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Developing the Digital Literacy Learning Environment

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JCSP 49

Service Paper

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PCEMI n° 49

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CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

JCSP 49 - PCEMI n° 49

2022 - 2023

Service Paper – Étude militaire

DEVELOPING THE DIGITAL LITERACY LEARNING ENVIRONMENT

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DEVELOPING THE DIGITAL LITERACY LEARNING ENVIRONMENT

AIM

1. The Canadian Armed Forces (CAF) is addressing several significant initiatives to evolve current capabilities within its fighting forces. For the Royal Canadian Air Force (RCAF), the North American Aerospace Defence Command (NORAD) modernization seeks to upgrade its command and control (C2) information systems to bring it in line with other modern militaries¹. To best leverage modern Information Technology (IT) systems by taking advantage of newer technologies such as cloud computing, and rapid software development, the RCAF requires personnel with a high standard of digital literacy to lead results. This paper presents reasons why the RCAF must lead digital literacy development and provides three broad recommendations that the RCAF can adopt to help facilitate a higher degree of expertise in digital literacy.

INTRODUCTION

2. The release of the CAF Digital Campaign Plan showcases direct guidance from the Chief of Defence Staff (CDS) directing the CAF to adopt a culture change whereby the CAF rapidly adopts new technology to its systems². Highlighting the themes of the campaign plan would be the future of sensor integration pan-CAF, how that information is managed and exploited, how it is defended, and how it is developed in future operations. The Digital Campaign Plan defines five lines of efforts (LOE) requiring actions to support the activities outlined within Strong Secured, Engaged (SSE)³. The focus of this service paper will be aligned with LOE 4 Develop the Digital Force as it pertains to the RCAF.

3. Considering the requirement for rapid change in how the CAF develops and manages its information, personnel across all professions must be cognisant of the technology available to assist and possess familiarity to best leverage its capabilities. Herein the RCAF is best postured to lead the efforts of the CAF in digital transformation, where concepts such as “every platform a sensor” tie in neatly to current air operations and the communications technology supporting sense functions naturally lend itself⁴. Additionally, the RCAF actively participates in the United States Joint All-Domain Command and Control (JADC2) experiments through its relationship as part of the North American Aerospace Defense Command (NORAD)⁵. The functions of JADC2 leverage Artificial intelligence (AI), Machine Learning (ML), and cloud-based technologies to support information sharing across multiple domains requiring a high digital literacy education across all users⁶.

¹ Government of Canada, “Fact Sheet: Funding for Continental Defence and NORAD Modernization.”

² Canadian Armed Forces / Department of National Defence, “Canadian Armed Forces Digital Campaign Plan,” 2.

³ Canada. Dept. of National Defence and Canada. Ministère de la défense nationale, “Strong, Secure, Engaged: Canada’s Defence Policy,” 11–17.

⁴ Dr. Goette, Richard, “Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations,” 93.

⁵ Sherman, “NORTHCOM TO BRIEF DOD NO. 2 OFFICIAL ON NEW JADC2 CAPABILITY.”

⁶ “Summary of the Joint All-Domain Command & Control (JADC2) Strategy,” 7.

DISCUSSION

Digital Literacy and its relation to the RCAF

4. Digital literacy, at its core, is the knowledge and expertise associated with keeping up with the latest in communications and IT that a person possesses⁷. To describe what it means directly to the RCAF, a person would be considered digitally literate when they could adapt to new technological changes by comfortably learning and adapting the latest technology in tandem with processes for executing air operations⁸.

5. Where digital literacy becomes an important consideration for the RCAF is that the expertise needs to be expanded rapidly across all professions to leverage the numerous future projects underway. For example, the NORAD Modernization project describes support for the Pathfinder initiative as part of its upgrades by leveraging new capabilities such as cloud computing and ML. Both these technologies are under rapid development within the industry. NORAD leadership has already identified that the expertise required in individuals who engage with the technology will need an advanced education to utilize and direct improvements⁹.

6. The RCAF must become an expert in collecting and managing data information from multiple sensors. The airborne capabilities of the RCAF mean that it is the service that is best suited to lead developments in integrating and collectively exploiting intelligence, surveillance, and reconnaissance (ISR) information comparatively to the other environments¹⁰. The heavy reliance on near-real-time sensor information requires planners within Air Operations to consider now the ranges and safety of aircraft and the necessary technology limitations and data management aspects to ensure that ISR from multiple sensors is integrated and distributed to those that require it.

7. The management of incoming sensor data must then be managed, distributed, and often have immediate responses. Therefore, the applications that contain this information will require expertise in their development and direction going forward. Some methods outlined for streamlining RCAF decision-making and data management are AI-enabled applications to hasten the delivery of crucial information for commanders and planners¹¹. An often-forgotten aspect of AI applications is the requirement to include ML technology and expertise to train AI to adapt to changes in processing constantly¹². Personnel educated with ML-based processes will be required to maintain the AI throughout future RCAF operations.

⁷ ABC Life Literacy Canada, "Digital Literacy."

⁸ Juan D. Machin-Mastromatteo, "Information and Digital Literacy Initiatives," 329.

⁹ Ray Townsend, "NORAD Deputy Commander Industry Engagement."

¹⁰ Dr. Goette, Richard, "Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations," 92.

¹¹ Royal Canadian Air Force, "RCAF Strategy: AGILE · INTEGRATED · INCLUSIVE," 5.

¹² AZURE Microsoft, "Artificial Intelligence (AI) vs. Machine Learning (ML)."

Importance of Digital Literacy to personnel

8. Digital literacy is not just limited to learning and adapting to new technology but also an understanding of threats presented by adversaries that will seek to counter them. As part of an education program in learning digital literacy, RCAF personnel would be familiar with cyber security risks, ensuring they are more resilient to attacks and identifying alternative methods to work around degraded environments. This resilience is a crucial enabler to all RCAF personnel as often in air operations, aircrews are required to move separately and need distributed technology to plan and communicate¹³.

9. An expanded digital literacy education program also works together with the concept of media literacy, which is becoming increasingly important in today's connected world. Media literacy is processing content delivered through media and analyzing biases or credibility¹⁴. Training and education for RCAF personnel assist them in the future operating environment in many ways, namely for trusting data sources and understanding how their actions could be perceived online¹⁵. Media literacy would also ensure resilience to online disinformation activities from adversaries¹⁶. This will be key for leaders' understanding of future battlespaces as adversaries seek to dislodge support and conduct cyber-enabled information operations to sap the will to fight.

10. The RCAF has some expertise in their professional trades that excel in varying digital and media literacy degrees. In particular, the Communications and Electronics Engineering branch excels in digital literacy concepts as it is often responsible for implementing communications, networking, and airfield systems for the RCAF¹⁷. Additionally, the Public Affairs Branch excels in media literacy expertise because their profession is responsible for public communications in all forms of media¹⁸.

11. Despite possessing trades with the requisite digital and media literacy skills, the issue is the limited number of personnel available for the RCAF to manage and advise on all aspects. As technology permeates the CAF, all personnel are now more connected to each system, and the broad access means that everyone must collectively become more knowledgeable. The ability to understand and interact with future technology can be given to more than just the technical experts, as they differ from the specialists in the operations the technology supports. For example, air operations planners responsible for generating the Air Tasking Orders (ATOs) to respond to missions will need experts in the systems and data to inform the correct capability. Understanding how future AI-enabled applications are sourcing their information and providing recommendations will be essential for planners to make informed decisions rather than just

¹³ Royal Canadian Air Force, "RCAF Strategy: AGILE · INTEGRATED · INCLUSIVE," 6.

¹⁴ DICTIONARY.COM UNABRIDGED, "Media Literacy."

¹⁵ Dr. Goette, Richard, "Preparing the RCAF for the Future: Defining Potential Niches for Expeditionary Operations," 121.

¹⁶ Andrew Rudyk, "Defending against Disinformation."

¹⁷ Government of Canada, "Communication Electronics Engineering Officer."

¹⁸ Government of Canada, "Public Affairs Officer."

trusting the AI. Data could be lacking in one sensor whereby awareness of possible mistakes occur, and better training the AI based on ML techniques will be critical to supporting missions.

Where to start integrating Digital Literacy

12. To excel in adapting newer technologies across the RCAF, digital literacy must therefore be inherent in all aspects of training. As newer technologies are integrated within the RCAF, whether for data management, decision-making C2, or tools for recruitment and procurement, each technology implementation must focus not only on the current users but must also be incorporated into all training.

13. The most crucial digital literacy adjustment is the cultural methodology that must be incorporated within the RCAF of a “life-long learner” for each member¹⁹. Along with its concept of “individual agility” for professional and technical mastery, the focus for RCAF personnel must not just be limited to recruitment and retention but also to the continual pursuit of refreshing and educating oneself on newer technology trends²⁰. This means that not only must the RCAF shift its training towards recent technology trends, but it needs a commitment to integrating new forms of technology that future RCAF culture must quickly embrace.

14. Data management applications and concepts of networks for communications have yet to be the focus of education pan-RCAF save for the professions that provide it, such as the Communications and Electronics Engineering branch. To begin digital literacy mastery, RCAF personnel must begin understanding the fundamental sciences behind IT technology as it relates to data management and networked communication. These sciences are implied throughout but are not expressly stated in SSE, the Digital Campaign plan, or the RCAF Strategy. To serve as a baseline of understanding a culture of basic training that incorporates the basics of data management, networked communication, and continued exercises throughout training assists personnel in broadly understanding the basics of technology for future use²¹.

15. While an education related to comparative studies within the computing sciences may be the first conclusion, a more nuanced approach to RCAF training meets the essential introduction to digital literacy. Since there is a correlation between the use of technology to manage information and showcase communications technology in schools, incorporating online tools for instruction and data management within existing instruction is the first step to starting digital literacy²².

16. Instead of actively teaching all RCAF personnel the basics of computing science, active participation with data management applications and familiarity with network devices will be the basis for integrating digital literacy. The RCAF’s introduction of the electronic flight bag (EFB)

¹⁹ Korhonen and Portaankorva-Koivisto, “Adult Learners’ Career Paths - from IT Profession to Education within Two-Year Study Programme in Finnish University Context,” 3.

²⁰ Royal Canadian Air Force, “RCAF Strategy: AGILE · INTEGRATED · INCLUSIVE,” 11.

²¹ Churchill, “Development of Students’ Digital Literacy Skills through Digital Storytelling with Mobile Devices.”

²² Hébert, Thumlert, and Jenson, “Digital Parents: Intergenerational Learning through a Digital Literacy Workshop.”

technology to all air crews is a solid step in the right direction²³. EFBs are currently used in modern air operations to plan and process ATOs, provide access to flight safety instructions, and several other practical applications that provide aircrews the ability to conduct their missions²⁴. This device is paramount to understanding networked communications and lends itself to rapid application development for information across multiple sources. EFBs are excellent tools that can form the basis of networked device understanding and serve as the perfect device to enable RCAF personnel's knowledge of online tools to manage online information.

17. The foremost step to embrace the digital culture would be to make the EFB or similar devices available for everyone in the RCAF. This would serve as a baseline in education for the RCAF as each member would have a device for everyday use and make it a standard part of the personnel's kit. This significant step would then have everyone, regardless of rank or trade, have access to a device to actively participate in application development through the ability to manage their tools, with future steps in providing education in tools development. All RCAF personnel leveraging these devices would provide a solid basis for delivering air operations-based courses. The expectation that everyone has the tool means that education can broaden its training to leverage the advantages with them.

18. The last logical step in preparation for digital literacy would be incorporating new applications that pull from the EFB technology that allows personnel to organize and access the required information. This ties in the familiarity of technology and data management aspects together and further professionalize the expertise of large data management concepts. This crucial step ties in networked information learning and gives practice and education in online data management that will be necessary for further development in AI / ML-enabled technology. For example, applications could allow users to create tools leveraging available information to support their general tasks. Allowing personnel the ability to create and manage their information would ensure localized adoption of digital literacy.

19. A center of excellence for application development and data management training would be an area for investment that the RCAF would then need to consider after creating the culture and an environment for digital literacy mastery. An example starting point is leveraging the RCAF Aerospace Warfare Centre (RAWC) Flight Deck, which develops applications for use in EFBs for use by the various Wings²⁵. Other considerations for placement within the RCAF have merits but are beyond the scope of this paper.

²³ Chris Thatcher, "Aligning the Air Force for 2035: An Exclusive Q&A with LGen Eric Kenny."

²⁴ ForeFlight Mobile Boeing Company, "FOREFLIGHT MOBILE."

²⁵ Maj Barry Tang, "A Canadian Kessel Run: Smuggling an Agile/DevOps Capability into the RCAF/CAF/DND," 57.

CONCLUSION

20. Educating RCAF personnel in a high standard of digital literacy will be paramount for future operations. The RCAF requires its personnel in the future to both adapt and enable multiple technologies supporting future operations, the capacity to understand how the information is managed to ensure it operates effectively, and the cyber security threats to enhance resilience to threats to the technology.

RECOMMENDATION

21. There are multiple releases from senior commanders regarding the requirement for education and familiarity with digital and media literacy. The primary issue at hand is the creation of programs, education, and training for RCAF personnel within the system to ensure a digitally literate workforce for future projects. To start the process, this paper advises that the culture and environment must be created to embrace digital literacy learning as described in LOE 4 of the CAF Digital Campaign Plan²⁶.

22. The RCAF can first achieve this standard of digital literacy and ensure that it lasts by adopting a “life-long learner” culture. This will ensure that personnel have an optimistic attitude toward learning new technology and creates a culture that can quickly adapt to more recent technology within its processes. This also helps inspire a personalized approach to online research that must be cultivated at all levels.

23. The second practice would be incorporating modern data management and organization tools into all aspects of RCAF training. Although deceptively easy due to the recent use of Microsoft Office 365 in response to COVID isolation measures, further incorporating various tools into courses for instruction and homework will serve to have personnel identify and become familiar with online networking and data management techniques.

24. The remaining practice required to ensure that the first two recommendations take hold is to provide the tools needed to practice and experiment with data management and networking. The RCAF should adopt a digitized workforce concept by delivering EFB-like devices to everyone in the RCAF and then steer training and education programs to leverage the capabilities and applications of each device. Therefore, data management and application experimentation become institutionalized rapidly, with everyone having the tools and capacity to practice it immediately available. A center responsible for developing training and education would need to be created to support the outlined environment.

²⁶ Canadian Armed Forces / Department of National Defence, “Canadian Armed Forces Digital Campaign Plan,” 18.

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