



Ready for digital learning? A mixed-methods exploration of surveyed technology competencies and authentic performance activity

Todd J. B. Blayone¹ · Olena Mykhailenko¹ · Roland vanOostveen² · Wendy Barber²

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Abstract The Digital Competency Profiler (DCP) is an online application for surveying the technology preferences and abilities of students in higher education. To explore the DCP as a digital-learning-readiness tool, a mixed-methods research design was developed for relating self-reported digital competencies and online-learning activity. To this end, three authentic scenarios, comprised of six tasks mapped to self-report items, were constructed. Having submitted their survey data, each of 15 participants visited the EILAB to complete a randomly-assigned scenario with a tablet. Both the performance activity and post-activity interviews were recorded digitally using a unique activity-station setup, and task artefacts were gathered as performance outcomes. Analysis was conducted in three phases. In Phase 1, both the audio-video performance data and activity artefacts were coded, assessed and scored. Exploratory correlational analyses showed a pattern of positive relationships at the task and scenario levels for two scenario groups, suggesting some predictive value for the DCP in this context. For the third group, a positive correlation was found at the scenario level, but negative correlations were found at the task level. In Phase 2, detailed case-studies were conducted, incorporating self-report data, coded performance timelines, and post-activity interviews. Several situational influencers related to problem-solving strategy, device comfort, task difficulty and motivation, beyond the purview of the DCP, were identified. In Phase 3, the findings were interpreted to position the DCP as a tool for identifying segments of students with members who, without support, will likely struggle to engage fully in technology-rich learning environments.

✉ Todd J. B. Blayone
todd.blayone@collaboritsi.com

¹ Collaboritsi.com and Educational Informatics Laboratory (EILAB), Oshawa, ON, Canada

² Faculty of Education and Educational Informatics Laboratory (EILAB), University of Ontario Institute of Technology, Oshawa, ON, Canada

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1 Introduction

Driven by innovation in digital technologies and educational praxis, institutions of higher learning around the globe seek to implement successful programs of digital learning, including forms of online, distance, blended and mobile education (Aparicio et al. 2016; Crompton et al. 2016; Siemens et al. 2015). Readiness for digital learning is an international research domain addressing factors influencing successful technology-enriched education. More specifically, this domain produces frameworks, instruments and empirical studies addressing e-learning readiness/preparedness (Leigh and Watkins 2005; Mosa et al. 2016; Parkes et al. 2015), online-learning readiness (Farid 2014; Horzum et al. 2015), and mobile-learning readiness (Lin et al. 2015).

Researchers in this field generally conduct either macro-level investigations of organizations, regions and countries (Beetham and Sharpe 2007; Bui et al. 2003), or micro-level studies of students (Dray et al. 2011; Parkes et al. 2015) and teachers (Gay 2016; Hung 2016). At the micro level, digital competencies, defined as knowledge, skills and attitudes supporting purposeful and effective use of technology (Ala-Mutka 2011), figure as highly significant readiness factors within conceptual frameworks (Al-Araibi et al. 2016; Demir and Yurdugül 2015) and instruments (Aydm and Tasci 2005; Hung 2016; Hung et al. 2010; Lin et al. 2015; Parasuraman 2000; Watkins et al. 2004). However, readiness instruments tend to adopt unidimensional and inconsistent conceptualizations of digital abilities, thus lacking the fine-tuned, operational approaches of digital-competency frameworks (Blayone et al. 2017a, b).

To address this shortcoming, researchers at the EILAB, University of Ontario Institute of Technology, Canada, are exploring the General Technology Competency and Use (GTCU) framework (Desjardins 2005; Desjardins et al. 2001; Desjardins and Peters 2007; Desjardins and vanOostveen 2015) as a readiness apparatus. In this capacity, the GTCU has several strengths. First, it offers a multi-dimensional model of digital competency and use, built on the IEEE's definition of computer hardware: "physical equipment used to process, store, or transmit computer programs or data" (IEEE 1990). Second, it has been used successfully for a decade to conceptualize and measure the digital competencies of students and teachers for fully online learning (Desjardins and vanOostveen 2015; Desjardins et al. 2010; DiGiuseppe et al. 2013, b). Finally, it integrates the Digital Competency Profiler (DCP), an online application incorporating a validated instrument, and offering profile-generation and comparison functionality (Fig. 1). Importantly, owing to growing international adoption, the DCP is being translated and adapted for non-Western contexts of use, such as Eastern Europe (Blayone et al. 2017a, b).

One limitation of the DCP as a readiness instrument, however, is that researchers have not yet gathered data relating self-reported digital-competences to observed performance. This is a significant gap because self-reports are sometimes unreliable predictors of performance. Combining instrument development with observational research, although onerous, can help a research team improve survey indicators, and draw more reliable inferences from self-reports (Bradlow et al. 2002; Hargittai and