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# Ergonomic Basics for Kids at Home and at School

Presented by:

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# Background

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- In 1999 the first "Schoolnet" program was established connecting 16,000 students to the internet
- As of 2014 nearly every school in Ontario had access to computers and 80% of teachers report using computers in learning beginning in kindergarten



Source: The Role of Technology in Canadian Classrooms, 2020

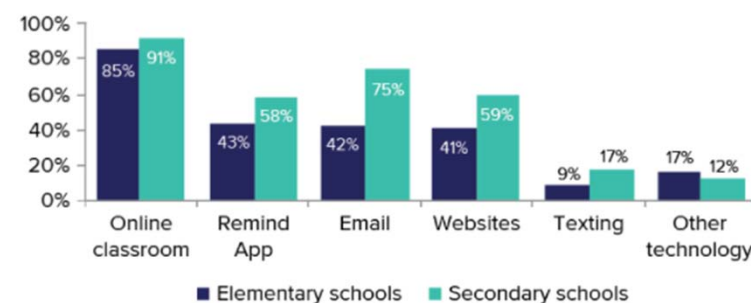


# Technology in the Classroom

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- 97% of elementary students and 100% of secondary students state some teachers use technology to communicate with students
- 33% of all elementary students, 40% of grade 7& 8 schools, and 66% of secondary schools encourage kids to bring your own device (BYOD) every day

Teachers' communication methods



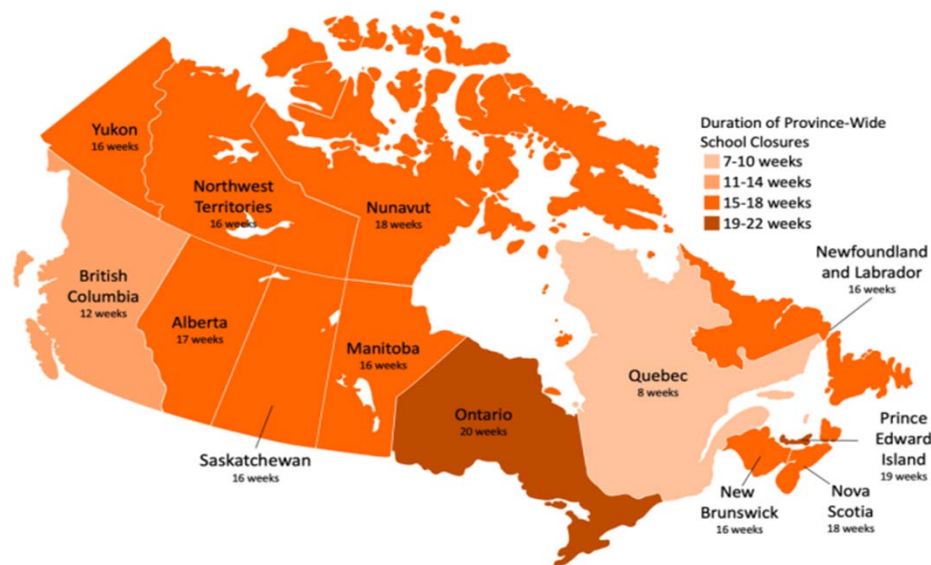
Source: People for Education, 2019



# Changes in Learning Platforms

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- March 2020 forced schools to close as a result of the pandemic
- In Ontario schools were closed for 20 weeks; longer than any other Canadian province or territory; affecting over 2 million students
- Initially not all school boards had a virtual platform and if they did teachers had not been trained



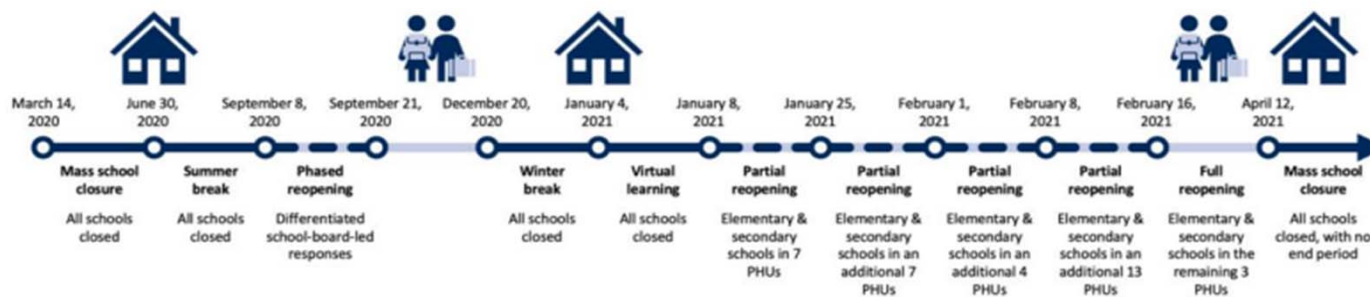
Source: [Scholars Commons @ Laurier](#)



# Virtual Learning

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- Beginning in September 2020 students were given the option of virtual, paper package or in-person learning
- 2020/2021 school year saw many disruptions to in person learning leading to several months of virtual learning for all students in Ontario

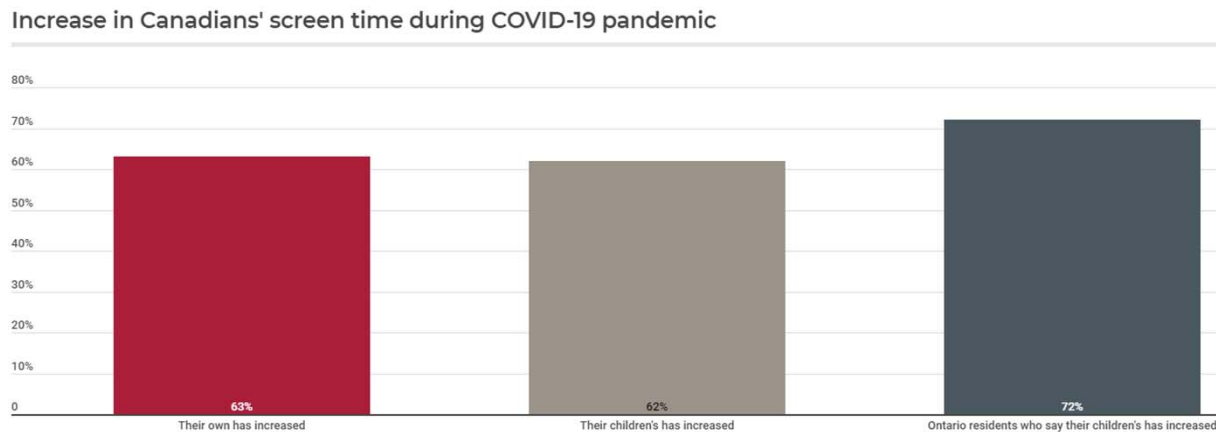




# Virtual Learning

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- Students were required to use computers, laptops, cellphones, and tablets to attend virtual class
- Screen time increased dramatically; movement decreased; limited socialization among students



Source: Canadian Internet Registration Authority (CIRA), Factbook 2021



# Virtual Learning

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- Remote learning remains an option
- School boards are required to provide students learning remotely with 300 minutes of learning opportunities
- Aside from school, Statistics Canada found that youth on avg spend 1.75 hours on the computer daily



Source: Statistics Canada, Canadian Health Measures Survey, Cycle 5 (2016 and 2017)



# Technology Implications in Youth

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- Interacting with these devices is based on body movement and often the postures assumed increase the risk of MSD
- Neck and shoulder pain is increased with the use of small devices
- Not positioning these devices properly
- These devices were not intended for long duration use
- Risk of permanent damage and life-long neck pain



# The Younger Generation

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- Musculoskeletal discomfort associated with children using laptop computers with prolonged poor posture
- 26% of the children reported they would continue on even when in discomfort
- Considerations for typing posture, keyboard height and workstation setup are not being considered
- Children being exposed to prolonged poor postures during critical periods of skeletal growth



Source: Harris & Straker (2000)



# The Younger Generation

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- Study compared tablet, desktop computer and paper tasks among children with a mean age of 5.6 years
- Measured 3D muscle activity around the neck and shoulder
- Tablet use was associated with more neck and trunk flexion, more flexed and elevated shoulders, and greater muscle activity around the neck
- Neck flexion increases the load on the cervical spine and stresses that may lead to early wear, tear and degeneration (*Hansraj, 2014*).



Source: Straker et al. (2008). A comparison of posture and muscle activity during tablet computer, desktop computer and paper use by young children. *Ergonomics*, 51 (4), 540-555.



# Need for Ergonomic Intervention

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- 2020 study evaluated the impact of ergonomics on children studying online during Covid-19 lockdown
- Students aged 10-17 reported increased discomfort
- Parents were unaware of ergonomics and problems related to ergonomic hazards

Reported Issues (n-186, aged 10-17y)	
Upper back pain	21%
Lower back pain	18%
Wrist & hand pain	6%
Dry Eyes	13%
Headache	11%
Insomnia	8%
Behavioural changes (anger, irritation, boredom)	6%

Parents Awareness of Ergonomics	
Knowledge of MSDs	0%
Proper Sitting Posture	6%
Eye-Monitor	1%
Keyboard & Mouse	0%
Importance of Breaks	38%
Laptop Ergonomics	3%
Contribution by Teachers	0%

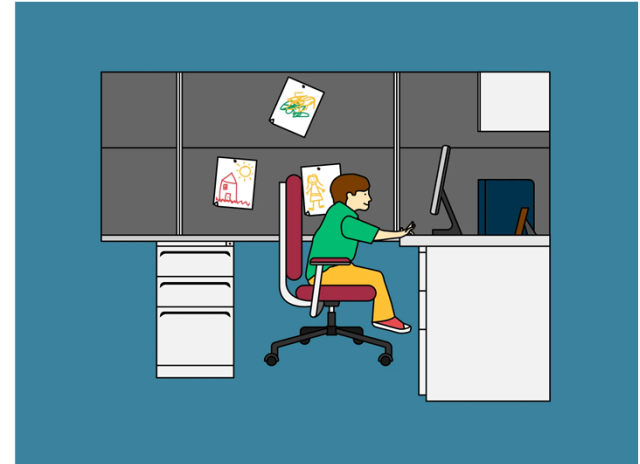
Source: Choudhary et al, 2020



# MSD Hazards

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- Awkward Postures
- Static Postures
- Force
- Repetition
- Contact Stress

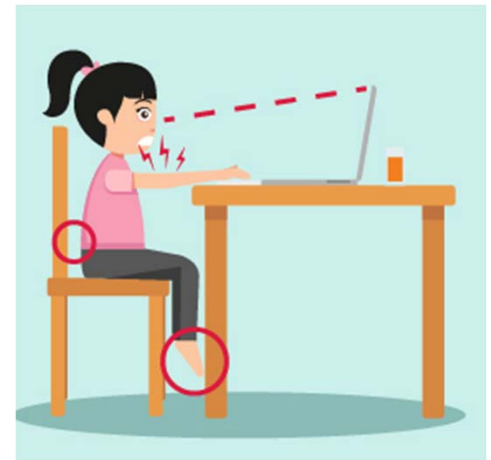




# Virtual Learning

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- Spaces inside homes were created or transformed into workstations to support virtual learning
- The furniture used typically does not support neutral posture (kitchen table, dining room chair etc.)
- Screen time increased leading to eye fatigue and less movement





# Classroom Learning

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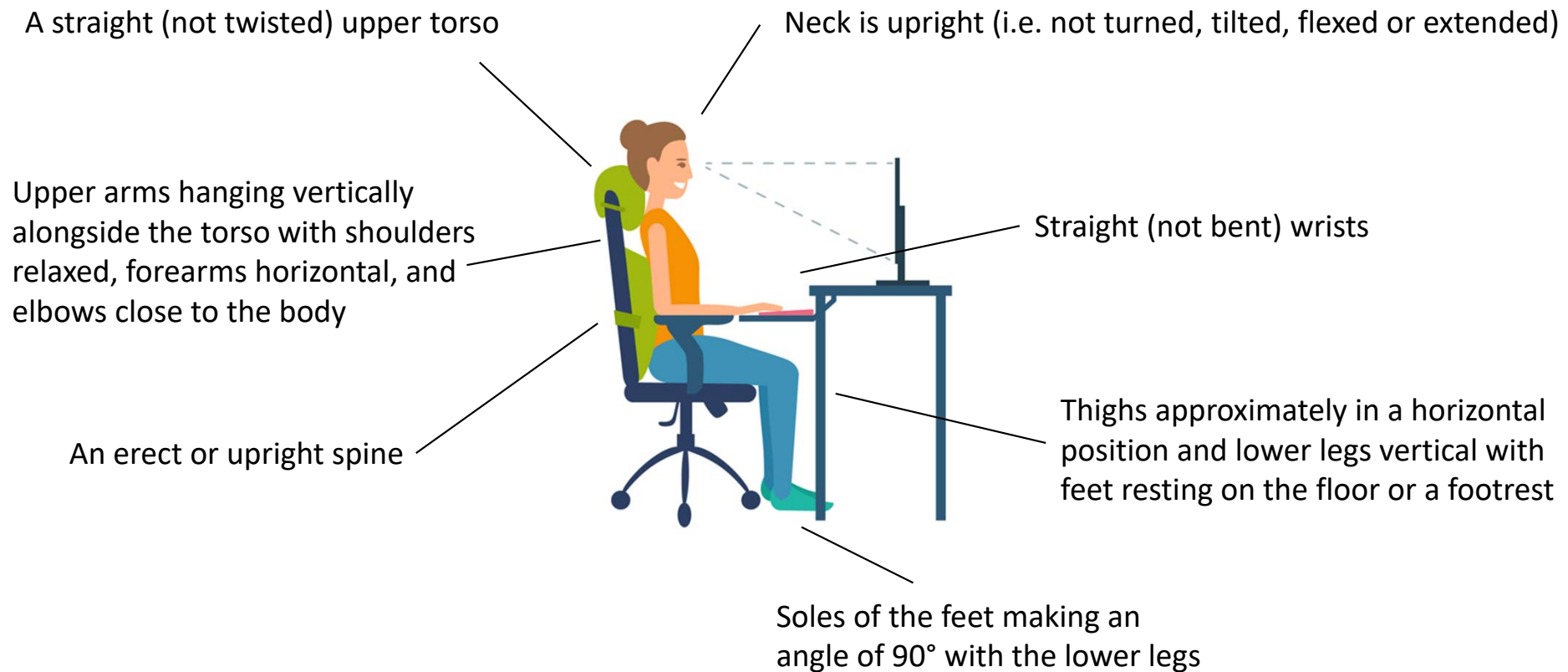
- Hard plastic chairs; one size fits all
  - Chairs may be too large causing a student's feet to dangle or force them to perch forward
  - Chairs may be too small causing contact stress
- Flat desks leading to neck flexion and hunched over posture
  - Desk height may be too low or high for students
- Increase use of tablets & laptops requires awkward postures, static gripping





# Proper Sitting Posture

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Source: **CSA Standard Z412-17**



# Classroom Solutions

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- Flexible seating arrangements promote movement and help students focus
  - Stools
  - Sitting on the Ground
  - Stand-up Area
- Studies support that standing desk for students are beneficial for academic achievement as well combating childhood obesity by increasing energy expenditure (Dornhecker et. Al., 2015)



Source: <http://www.ergonomicfocus.com/ergonomic-focus/schools-address-class-ergonomics/>  
<https://theconversation.com/letting-kids-stand-more-in-the-classroom-could-help-them-learn-53606>



# Chair Solutions for Virtual Learning

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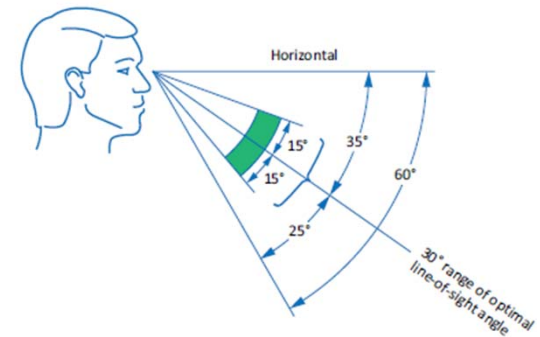
- If chair is too low for work surface place pillow/cushion, stacked towels, etc. on seat to raise body
- If chair is too high – cause feet to dangle- use books, stool, boxes, crate, or pop case to elevate feet
- If seat pan is too large place towel, pillow etc., between back and back rest. May need one at both lumbar and thoracic regions





# Screen Position

- Position the screen/monitor an arms-length away (smaller screens may need to be closer) directly in front of the user
- Eyesight should be at the top portion of the screen
- Positioning should allow for neutral neck postures





# Screen Solutions

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- In most cases tablets and laptops are being used for virtual learning as well as in the classroom
- Important to position the screen to allow for neutral neck postures
- Use books, packages of paper to raise the height of laptops
- Important that external input devices be used
- Tablet stands should be used

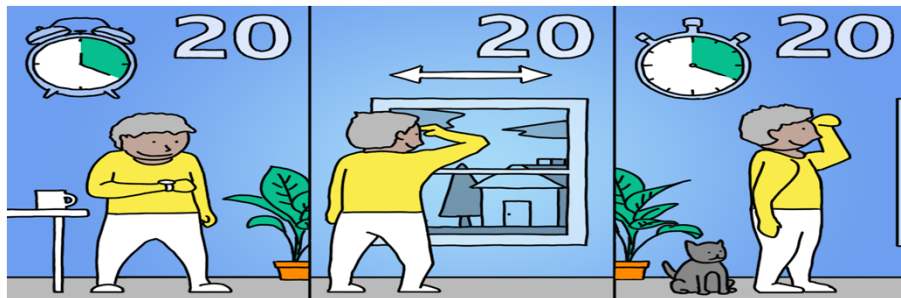


Picture: <https://www.onlineschoolcenter.com/tips-ease-online-student-aching-back/>



# Eye Fatigue

- Computer Vision Syndrome/digital eye strain: dry eyes, headaches, eye sensitivity and strain
- 20-20-20 Rule: Every 20 minutes look at something 20ft away for 20 seconds
- Adjust brightness on the screen
- Screen positioning and lighting:
  - Do not place screens directly below overhead lights
  - Position workstations perpendicular to windows

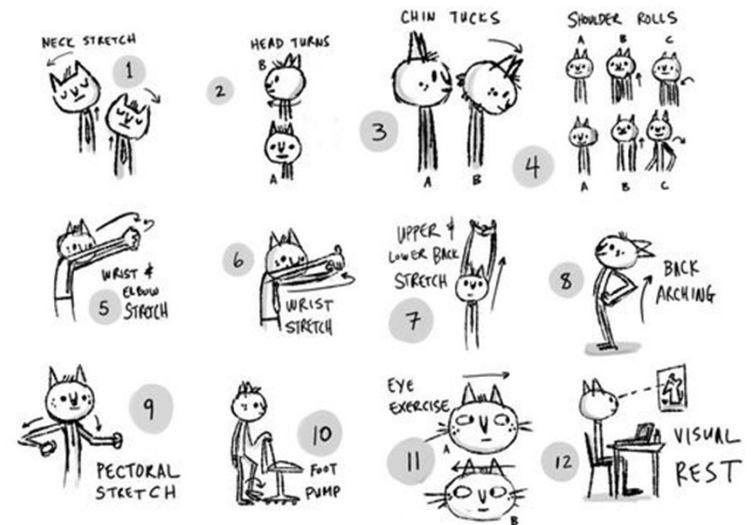


Picture: <https://www.bbc.com/news/uk-55933168>



# Move

- At least every 10 minutes, take a short (10-20 second) break- take your hands off the keyboard and move
- Every 30-60 minutes, take a brief (2-5 minute) break to stretch and/or walk around
- Stand and while watching lectures or attending discussions that do not require keyboard/mouse interaction



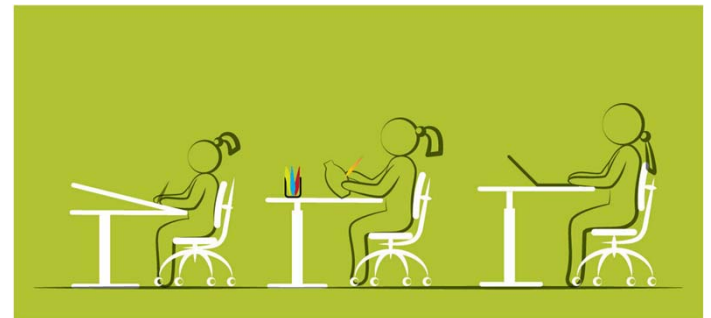
Source: <https://uhs.umich.edu//computerergonomics#move>  
Picture: <https://www.pinterest.co.uk/pin/240661173810392330/>



# Key Takeaways

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- Time spent completing studies should not hurt:
  - Educate your children/students about ergonomic hazards that exist in their learning environment
  - Educate children/students about neutral body postures
  - Work with children/students to develop solutions
- Contact us for additional support:
  - Melissa: [mstatham@ohcow.on.ca](mailto:mstatham@ohcow.on.ca)
  - Andrew: [aflanagan@ohcow.on.ca](mailto:aflanagan@ohcow.on.ca)



Picture: <https://efurnit.com/ergo-4-education/ergonomics-for-schools/>



# References

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- Choudhary, M. S., Choudary, A. B., Jamal, S., Kumar, R., & Jamal, S. (2020). The Impact of Ergonomics on Children Studying Online During COVID-19 Lockdown. *Journal of Advances in Sports and Physical Education*, 3(8), 117-120. doi:10.36348/jaspe.2020.v03i08.001
- Hansraj, K. K. (2014). Assessment of stresses in the cervical spine caused by posture and position of the head. Retrieved September 09, 2021, from <https://pubmed.ncbi.nlm.nih.gov/25393825/>
- Page AS, Cooper AR, Griew P, Jago R. Children's screen viewing is related to psychological difficulties irrespective of physical activity. *Pediatrics*. 2010.
- People for Education (2019). *Connecting to success: Technology in Ontario schools*. Toronto, ON: People for Education.
- <https://inkspire.org/post/the-role-of-technology-in-canadian-classrooms/-MCe6KZyeU-4tTnYheH9>
- Dornhecker, M., Blake, J.J., Benden, M., Zhao, H. & Wendel, M. (2015) The effect of stand-biased desks on academic engagement: an exploratory study, *International Journal of Health Promotion and Education*, 53:5, 271-280