The Use of Digital Technologies by Teachers in Their Pedagogical Practice and the Experiences and Conditions that Enable Their Work: A Case Study

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Rationale
- Researcher's own personal trajectory with digital technologies
- Pervasiveness of technology in many areas of human activity
- Connection between education and digital literacy
- New BC curriculum and education in Canada

Research Questions

How and to what purposes do four teachers in two local school districts on Vancouver Island, BC who have committed to working with digital technologies use these technologies in their pedagogical practice?

What are the experiences and conditions that create possibilities for these teachers to understand and utilize digital technologies, and how are these experiences and conditions being created/enhanced for them?

Theoretical Framework
- The theoretical framework of a study is located at the intersection of "(1) existing knowledge and previously formed ideas about complex phenomena (2) the researcher's epistemological dispositions, and (3) a lens and a methodically analytic approach" (Collins and Stockton, 2018, p. 2).

1) Literature Review
- Digital Literacies: Meaning is constructed by people when they use language to make sense of the world and participate in it, and that this practice is often materialized by means of different genres, which more and more are enabled by digital technologies (Bazalgette & Buckingham, 2013; Coscarelli, 2009; Silveira et al., 2012).
- TPACK: Technological, Pedagogical, and Content Knowledge is a response to technology education that would focus solely on digital skills (Koehler & Mishra, 2005) and posits that teaching involves different types of knowledge (Koehler et al., 2007).
- Maker Pedagogy and Pedagogical Hacking: "Neither teacher educators, nor teacher candidates, can hope to anticipate the technology knowledge (technical competencies) that will be required in the future" (Bullock, 2016, p. 10). "Hacking is ultimately pedagogical, an act wherein people seek to unravel, deconstruct, devise and create in support of our desires to know more about the world we live in" (Smith et al., 2018, p. xii).

2) Philosophical Positioning
- This is an interpretive qualitative study and assumes that social reality is not something pre-existent and independent of our interpretation of it, but rather that the "activities of our mind select and give meaning to the world around us" (King & Horrocks, 2010, p. 12).
- Regarding how we exist in the world, this research subscribes to a relativist ontology, which maintains that there are multiple interpretations to social phenomena and that "[o]ur understanding and experiences are relative to our specific cultural and social frames of reference, being open to a range of interpretations" (King & Horrocks, 2010, p. 9).
- Regarding what is considered knowledge, this research is based on a social constructionist epistemology, which seeks to "place emphasis on social interaction and the construction of meaning in situ" (Somekh & Lewin, 2011, p. 53). It assumes that "social reality is constructed through language, which produces particular versions of events" (King & Horrocks, 2010, p. 20).

3) Methodology and Methods
- "Case study is an 'approach' to research which seeks to engage with and report the complexity of social and educational activity, in order to represent the meanings that individual social actors bring to those settings and manufacture in them" (Chadderton & Torrance, 2011, p. 53).
- Data collection: a) Official documents from the BC government; b) Two 45-minute interviews with 3 participants, and one longer, 55-minute interview with a fourth participant, for a total of seven interviews conducted and recorded using Zoom; c) Transcripts were auto generated and then edited (Hopper et al., 2021); interview guide with open-ended questions (King & Horrocks, 2010).
- Data analysis: a) Table with converging points from the data collected from the BC Curriculum, researcher's own experience with digital technologies, and what was learned by means of the literature review; b) NVivo to code and categorize interview transcripts (Saldaña, 2013); c) Themes and subthemes: "When the major categories are compared with each other and consolidated in various ways, you begin to transcend the "reality" of your data and progress toward the thematic, conceptual, and theoretical" (Saldaña, 2013, p. 12).

Context

District	School	Type and Grades	Student Enrollment (2022/23)	Teachers
1	A	Secondary (9-12)	902	Heather
				George
	B	Secondary (9-12)	567	David
2	C	French immersion single-track elementary (K-7)	420	Diane

Participants

Heather: 30-year experience in education (20 as a French teacher and 10 as a teacher librarian). Had a Master of Library and Information Studies, which she took mostly online.

Diane: Teacher librarian for 10 years. Also had a Master of Library and Information Studies with a strong focus on technology. Joined education after being a store manager.

David: English teacher, grades 9 to 12. Was inspired by his own teachers to become a teacher himself. Long personal trajectory with digital technologies. Ran a farm before becoming a teacher.

George: Applied Design, Skills, and Technology (ADST) teacher, grades 9 to 12. Taught Drafting and Design, Robotics, and Design and Innovation but was trained as a Social Studies teacher. Was a reference in his school for his familiarity with technology.

Key Findings

1) Safety and Privacy: Participants made sure students knew how to be safe when going online, understood their rights, developed a critical lens when evaluating online resources, and had a responsible approach when interacting with others, which are all characteristics of digital citizenship.

2) Teaching with and about Technology: Participants employed technologies to assist in instruction delivery, assess student work, present authentic materials, and teach students how to use technology to draft and design. Technology appeared as a means that allowed teachers to teach their subjects while enacting their pedagogy. Ultimately, the participants' practice in their schools revealed aspects of TPACK in that different types of teaching knowledge worked together to benefit student learning.

3) Making and Hacking: There were situations in which an appropriate tool was not available to participants, and they had to curb normative uses, or hack certain tools to fully enact their pedagogical intentions. Participants recognized that what this research refers to as pedagogical hacking requires an advanced level of comfort with digital technologies.

4) Digital Literacies: Participants recognized digital technology as playing an important role in the learning and teaching of digital literacies. Not only does technology allow students to learn from a myriad of different genres, but it can also enable them to demonstrate their learning and express themselves by exploring different formats.

5) Importance of Teacher Librarianship: Teacher librarians play a vital role in schools, especially when it came to supporting students and teachers with their uses of digital technologies. Half of the recruited participants ended up being librarians, which was not an intended outcome in the initial research design. This aspect of this study captures a reality in which teacher librarians and libraries are being associated with digital technologies.

6) The Contributions of Formal Education: A long history with digital technologies is not a prerequisite in becoming proficient in them and being able to use them pedagogically. Participants had different personal and educational stories with ICTs to share but were equally recognized in their schools for their use of technology. What the findings show as a more determining factor as to whether teachers will use technology is the contribution of their formal education.

7) Teachers as Unfinished Professionals and Learning as Dialogue: Participants were open to continue learning, which captures the idea of teachers as unfinished professionals (Freire, 1996), lifelong learners (Harvey & Kamvounias, 2008), and of growth mindset (Dweck & Yeager, 2019). One of the most important examples of a source for continuous learning participants indicated was their students.

8) Equipment Availability and Connection Reliability: Equipment availability and connection reliability are fundamental elements for any work that might be done with digital technology in schools The lack of appropriate equipment and complex scheduling systems acted as a barrier in allowing participants to fully explore digital technologies in their practice. Maker pedagogy and pedagogical hacking appeared as alternatives to repurpose older and obsolete technological apparatuses and finding novel, creative uses for them. Equipment availability in schools does not necessarily transfer to teacher taking it on; without proper training, teachers will not likely enhance their pedagogy with the use of technology.

Contributions
- Research in Education: Combination of three different theories to interpret the practices of four teachers and their capacity to be leaders in their schools when it came to their understanding and use of digital technologies.
- Teacher Education: Because I asked participants about their experience in higher education, this study has contributions to make to the field of teacher education. Participants expressed they highly valued the courses about technology they took, especially those that allowed them to become familiar with and explore different technologies, and those that intentionally taught them how think pedagogically about ICTs.
- Teaching Practice: Much of what participants in this study had to share referred to their pedagogical practice, and the findings in this research have contributions to the work of teachers. Particularly regarding digital technologies, which are ever evolving, the findings show that being open to continue learning can play a vital role in one being able to use technology for educational purposes.

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