- Comes with client tools and handouts.

**Zone<sup>n</sup>**  
**Instructor Training**



Training pediatric occupational therapists as **Zone'in Certified Instructors** to deliver *Foundation Series Workshops* in every community!

**Zone<sup>n</sup>**  
**Consultation**

- Parents
- Educators/Schools
- Health Clinics
- Governments:
  - Civic
  - Health
  - Education
  - Social
- Researchers
- Technology Production Design



## **Contact Information**

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Facebook: [zoneinprograms](https://www.facebook.com/zoneinprograms)

Twitter: [ZoneinPrograms](https://twitter.com/ZoneinPrograms)