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LANGUAGE TRAINING: ARTIFICIAL INTELLIGENCE AS A COST-SAVER

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Canada

LANGUAGE TRAINING: ARTIFICIAL INTELLIGENCE AS A COST-SAVER

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AIM

1.   The Department of National Defence (DND) including the Canadian Armed

Forces (CAF) expends exorbitant amounts of time and funding for second language

training every year across all ranks and elements. New emerging technology can ease the

training burden of second language training by reducing budgetary requirements and the

time allocation spent by students and teachers alike. Emerging technology must be

considered for future program delivery and it must be deliberated now as the latest

Artificial Intelligence (AI) technology could possibly eliminate the need for most if not

all language training. This paper will demonstrate that the high costs of language training

can be significantly reduced through AI.

INTRODUCTION

2.   "Language training is different from other types of professional training because

it is typically spread over a relatively long period of time. This entails significant costs

and has an impact on the time learners can dedicate to their work".[1] Second Language

training in the CAF is an extensive, time consuming, expensive endeavour. Most

Canadians agree that learning a second language is important, however, it is not the

mandate of the CAF to provide this training as a core warfighting function. It is an

interesting observation that Strong, Secure, and Engaged (SSE) does not mention

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[1] Web Experience Toolkit, "Challenges: The New Environment for Language Training in the Federal Public Service," March 26, 2014, https://www.clo-ocol.gc.ca/en/publications/studies/2013/challenges-the-new-environment-for-language-training-in-the-federal-public-service.

anything referencing future program delivery of DND/CAF language training.[2] DND/CAF also provides foreign language training to civilian and military members expecting to be posted Outside of Canada (OUTCAN) in numerous other languages.[3] The role of second language training in DND/CAF is given priority amongst many core military tasks without explicating stating this task in military strategic documents because of the requirement for a language profile for promotion. The obtainment and maintenance of a second official language is a promotion factor across all ranks, in reading, writing, and oral proficiencies and must be re-certified every five years. This has lead to increasing demand for language training at the expense of military activities.[4]

3.   There once was a time when spelling and cursive hand writing were valued skills that were assessed on the annual Personnel Evaluation Reports (PERs) and were a sign of how well leaders could communicate. In 2019, few are concerned within the CAF or likely within any government department about the spelling skills of a potential employee. The highly accessible imbedded programming on cell phones, Blackberry's, work computers, etc., autocorrects almost every aspect of written text from spelling to grammar to correct punctuation. As a society, we no longer value these skills like we once did.[5] There is now new technology for language training that could also make this

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[2] National Defence, "Strong, Secure, Engaged: Canada's Defence Policy," policies, aem, September 22, 2017, https://www.canada.ca/en/department-national-defence/corporate/policies-standards/canada-defence-policy.html.

[3] The Maple Leaf, "Foreign Language Training in the Canadian Armed Forces," The Maple Leaf, February 12, 2019.

[4] Office of the Commissioner of Official Languages, "Challenges: The New Environment for Language Training in the Federal Public Service," March 26, 2014.

[5] Nabeel Al Ahmed, "Future of Artificial Intelligence for 2020," ReadWrite [BLOG]; San Jose, March 27, 2019, https://search.proquest.com/docview/2252760541/citation/7A0104D4C1154505PQ/1.

same leap from a once valued skill to one that can be computer corrected instantaneously with personal Artificial Intelligence (AI) processors.

DISCUSSION

4.　　The Official Languages Act states that every federal institution has the duty to ensure that where services are provided that any member of the public in Canada can communicate with and obtain those services in either official language.[6] In 2015, "the CAF provided language training to more than 4,000 members."[7] There are a total of 68,000 Regular Force members, 27,000 Reserve Force members, 24,000 civilian employees in DND/CAF who may require second language training.[8] The Canadian Forces Language School (CFLS) who reports to Military Personnel Generation (MPG), alone had an average yearly budget of $11.5M for language instruction for military members only.[9] This does not take into account all the individual training done through Standing Offers, contracts, and individualized coaching for military executives. Nor does it account for the IT and physical infrastructure of maintaining language schools of almost every Wing and Base across Canada. Another highlight of costs is the funding for the Canada School of Public Service members which received a funding envelope of $38.6 million in 2003 invested over three years, and again until 2008, while the waiting

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[6] Legislative Services Branch, "Consolidated Federal Laws of Canada, Official Languages Act," April 8, 2019.
[7] Chief Review Services, "Evaluation of the Canadian Defence Academy" (National Defence, January 2015).
[8] National Defence, "Mandate of National Defence and the Canadian Armed Forces," February 19, 2013.
[9] Chief Review Services, "Evaluation of the Canadian Defence Academy" (National Defence, January 2015).

list for training continued to grow during this period.[10] Since 2011, as a result of the Government of Canada's Strategic and Operating Review, the number of institutions subject to budget cuts has increased with regard to language training."[11] At the same time as budgetary reductions, the Government of Canada is also developing a language training program for Indigenous Peoples which will be trialed starting in 2019-2020 and as of today has not been costed.[12] With the cuts to budgets and increasing new programs the government is facing a clash of priorities.

5.   Additionally, one must consider the payroll hours paid while military members are in language training and not conducting military activities. For example a basic Regular Force Captain who must achieve a level B profile will require 1300 hours of instruction at 7 hours per day for a total of 185 training days.[13] Their base salary is $6596 monthly for total salary spent for language training for approximately six months is $40,675[14]. This example uses one of the lowest ranks and salaries as a comparison, there are numerous senior and general officers partaking in this training and for longer periods of time. With approximately 20,000 officers who must have a second language training profile, the dollar figures are astounding even when accounting for members enrolling with a second language. Moreover, in the public service, DND members receive $800 a year for having a bilingual profile, amounting to $66 million each year for the entire

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[10] Office of the Commissioner of Official Languages, "Challenges: The New Environment for Language Training in the Federal Public Service," March 26, 2014.

[11] Office of the Commissioner of Official Languages.

[12] Public Services and Procurement Canada Government of Canada, "Dashboard on the Status of the Language of Work Recommendations," November 29, 2018.

[13] Official Languages Branch and Treasury Board Secretariat, "Policy on Language Training" (Treasury Board Secretariat, 2001).

[14] National Defence, "Pay Rates for Officers," service description, aem, May 15, 2018.

public service.[15] This basic number crunching points to the high cost and work hours lost for DND/CAF language training. Second language training for adults already in the workplace is a costly investment that requires innovative ideas to improve efficiencies so members can return or remain at work conducting critical tasks.

6.   Technology in 2019 can improve communications in almost any language. Google Translate has been in existence since 2006 and has become significantly more advanced through to today.[16] Half a billion people worldwide use Google every day to translate more than 143 billion words in more than 100 languages and the trend is increasing.[17] Google Translate is available on personal phones, smart watches, and Defence Wide Access Network (DWAN) computers; many DND/CAF members use this tool daily. While not perfect, the translation algorithm improves yearly.

> "In 2016, Google took their translation services a step further by pivoting to neural machine translation (NMT)—a deep learning method that essentially involves the use of a broad scope of linguistic sources while looking at whole sentences instead of just words when translating."[18]

Google Translate and other translation computer based platforms can bridge the gap for reading and writing in other languages and it can also provide limited speech translation. This technology will only become more sophisticated in the coming years and is a free service that many CAF members already utilize. The

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[15] CBC News · Posted: Sep 29, 2017 5:00 AM ET | Last Updated: September 29, and 2017, "Dump Public Service Bilingual Bonus, Top Bureaucrat Says | CBC News," CBC, September 29, 2017.

[16] Ido Ramati and Amit Pinchevski, "Uniform Multilingualism: A Media Genealogy of Google Translate," *New Media & Society* 20, no. 7 (July 1, 2018): Pg 7.

[17] The Hamilton Spectator (Online), "Are We Using Google Translate Responsibly?"; Hamilton, December 31, 2018.

[18] Nick McGuire, "How Accurate Is Google Translate in 2019?," *Argo Translation Inc.* (blog), May 1, 2019.

latest update to Google Translate as of 10 July 19, can reduce errors in the final

translations by as much as 85 percent.[19] Experts in AI predict that "human

employees will be increasingly occupied with feeling tasks since thinking tasks

will be taken over by AI systems in a manner similar to how mechanical tasks

have been taken over my machines and robots."[20]

7.   Another new technological advance in language deciphering are translation

earbuds. In 2019, numerous companies have created earbuds that can translate spoken

language instantly between two people who are wearing an earbud and it also shows a

transcription of the translation on your cell phone. "You can use them as a set of earbuds

that translate 15 languages (and 42 dialects), or you can share one earbud to carry on a

conversation."[21] An added bonus, is that the conversation can happen almost privately

through the earbuds, no one else needs to hear the translation. These simple devices are

available today for under $250 a pair.[22] Again, the sophistication of the technology is

improving at a rapid rate and the expected margin of error of translation is expected to

shrink making this technology even more accurate in the future. Looking around current

cubicles in DND/CAF buildings, there are plenty of members wearing personal earbuds

to listen to music or drown out cubicle noise. It is not a vast leap to the possibility of

being able to communicate with a different spoken language co-worker while wearing

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[19] James Vincent, "Google's Live Camera Translation Is Getting Better AI and 60 New Languages," The Verge, July 10, 2019.

[20] Michael Haenlein and Andreas Kaplan, "A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence," *California Management Review* 61, no. 4 (August 1, 2019): 5–14.

[21] "New Earbuds Let You Speak That Language You Meant to Learn - ExtremeTech," accessed October 26, 2019, https://www.extremetech.com/electronics/283276-earbuds-that-let-you-speak-that-language-you-meant-to-learn.

[22] *Ibid*

earbuds. The technology can span multiple languages to include other prevalent languages Canadians speak in addition to the official languages, thereby effectively communicating with the entire Defence Team in their desired language.

8.   Finally, even more futuristic advances are expected with AI and translation services. Google just announced this year that they have created a new tech called the Translatotron, an end-to-end speech-to-speech Translation Model.[23] Traditional computing translation requires various components to provide the desired translation output: first, the computer must recognize the spoken language and translate it to text, secondly, it translates this text to the desired language and finally the text is converted to speech. Google has proclaimed that they have created a direct speech-to-speech translation without relying on intermediate text representation[24]. This type of programming will eliminate the text portion of the speech translation process. "By eliminating the unrequired text translation the speech translation will be faster, avoiding compounding errors between recognition and translation, making it straightforward to retain the voice of the original speaker."[25] The Translatotron will be able to essentially retain the speakers voice, inflection, and tone and translate those characteristics over to the other language along with the spoken word. The annoying robot interpreter voice with no emotion would disappear and true translation of precise communication can occur in any foreign language.

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[23] "Introducing Translatotron: An End-to-End Speech-to-Speech Translation Model," *Google AI Blog* (blog), accessed October 26, 2019.
[24] *Ibid*
[25] *Ibid*

CONCLUSION

9.   The current budgetary costs of language training for DND/CAF are exceedingly

high. The work hours missed when away from primary duties coupled with salaries that

are paid while undergoing language training and the overall cost of the CFLS program

delivery are sure to be subject to scrutiny when technology advances. The future of AI is

staggering and it is happening at lightening speed. There are already tools that exist today

to allow successful communication and service provision between different language

speaking people. While not perfect, the translation earbuds and Google Translate

certainly provide all the requirements of second language outputs: they translate reading,

writing, and now oral speech. The additional innovative AI programming with systems

such as Google's Translatotron are providing a vast landscape for immediate human

quality translation. These systems could possibly eliminate the future need for language

training similar to the way hand writing, grammar, and spelling courses for DND/CAF

members have been eliminated. The total savings from eliminating language training

across DND/CAF could be substantial and put towards operational core tasks.

RECOMMENDATION

10.   DND/CAF should investigate the future possibilities of language training. MPG

should enlist a research team to analyze future emerging trends in translation technology

and how we can incorporate these into daily military activities. DND/CAF should

consider the integration of this technology soon to capitalize on major cost savings from

the CFLS program delivery. This translation technology is arriving regardless if

DND/CAF decides to utilize it or not. Personal usage of translation systems is increasing

everyday as they become easier, cheaper, and more accurate. Members already use this

technology in their day to day work activities and they will continue to do so. DND/CAF should leverage this capacity and at the very least permit and encourage the use of translation earbuds in the workplace. The implementation of this technology seems to be much less expensive than our traditional in-class training and all of the associated infrastructure. The integration of technology for language translation should not be ignored simply because currently, society values the absolute real cognitive ability to read, write, and speak another language. As long as members can communicate and provide services in any desired language DND/CAF has met the mandate for the Official Languages Act.

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