A Strategic Partnership to Understand the Ecosystem, Adaptability and Transfer of Digital Skills – A Focus on the Educational System

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Abstract: This paper is a report on the findings of a qualitative study on the development of digital skills. Discourse analysis techniques were used to examine the resulting transcript of interviews with experts in technopedagogy for evidence of digital skill development from both the high school and postsecondary contexts. Using the DELPHI method, six experts were consulted about key digital competence. Qualities such as resilience, adaptability and open-mindedness were identified as key. Findings also indicate that digital skill can be defined by one's ability to use technologies and adapt positively to challenges during use. From an educational perspective, our results show that the digital skills needed to succeed in a technological world are not necessarily the ones developed in schools and colleges. For instance, experts agree that educational institutions looking to foster digital skills should move beyond teaching mainly technical ability (like learning computer software), focusing instead on developing more analytical or critical ability, such as finding credible information on the Web or commenting on a fellow student's blog.

Introduction

Digital culture is all around us. In this constantly evolving digital landscape, one is required to acquire, maintain and build new digital skills, that can be transferable to new circonstances later on in life. For example, faced with the challenges and requirements of an increasingly digital economy, the Canadian Social Science and Humanities Research Council (SSHRC) suggests that Canadians be able to "find, organize, understand, evaluate and create information using digital technology in order to function in the workplace and in everyday life" (2010, p.1). The Council also warns that many adult Canadians do not have these skills and, as such, are denied the opportunity to fully participate in today's digital economy (SSHRC, 2010). Digital skills can be, as stated, transferable as they are used in different spheres of one's life, especially in the context of education and employment (European Commission, 2012). According to the Organization for Economic Cooperation and Development (OCDE), these skills boil down to being able to solve problems in technology-rich environments (2013). The need to develop these skills is widely accepted. Yet, how they are structured and how they are acquired at various stages of life are not fully understood. From both a theoretical and a practical point of view, these areas remain unchartered. Indeed, there is an apparent dearth in the scientific literature in regards to the definition and measurement of digital skills. More precisely, we do not know very much about how digital skills are acquired and transferred from one educational stage of life to another, namely from the home to kindergarden, from elementary school to High School, from High School to college and, finally, from college and the workplace. In an attempt to better understand the evolution of acquired digital skills throughout one's life stages, we created a research partnership uniting representatives of educational institutions (schools, colleges), employers and community actors such as families and not-for-profit organisations. One of the main objectives of this research partnership is the establishment of a digital skills development continuum.

Vodoz (2010) coined the expression *digital divide*, proposing that young people who seem to have good digital skills may struggle in transferring these skills to the workplace. Dauphin (2012) suggested a significant break between, on the one hand, a communicative, fun and consumer-driven relationship with information and communications technologies (ICTs) on the part of teenaged users and, on the other hand, the more practical use of

ICTs prescribed by academic institutions. Does this difference in the use of technology affect success in various contexts of life? In fact, surveys conducted by business associations such as the Canadian Federation of Independent Business (CFIB) show that shortages of skilled laborers are among the top three issues that matter most to businesses. The unemployment rate among young people aged from 15 to 24 years old increased between 2007 and 2012 from 10.8 % to 13.4 % in Canada and, in the province of New-Brunswick, grew from 12.3 % to 18.4 % in the same time period (LaRochelle-Côté, 2013). These two observations lead us to believe that there exists a gap between the skills acquired by young people and those sought out by employers. Given the fact that today's young adults seem to operate skillfully in the digital world, we wonder if they actually develop the digital skills needed to succeed and participate fully in today's society. What role do schools and colleges play in the process of developing digital skills that can be transfered to other facets of life.

The Study

This research project will take place over a period of three years. It will allow for the gradual creation of a partnership between experts form different levels of pedagogical intervention, from early education to high school, through to post secondary education and into adulthood. In the first year of the project, across different stages of one's educational path and beyond, a profile of digital skills will be developed in order to identify critical transition points in life where concerted efforts in developing digital skills would be most effective. We look to gather such information through consultation with our various partner agencies. We have chosen to adopt the DELPHI method (Linstone & Turoff, 1975) as our main methodological strategy. According to Mamaqi et al. (2010), the DELPHI method is appropriate when used in studies aimed at defining new skills and abilities important to lifelong learning, Our specific focus is on lifelong learning in the digital world. The relevance of this method in the pursuit of such a focus was confirmed by a Joint Research Center (JRC) report (Janssen and Stoyanov, 2012), which sought to identify key components of digital competency in order to develop a list of criteria and build conceptual frameworks facilitating digital adaptation through all categories of learners. In line with a more "classical" interpretation of the DELPHI method (Corbière & Larivière, 2014, p. 285), we began by finding experts in areas of digital knowledge and application in the context of education. From our various partner organizations, we identified digital experts in education and proceeded to conduct individual semi-structured interviews with each of them. After an initial review of the literature on the topic of digital skills, we know that despite the fact that young people live in a technological age, their level of digital competence remains relatively low, especially for more complex tasks. However, more frequent use of the Internet seems to lead to an increase in digital skills. What digital skills are essential to a student's success? Among these skills, which are actually developed in schools and colleges? We believe that consulting experts on the matter at hand will help us answer such important questions.

This paper will present results obtained from interviews conducted during the first year of the project. Experts from both the public school system and the postsecondary educational system took part. Six experts were identified via snowball sampling and were ultimately selected according to their expertise relating to applied digital competency in education. We interviewed the following three experts from the public school system : a pedagogical agent (Caroline)[1] who works with school principals and teachers in a local school district; an ICT mentor (Melanie) in a local school district who advises teachers directly on the pedagogical integration of ICTs; and a teacher who regularly integrates ICTs in his classroom and lessons plans (Paul). As for the three postsecondary experts, one is a professor responsible for the training of colleagues who would like to improve on the integration of ICTs (Margaret), another is a professor who uses ICTs to teach her college class (Natalie), while the third one taught community college computer classes for many years (Lucas). In order to find out how digital experts defined digital skills and perceive their development through schooling, the following strategic questions were submitted to them during interviews : *How do you define digital skills? How did you develop your own digital competency? What digital skills are needed to excel in school/college? What digital skills should one expect to develop towards the end*

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[1] All names in this article are pseudonymes.

of high school/college? In the form of emergent thematic categories (Miles & Huberman, 1994) derived from inductive analysis of interview transcripts, the results presented in the next section will help to guide subsequent research efforts over the course of the next two years.

Findings

In our research, we used conventional qualitative content analysis to establish meaningful results in the form of thematic categories. As explained by Hsieh & Shannon (2005, p. 1279), "the researcher [approached] the text by making notes of his or her first impressions, thoughts, and initial analysis". As this process continues, codes emerged from the text, codes that were reflective of more than one key thought. "These codes [were] then sorted into categories based on how different codes [were] related and linked" (Hsieh & Shannon, 2005, p. 1279). Finally, we submit these emergent categories as organized in the form of two principal meaningful clusters (Coffey & Atkinson, 1996; Patton, 2002).

Digital skills can be defined by one's ability to use ICTs and adapt positively to challenges during use

When asked to define digital skills, the experts we interviewed pointed to two main elements needed to develop digital skills rather than offering a standard-type definition. First, they all talked about digital skill as the ability to use different technologies. For Natalie, a college professor, "digital skills are those skills you have in working with various technologies, with numbers and data". Margaret, also a college professor, goes one step further, stating that "digital skills lead to a better informed person… a better citizen".

Secondly, the experts we consulted all believe that a digitally skilled individual has certain qualities such as openmindedness towards ICTs, a positive attitude towards technology in general and the ability to adapt to a rapidly changing digital world. As Lucas put it, "it's important that people be openminded towards new technologies and view the everchanging digital world positively". Margaret adds that people who are digitally competent are "able to adapt to change as new technologies will continue to be a part of everyday life". For Caroline, "people can't expect to learn new technologies without having to overcome a few obstacles… being digitally skilled means being resilient in the face of changing technology". This idea of resilience and the ability to adapt to change is seen by all participants as key to being digitally competent. Associated with such resilience is the ability to learn autonomously. As Lucas put it, "being digitally skilled is being able to learn without a manual, on one's own through trial and error". For Melanie, "it's a question of being autodidactic and knowing how to be resourceful". Finally, most of the experts consulted spoke of the added value of leaning on one's family, friends and colleagues when learning or adapting to new technologies. For instance, Lucas stated that "people should be open to collaboration when learning new technologies".   All of these representations of digital skill were shared in the context of education.

The digital skills needed to succeed in a digital world are not necessarily the ones developed in school

After helping to construct a clearer picture of digital competency development, our experts also compare their vision of what digital skills should be developed in the education system with what they see as a less than ideal technopedagogical reality in schools and colleges. The elements of this comparison represent the second major emerging category which resulted from our qualitative content analysis. In short, to successfully teach digital skills at both high school and college levels, our experts spoke of two essential underlying competencies, namely technical competency and analytical competency.

As for technical competencies such as the use of various software programs and operating systems, our experts see them as important since knowing how to use devices and systems is crucial to integrating new technologies as they evolve. As Melanie explains, "in education, my students benefit from using different kinds of

technologies since we often work on projects … writing papers using Word, preparing presentations using PowerPoint, communicate using Outlook or Clic, [an open-source learning platform]". Using the actual device (applications, tablet, Smartboard…) is important, but "equally important is the ability to use technological spaces … to find and use information from the web" (Caroline).

In regards to analytical competencies such as the ability to find credible information on the Internet, our experts noted that they are particularly important since they bring students to think critically. Five of these experts insisted on the importance of teaching students to transfer what they learn to their personal life or even practical work situations. These experts believe that critical thought as well as ethical digital practice are examples of analytical competencies that need to play a bigger part of schooling. As Melanie explains, "I want my students to realize that when they are online at home, they need to practice responsible online habits just like they would in class". Caroline spoke of "developing a level of professionalism in her students when it comes to social networking and e-mails…"

According to our experts, there is a marked difference between what teaching digital skills should be compared to what is actually taught in today's schools as analytical competencies are only marginally taught. As Margaret put it, with regards to analytical competencies, "we don't do enough".

Conclusion

According to the experts we consulted, there seems to be a gap between analytically driven digital skills and the lower level technically-based digital skills actually taught in schools and colleges. Indeed, though all the experts agree that both technical and analytical competencies are at the forefront for the development of digital skills, they also warn that there is too much emphasis placed on the development of technological skills. When asked to define digital skills, our experts pointed to two principle elements needed to develop digital skills rather than offering a standard-type definition. Essentially, they consider digital skill to be related to one's ability to use technology effectively as well as certain qualities such as openmindedness towards ICTs, a positive attitude towards ICTs and the ability to adapt to a ever-changing digital world.

Our results seem to confirm Vodoz's reference to a *digital divide* (2010), a concept whereby students develop "good digital skills", but do not successfully transfer these skills to their futur professional life. In as much, any attempt to reduce Vodoz's *digital divide*, thus enabling transfer to occur, public school and college educators need to focus on the development of a more complete set of digital skills in students. More precisely, in developing these digital skills, educators need to focus more on the development of analytical competencies, not only technical competencies.

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