**Introduction Draft and Peer Review**

**Introduction**

Nine of Ten Canadians think it is important to learn computer science [CS] in school, yet only seven out of thirteen provinces include CS in their curricula. Ask yourself, if you had to, could you navigate to and open a file on your computer using only command line? For many Canadians the answer is no. Although some might say using command line is unnecessary, sometimes a basic knowledge of file systems and commands can help get you out of a bind with problematic software. More generally, CS education is beneficial to Canadian in multiple ways. Firstly, CS education helps improve problem-solving and critical thinking skills. Secondly, CS education is a rapidly growing and essential sector in Canada and therefore worth investing in. Lastly, CS education can help improve social equity in Canada. CS education teaches essential skills and valuable socially and economically in Canada, therefore the Canadian federal government needs to implement a national CS education program.

1. Anecdote about helping a “computer literate” friend configure a text editor to suit their current needs. This has to do with using command line to get a program running properly (referenced in introduction).
2. Improving Problem solving skills.
   1. A study of 1st grade students showed coding exercises were associated with improving two executive functions: planning and response inhibition.
   2. A study conducted by Stanford undergrads (concern for credibility here, but study appeared to be conducted well) also associated computer science courses in undergrads with increased problem-solving ability. Here they related improved problem decomposition and comprehensive data collection to computer science majors. Results improved for higher year students. This is in contrast to other STEM majors who did not score as high in these areas, or improve as higher year students.
   3. Executive functions are associated with greater success in STEM.
3. Economically strong sector which is growing rapidly.
   1. Innovation, science and economic development [ICT] sector accounts for a significant portion of Canada’s GDP (5.1% in 2020) (Innovation, Science and Economic Development Canada, 2021).
   2. The average salary in this sector is 46% higher than the average Canadian (Innovation, Science and Economic Development Canada, 2021).
   3. The sector is also growing rapidly, with compound annual growth rate [CAGR] of 4.2% from 2015-2020 compared to .7% CAGR for the whole economy during the same period. The sector accounted for 27.2% of GDP growth in Canada (Innovation, Science and Economic Development Canada, 2021).
   4. During 2020 the sector saw 2.9% increase in GDP compared to a contraction of 5.1% by the whole economy. This shows that technology related fields are resilient to some economic turbulence (Innovation, Science and Economic Development Canada, 2021).
4. Can help improve equity for underrepresented groups.
   1. For this argument to be valid, we must assume equal access computers and internet even though some computer science teaching can be done without a computer.
   2. That said, steps have been made to improve equity in technology related fields
      1. Programs have been put in place increase the number of women studying computer science.
      2. Efforts have also been made to include methods of learning that are more appropriate to indigenous groups.
   3. If reasonable effort is made to connect rural communities and give proper funding to the computer science program, then the benefits of computer science education will be seen in many groups. Improved problem-solving skills as mentioned previously being one of the benefits. Other benefits include improved efficiency in everyday use of technology
5. Conclusion

**References**

Innovation, Science and Economic Development Canada (2021) *2020 Canadian ICT Sector Profile*. Retrieved from Innovation, Science and Economic development Canada’s Website: <https://www.ic.gc.ca/eic/site/ict-tic.nsf/eng/h_it07229.html>

Sariffodeen, M. (2018). *Learning for the Digital World: A Pan-Canadian K-12 Computer Science Education Framework*  [PowerPoint slides] Canada Learning Code. <https://k12csframework.ca/wp-content/uploads/Learning-for-the-Digital-Future_Framework_Final.pdf>

Salehi, S. Wang, K. Toorawa, R. & Wieman, C. (2020) *Can majoring in computer science improve general problem solving skills?* SIGCSE 2020 51st ACM technical Symposium on Computer Science Education, Portland, Oregon, USA. <https://dl.acm.org/doi/10.1145/3328778.3366808>

Brown E. Brown, R. (2020) *The effect of advanced placement computer science courses taking on college enrollment.* West Coast Analytics. <http://www.westcoastanalytics.com/uploads/6/9/6/7/69675515/longitudinal_study_-_combined_report_final_3_10_20__jgq_.pdf>

Blums, A., Belsky, J., Grimm, K., & Chen, Z. (2017). Building links between early socioeconomic status, cognitive ability, and math and science achievement.*Journal of Cognition and Development, 18*(1), 16-40. <https://doi.org/10.1080/15248372.2016.1228652>

Arfé, B., Vardanega, T., & Ronconi, L. (2020). The effects of coding on children's planning and inhibition skills.*Computers and Education, 148*, 103807. <https://doi.org/10.1016/j.compedu.2020.103807>