

Strengthening Digital Teaching & Learning for Trades, Vocational, Education and Training Practitioners



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List of Abbreviations

BC	British Columbia
COVID-19	Coronavirus Disease 2019
F2F	Face to face
ICT	Information and communication technology
ITA	Industry Training Authority
LMS	Learning management systems
OER	Open educational resources
PD	Professional development
PSI	Post-secondary institution
TTBC	Trades Training British Columbia
TVET	Trades, Vocational, Education, and Training
WHO	World Health Organization

Abstract

This research study explored strengths of digital teaching and learning in trades, vocational, education, and training (TVET). The study used a mixed-methods research methodology with an appreciative inquiry approach to capture both quantitative and qualitative data. The intention was to capture TVET instructors' perceptions while remote delivery restraints were still in place in the Province of British Columbia during the COVID -19 global pandemic. Data were gathered through a survey involving 37 participants and interviews with nine participants. The study revealed three themes to strengthen digital learning and teaching in TVET: digital pedagogy, technology and tools, and open educational resources and open pedagogy. The global pandemic has changed trades education and the use of digital pedagogy offers educators the opportunity to permanently embrace these approaches.

Keywords: digital pedagogy, vocational education, open pedagogy, open educational resources, digital literacy, COVID-19, pandemic, TVET

Introduction

Prior to the coronavirus disease 2019 (COVID-19) crisis, trades, vocational, education, and training (TVET) professional development had begun to focus on integrating technology practices and open education into teaching and learning. It is safe to say that the global pandemic accelerated this process. Many TVET instructors found themselves having to learn and use digital tools in their teaching practice. The primary purpose of this study was to examine instructors' perceptions related to digital teaching and learning within TVET with the aim to identify existing strengths, acknowledge barriers, and to propose a path forward. Our hope is that the findings and recommendations from this study will support the future direction of professional development for TVET instructors in British Columbia (BC), improving student learning outcomes, and their learning experiences.

This research project was previously set for implementation in late 2019 early 2020, obtaining research ethics approval caused some unexpected delays. From the frustration surrounding this time delay came an unexpected opportunity. In early 2020, the World Health Organization (WHO) announced news of a global pandemic due to the novel COVID-19 virus. By March 9th, all postsecondary institutions in BC had to move to an online delivery method of teaching due to the COVID-19 pandemic. As BC Minister of Advanced Education, Skills, and Training Melanie Mark (as cited in Zussman, 2020) stated,

Every public post-secondary institution in B.C. and the Industry Training Authority has acted rapidly to move to digital program delivery and innovative ways to ensure students and apprentices continue to receive instruction. This has been an enormous undertaking in a very short period of time. (para. 10)

For this reason, the researchers deliberately delayed their data collection knowing that instructors' experience and understanding of digital teaching and learning was rapidly changing due to the expansive use of information and communication technology (ICT) in teaching practices. While some instructors had some experience integrating ICT into their teaching practice, for many this was new territory.

Literature Review

Prior to the data collection and analysis, we conducted a review of existing literature, discussing (a) digital teaching and learning practices, (b) digital literacy and fluency, (c) the use of open educational resources and open educational pedagogy, and (d) professional development opportunities for TVET instructors.

TVET Learning and Teaching Practices

TVET faculty have spent considerable amounts of time in their respective fields of study as practitioners. This learning by doing, or apprenticeship, is often “associated with vocational training where a more experienced tradesman or journeyman models behaviour, the apprentice attempts to follow the model, and the journeyman provides feedback” (Bates, 2015, Section 3.6.1, para. 2). This can be done through an informal agreement with a master craftsperson or through a more intentional agreement between the apprentice, employer, training provider, and some governing body (Meredith, 2011). In Canada, approximately 80% of an apprentice’s time is spent on the job, working for an employer, while the other 20% of the training is completed through an approved technical trainer (Alberta and Industry Training, n.d.). While most of the apprentice’s training will occur on the job, the technical training that is provided often offers a much-needed foundation. It is often in school that an apprentice will be given context as to the activities that they have experienced in the field. While the students may be active in their on-the-job training, they are expected to be much more passive in the classroom. In fact, the student will experience classes much like those in any traditional school. As Ahmed et al. (2017) noted,

The instructors in vocational colleges and indeed many TVET institutions are equipped with the traditional teaching methods including lecture methods, discussion methods, case studies, programmed instructions, role play, demonstrations, experiments and educational field trips among others. [These instructional strategies, however, provide little scope] for negotiation and construction of meaning. (p. 413)

While there are some traditional methods that hold their place in vocational education, Ahmed et al. (2017) went on to note that this type of model encourages a passive style of learning. As apprentices are learning how to construct, troubleshoot, and collaborate, passive learning may not necessarily be the best model for trade education. Flinn (2020) noted,

It never made sense to me that we were training future tradespeople in how to construct, troubleshoot, maintain and collaborate by putting them in classes, where they would stare at the back of each other’s heads and work in isolation. (para. 2)

In this type of model, TVET instructors are the subject matter experts who share their experience and knowledge with their students. This tracks with Freire's (1972) banking concept of education. The instructor is the bank, depositing knowledge into the empty vessels that are their students. Instead of the subject matter being the destination, there are some who use the subject matter as a tool for engagement. Used in this manner, the subject matter can engage the student's world and experiences and make for a more active rather than passive experience (Rose, 2004).

Active teaching becomes much more of a learner-centred experience than an instructor-led experience (Stommel, 2018). As TVET has moved into the 21st century, active learning is an important aspect, especially when it comes to the digital integration of active learning within its pedagogy. When considering the role and importance of digital applications Morris and Stommel (2018) noted, "Technology is a pedagogical decision. The choices made around technology [should not] drive pedagogy but are driven by careful decisions and thinking about teaching and learning" (p. 108). No longer is the instructor expected to take the stage and share their wisdom with the masses; they can come down off the stage and help facilitate an educational experience for their students. A community of practice (Lave & Wenger, 1991) can be created and the students can help co-create their own learning. As students progress through their education, they find that not only can they help create the curricula, that in fact the "community is the curriculum" (Cormier, 2010, Changing Knowledge section, para. 6).

Vocational education need not present an image of stagnation; on the contrary, the curriculum can become something that is dynamic and experienced. Cuban's (1993) framework for inquiry rests on the notion that discrepancies exist between the official, taught, learned, and tested curricula, asserting that despite some overlap between each four components incongruences exist due to the human element. It is at this point of inquiry that the prime unit of analysis used by Eisner (1985) and Cuban (1993) resides within what Aoki (1999) referred to as the curriculum-as-lived. Aoki claimed the standard way of thinking about curriculum is to perceive it as a master plan, one that mandates what must be taught and learned. However, he suggested an alternative view through the conceptualization of curriculum both as-lived and as-planned (Aoki, 1999). In doing so, Aoki drew attention to what exists daily within the dynamic setting of the classroom between student and teacher, during the "planned and the unplanned, [and] between the plannable and the unplannable" (p. 180). Aoki did not propose the lived and planned curriculum exists as a binary; rather, he suggested the notion of a dwelling space in

which both curricula come together. Similarly, Kridel (2010) referred to the zone in which curriculum and teaching meet, claiming that the implicit curriculum is immersed in an area of subjectivity where minute-to-minute, face-to-face, decision making takes place between teacher and student.

Digital Literacy and Fluency

Since the turn of the 21st century, teaching has moved into the digital realm resulting in the availability of more and more resources in the ICT realm. Therefore, instructors require some form of digital literacy and fluency in order for them to both access or create resources (Petrides et al., 2011). Digital literacy is defined as the “confident and critical use of ICT for work, leisure and communication” (European Commission, as cited in Hall et al., 2013). Nixon (2003) suggested the use of ICT shifts the focus of educational institutions, whereas “traditionally, schools are information consumers rather than producers” (p. 269), the use of technology and open educational resources can allow schools (and students) to become producers and consumers. Digital fluency is a much more complex concept to center around one common definition. Niessen (2013) stated, “Digital fluency involves not only the technological ability but also the creation and communication of complex ideas and meaning are part of digital fluency, as well as understanding such communications” (p. #5). This requires not only the understanding of the technological tools but also knowledge in how to use them in their own specific contexts.

With the ubiquitousness of ICT and its use in education, institutions must help promote ubiquitousness “responsible uses of the internet and raising awareness on new threats” (Avvisati, 2014, p. 17). As students are introduced to the concepts and integration that is involved with ICT, educators must have a core set of competencies to ensure that there is a minimal level of digital literacy (Borthwick & Hansen, 2017). Ensuring that these competencies are met may be difficult with rapidly changing technologies, so careful thought and planning must be given to ensure that educators have the minimal skills necessary to utilize the tools at their disposal (Borthwick & Hansen, 2017). While there is the assumption that students have an intuitive understanding of technology, it would appear that students’ use and knowledge of technology is much more complicated than Prensky’s (2001) digital native idea would suggest (Lea & Jones, 2011).

To ensure that there is an understanding of the tools necessary to fully utilize the capabilities of ICT, institutions must be mindful of making sure these skills are taught (Avvisati,

2014; Borthwick & Hansen, 2017; Nixon, 2003). ICT training should not be done through an introductory level course on ICT at the beginning of a class. This training should be integrated into the entire curriculum in the context of the course that the student is enrolled in and provide the training as they need it (Hall et al., 2013). In order for literacy and fluency to be built into the curriculum, it also requires the instructors to have an understanding and comfort in the technologies they are teaching.

The Use of Open Educational Resources and Open Educational Practices

Open Educational Resources (OER) are defined as “teaching, learning or research materials that are in the public domain or released with intellectual property licenses that facilitate the free use, adaptation and distribution of resources” (United Nations Educational, Scientific and Cultural Organization, n.d., para. 1). OER are becoming more prominent in higher education systems. Two of the most cited reasons for its use are cost savings for students and access (Jhangiani et al., 2016; Karunanayaka et al., 2015; Petrides et al., 2011). Faculty are often more drawn to the ease of use and quality of the OER when determining adoption (Petrides et al., 2011). The use of OER is as varied as the types of resources available. The applications range from merely swapping out a standard textbook for OER to a complete shift in pedagogical practice (Ehlers, 2011; Hegarty, 2015; Masterman & Wild, 2011; Pitt, 2015). One of the more compelling features of OER is its ability to be customized for the contexts that faculty need them. While standard learning resources are developed and released as complete and finished products, OER is designed for alteration past their date of release. Under creative commons licensing, the resource may be reused, remixed, revised, and redistributed to fit the context for which the user needs (Lane, 2010; Lane et al., 2009). As opposed to standard teaching and learning resources, OER utilizes a mixture of content, communication technologies, digital literacy, and innovations to help faculty and students in the contexts in which they find themselves (Farrow, 2017).

Open educational practices (OEP) can be defined as “collaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer learning, knowledge creation, and empowerment of learners” (Cronin, 2017, p. 18). With the affordances that OER and OEP offer, educators no longer need to be the sole provider of curating and producing resources. Students can become part of the production process with their peers (Masterman, 2016).

As students are brought into an open pedagogical model, there is a shift in the traditional roles between students and teachers. Traditionally, teachers would be seen as a source of knowledge, while the students are the receptacles (Bovill et al., 2011). In an OEP model, the role of a teacher becomes one of a facilitator or mentor, guiding students in developing their meaning (Masterman, 2016). Technical proficiency is identified as a barrier for both teachers and students in the use of OEP. Those who lack the skills in utilizing the tools available with participatory technologies are less inclined to embrace the advantages that OER and OEP have to offer (Pawlowski, 2012; Wild, 2012).

Professional Development

Professional development for TVET instructors extends beyond the requirement of learning to teach while teaching; it also requires ongoing professional development in the domain of the trade, as reported in Serafini's (2018) study. TVET instructors' professional development requires a four-prong approach: pedagogy, digital fluency, trades-specific theoretical knowledge, and work-based competency (Vinden, 2020). The need for professional development is more pertinent in the 21st century than in previous years due to rapid changes and advances in technology, which include advances in education and in industry. Similarly, Wheelehan (2015) argued the knowledge demands of jobs are increasing due to growth in technology and the complexity of society, which allows for people to progress in the workforce. This demand not only increases the educational purpose of TVET in order to support students' occupational mobility (Wheelehan, 2015), but also it increases the professional development requirements for TVET instructors. Lucas et al. (2012) reported a similar conclusion, stating, "Our view is that vocational teachers need a clear understanding of the variety of learning methods that lead to different learning outcomes, before they can make informed and effective pedagogical decisions" (p. 10).

Despite efforts made to support instructors as they learn to teach, Lucas (2014) reported, "Vocational pedagogy is under-researched and under-theorized" (p. 2), claiming that TVET is seen as the "poorer cousin of academic education" (p. 2), hence the lack of formal education for instructors. Consequently, very little is known about vocational pedagogy (Young, 2013), which drove Lucas to pose the question, "How can VET teachers become more confident and competent in vocational pedagogy?" (p. 5). Lucas provided this question in 2014 well before the

COVID-19 crisis hit BC in March of 2020, yet it remains relevant. Our hope is that this study will continue the conversation.

Researchers' Biases

It must be acknowledged that each researcher brought different experiences, lenses, and, therefore, bias to the study. Each researcher will speak to and acknowledge the biases that they may have brought to the study.

Chad

As an advocate for educational technology, I carry the perception that students and instructors will benefit from its use. I am a trades instructor (electrical), and I taught a course at the beginning of the COVID-19 crisis. While this offered certain insight, it also allows for some bias on the side of the instructors who participated in the study. These biases were mitigated through self-reflection as well as collaboration with the other researchers.

Sally

From a Vygotskian stance, I came to this study with a passion for curriculum studies and a curiosity to better understand the influence of technology as both a cultural and psychological tool. Having designed and taught a fully online asynchronous Level 2 apprenticeship course for hairstylists in 2018–2019 pre-pandemic, I bring with me experience and, therefore, some biases that lean toward the benefits of digital pedagogy. Collaboration combined with self-awareness have mitigated such biases.

Tim

From an organizational leadership perspective, I approached this study with a keen interest in discovering the impact of digital teaching and learning within the TVET system both in the local and provincial context. I am a former Piping Trades Program Head and current Provincial Trades Representative for Open Education. As such, I came to this study with some bias with regard to the institutional development, and use of digital pedagogies and have reduced that bias through self-reflection and collaboration with the other researchers.

Research Questions

The primary aim that guided this study was as follows: Exploring approaches to strengthen digital teaching and learning pedagogies for trades, vocational, education, and training practitioners.

The following primary questions guided the inquiry:

1. What digital teaching and learning practices are being used by TVET instructors in BC?
2. What levels of competency do TVET instructors hold in digital literacy and fluency?
3. What are TVET instructors' perceptions regarding their students' views on digital learning?
4. What are TVET instructors' professional development needs in regard to digital teaching and learning practices?

Methodology

The study used a mixed-methods approach coupled with an appreciative inquiry lens. The benefit of mixed methods is it allows for the use of both numerical and narrative data and requires the analysis of both forms to “provide improved depth and strength to a study” (Aaron, 2011, p. 274). While the inductive style logic of qualitative data provides insights to participants’ perceptions, behaviours, attitudes, and interactions (Scruggs et al., 2007), it is further strengthened when both forms of data are “integrated during the design analysis through the merging of data, connecting the data, and embedding the data; making mixed-methods methodology appropriate for social science researchers” (Creswell, 2014 p.14).

This study was bounded by time and space, restricting the data collection period to January 1st, 2021 to March 1st, 2021, and the location to BC. Our intention was to capture TVET instructors’ perceptions while remote delivery requirements were still in place in the Province of BC, as per the Public Health Officer. At the time of the data collection, TVET instructors in BC had been teaching using various modes of online remote delivery for approximately 12 months. The focus and the questions that guide this study are specifically aimed to explore the perceptions of individuals, which is evident in the choice of methodology, design, and data collection methods.

Data Collection Methods

To gather data, we chose to conduct an online survey and optional semi-structured one-on-one interviews. Each of these data collection methods will be discussed in detail in the subsections that follow.

Online Surveys

The online survey consisted of 28 questions (see Appendix A) that were designed using both quantitative and qualitative approaches. Quantitative questions were close ended and designed using a 5-point Likert scale system as depicted in Table 1. The qualitative questions were open ended and required written responses. The online survey was distributed using Google’s survey tool, which ensured participants’ anonymity throughout this step of the data collection.

Table 1*Themes at a Glance*

Likert Scale Rating	Responses
1	Strongly Agree
2	Agree
3	Neutral
4	Disagree
5	Strongly Disagree

Focus Interviews

In addition to the data collected from the online survey, we wanted to interview individual instructors to better understand their perceptions related to strengths of digital teaching and learning in TVET; this provided instructors the opportunity to give a voice to their individual perceptions and give legitimacy to their experience (Stringer, 2014). Using an appreciative inquiry lens to guide our approach helped capture and appreciate existing successful digital pedagogies used in TVET programs and allowed the interviewees to have their stories and experiences heard (Cocknel & McArthur Blair, 2012, p. 29). A member of the research team conducted interviews via Zoom meeting rooms using a series of semi-structured open-ended questions (see Appendix B) to guide the interview. We digitally recorded all interviews via Zoom and transcribed the recordings using Otter.ai (n.d.).

Data Analysis

We used thematic analysis to analyze the data collected. Thematic analysis is the process of identifying themes from the qualitative data collected (Braun & Clarke, 2006; Maquire & Delahunt, 2017). Our data analysis began by consolidating all participants' Likert Scale rankings using a shared spreadsheet. The next step required the analysis of the online survey open-ended written responses, in conjunction with analysis of the interview transcriptions in an approach to discover themes. We interpreted the data gathered from the surveys through the values, beliefs, and experiences as shared by participants during the semi-structured one-on-one interviews. This enabled us to identify salient themes through the process of underlining keywords, the creation of word-frequency lists, and the use of colour coding techniques. In addition, we used a

compare-and-contrast approach on the idea that themes represent ways in which participants' perceptions are similar or different from each other (Glazer & Strauss, 1967).

Participant Sample

Thirty seven individuals completed the survey ($n = 37$). The participant sample consisted of instructional faculty members who teach TVET programs in post-secondary institutions in BC. It is unknown how many faculty members received the invitation to participate in this study, as initial recruitment was carried out via email using email addresses obtained from institutional employee contact information pages. All contacts were asked to share the invite widely with their colleagues to encourage a snowball sampling.

Participant anonymity was upheld with the use of Google's survey tool. The researchers saw no benefit to obtaining participants' demographics for the purposes of this study; therefore, participants' age, gender, years of teaching, and nature of trade were not included. In addition, no data were collected in relation to the name of the participants institution, as participants were required to speak only on their own behalf and not on the behalf of their institution.

Of the 37 survey respondents, nine instructional faculty members agreed to participate in a follow-up interview ($n = 9$). Although participant identity was exposed during this process, anonymity was maintained by the use of researcher assigned alphanumerical pseudonyms.

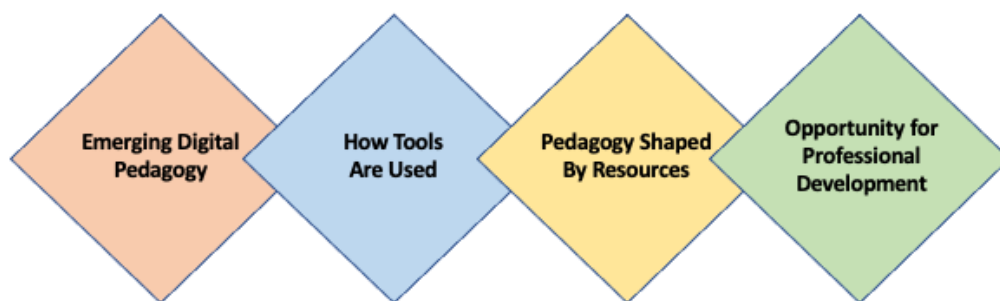
Analysis, Results, and Discussion

Four overarching themes emerged from the analysis of both quantitative and qualitative data gathered from the online survey and the interviews. In this section each emergent theme and its associated sub-themes are discussed in detail.

To maintain anonymity and confidentiality, participant codes have been used to cite excerpts from the interviews. These codes range from P1A to P9I. Survey participants were not coded individually and are generically referred to as survey respondent.

Figure 1

Themes at a Glance



Emerging Digital Pedagogies

Synchronous Teaching

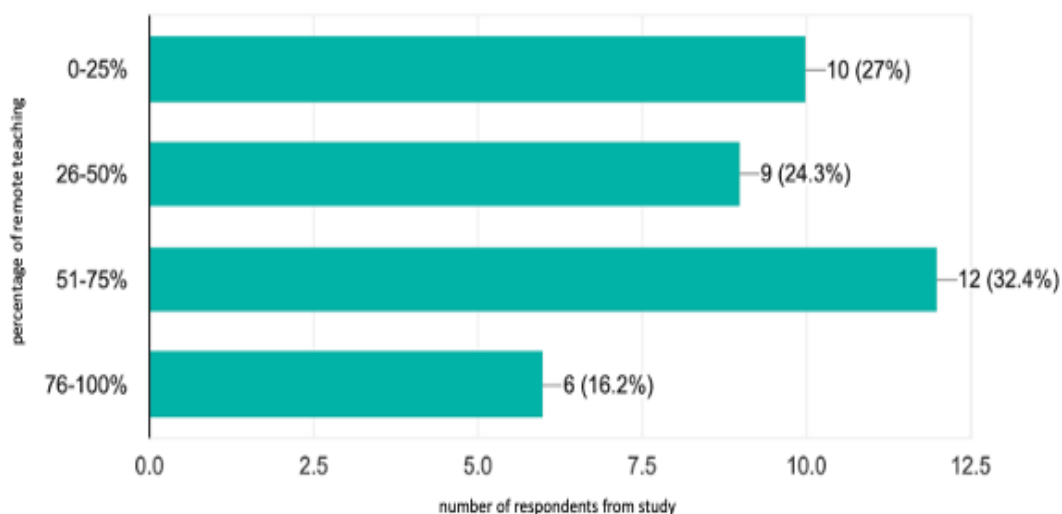
The survey data showed 100% ($n = 37$) of participants perform *remote* synchronous teaching activities (see Figure 2). These were divided into four groupings for analysis. The largest grouping of instructors at 32.4% ($n = 12$) showed that time spent teaching synchronously via a virtual meeting room, ranged between 51–75% of total time, compared to the smallest grouping at 16% ($n = 6$) ranging between 76–100% of total teaching time.

When asked how much time participants assign to asynchronous modes of teaching, the largest grouping of instructors at 43% ($n = 16$) claim to spend between 0– 25% of total time using modes of asynchronous teaching (see Figure 3). Compared to the smallest grouping of instructors at 5.4% ($n = 2$) claiming to spend 75–100% using asynchronous modalities.

The comparison of results between Figures 2 and 3 show a higher number of participants use synchronous approaches via digital meeting rooms for higher amounts of time than those using asynchronous modes via the use of learning management systems (LMS).

Figure 2

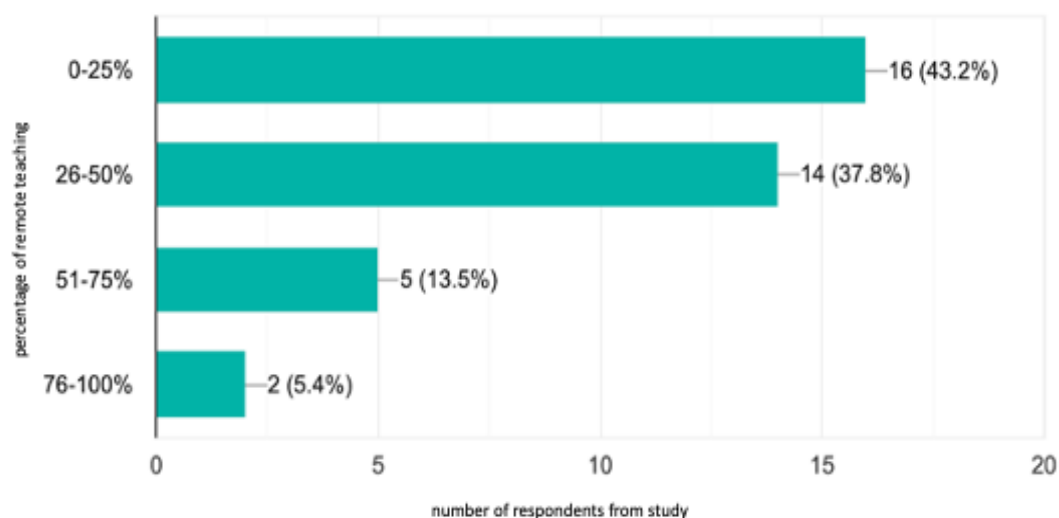
Percentage of Remote Teaching that is Currently Synchronous



Note. This includes digital meeting rooms such as Zoom, Microsoft Teams, and BlueJeans.

Figure 3

Percentage of Remote Teaching that is Currently Asynchronous



Note. This means students complete a variety of preassigned assignments, discussion, and assessments using a learning management system. Asynchronous learning does not include digital meeting rooms such as Zoom, Microsoft Teams, and BlueJeans.

Zoom

The survey showed 83% ($n = 31$) of participants use Zoom, and an additional 13.5% ($n = 5$) of participants use Microsoft Teams, totalling 36 responses to this question. While we found diversity in the tool use among the survey participants, we found all interview participants, 100% ($n = 9$), use Zoom as their digital platform for synchronous teaching activities. They had learned about Zoom digital meeting rooms in March 2020 following the announcement made by the WHO that led to the closing of all post-secondary institutions in BC, and the requirement for all post-secondary instructors to work from home. The interviewees' preference to use Zoom was based on decisions made by their institutions.

Replicating Face-to-Face Interactions

During the interviews participants reflected on their experiences related to synchronous teaching activities using Zoom and described a wide range of pedagogical approaches used during synchronous Zoom sessions. For example, Interviewee P5E stated,

When we all went into lockdown, I was just basically doing a Zoom session for 4 to 5 hours per day and showing my PowerPoints by sharing my screen, and you know, trying to stimulate discussion amongst students. It was better than nothing, but it wasn't a high point of teaching pedagogy or anything.

Similarly, interviewee P6F claimed to spend 6.25 hours per day emulating the physical workspace by using the same approaches as they had done in the face-to-face (F2F) classroom. After a year of using this approach, the interviewee stated, "I've learned that you don't want to duplicate the classroom, because who wants to be online with their teacher for 6.25 hours per day."

Blended

While these two teaching examples reflect the transfer of traditional teaching practices to the digital space, other participants reported examples of having implemented a blended approach. Interviewee P2B stated,

I meet with the class every morning on zoom for an hour and half to do a session. Then students have assignments to do which they have flexibility on—they could do them, you know, at 10 o'clock at night if they had to go to work during the day. This gives the students lots of flexibility.

The pedagogical practices discussed this far are seen to range from traditional classroom lecture style approaches, in which students are required to attend for long periods of time each day, to a blended model where the course design is structured to include both synchronous and asynchronous learning, reducing the required Zoom hours for both student and instructor. These two models were aligned with the approaches used by eight of nine interview participants.

Asynchronous Blended

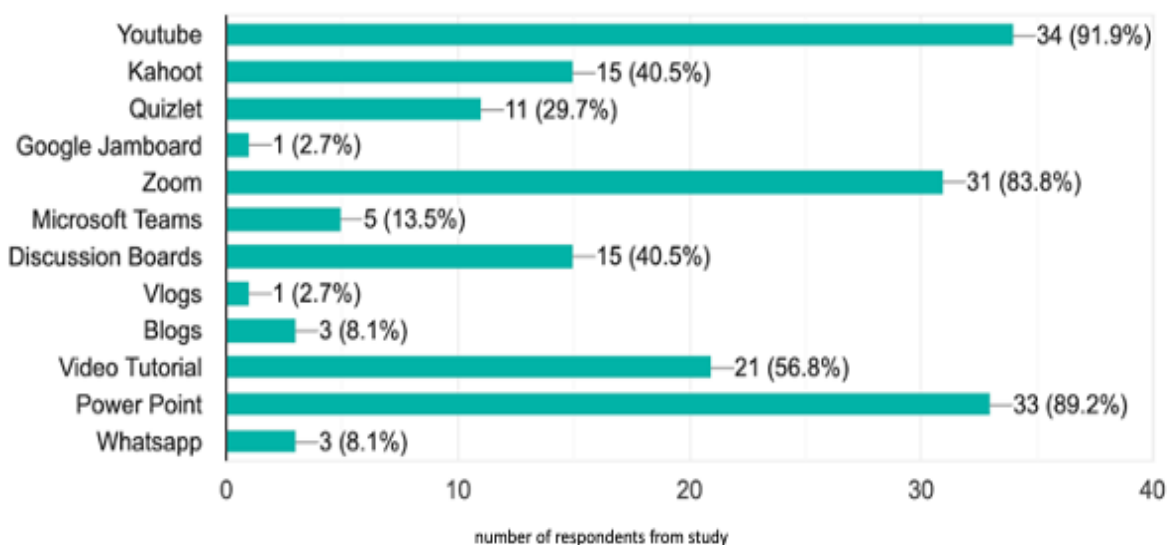
A third pedagogical model was shared by one interviewee. This mode reflects a blended approach, yet it differs from the previously discussed blended model as it is seen to be asynchronously dominant. This course design required students to meet in Zoom for only 1 hour per week. Interviewee P5E stated,

I took the backwards design course where the person that was mentoring me suggested that, as the instructor, I should be arranging activities for students to do that help them engage with the material asynchronously. And I should be parachuting in for the high level stuff, which I do via a zoom session. Zoom really shouldn't be about me presenting things, it should be about me presenting activities for students to work with—work on together with each other and breakout rooms, or in one large group, depending on what it was. So that was the approach I took in my teaching this year. And, you know, I think it was fairly successful.

The pedagogical approach shared by interviewee P5E reflects the complexity of digital fluency, involving not only technological ability, but pedagogical acumen and the ability to create and communicate complex ideas digitally.

Digital Tool Use

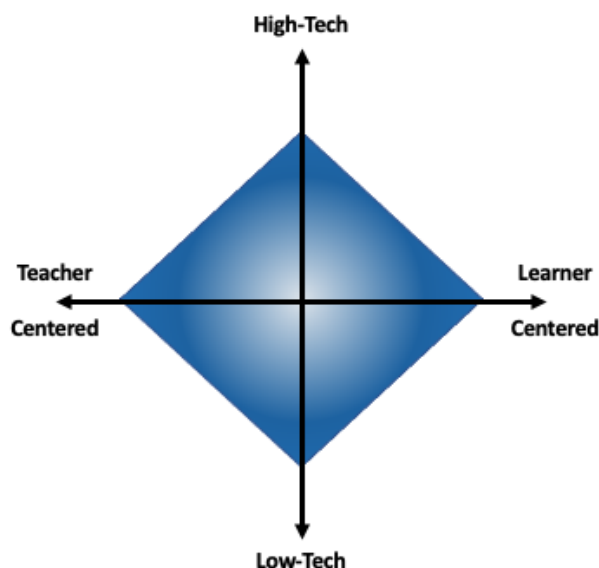
In addition to virtual meeting rooms, the survey respondents were asked to select which digital tools they currently use (see Figure 4). YouTube was seen to be the most used tool amongst the participant group with 91% ($n = 34$) using this platform. Microsoft PowerPoint slides ranked the second most used digital tool by 89.2% ($n = 33$) of participants, and third was video tutorials used by 56.8% ($n = 21$) of participants. Interactive digital tools such as JamBoard (2.7%; $n = 1$), vlogs (2.7%; $n = 1$), and blogs (8.1%; $n = 3$) were seen overall to be used by far fewer participants.

Figure 4*Digital Teaching and Learning Tools Currently in Use*

Note. Participants were asked to select all responses that applied.

How Tools are Used

The survey provided a clear picture of the digital tools used by participants. The interviews, however, provided insight into the various ways these tools are being used and pedagogies that underpin those decisions. Instructors' use of digital tools showed varied pedagogies ranging from what we categorized as low-tech teacher centred to high-tech teacher centred approaches, and from low-tech learner centred to high-tech learner centred (see Figure 5). Before discussing this concept in full, we want to state that our intention is not to rate one model over another. To the contrary, we consider these models to be representative of the passion and dedication the participants in this study have shown toward teaching and learning and the success of their students during the time of the COVID-19 pandemic.

Figure 5*The Varied Range of Pedagogies****Four Pedagogical Approaches***

Low-Tech Teacher-Centred. The category of low-tech teacher-centred includes those that use virtual meetings regularly for long periods of time during which they provide students with YouTube and Microsoft PowerPoint presentations in real-time, along with hands-on demonstrations via a webcam, and the use of a physical (analog) whiteboard for diagrams and calculations. In such settings we found traditional classroom pedagogies at play and the teacher to be at the centre of the learning environment. Here the use of digital tools are limited to the time spent in the virtual meeting room with the addition of email for the submissions of assignments.

High-Tech Teacher-Centered. Alternatively, interviewee P7G provided a detailed example of a daily 4 to 5 hour Zoom session that we categorized as high-tech teacher centred:

Being in this medium is really good, because it just gives me really quick access. I've got multimedia so I can play videos, I can play DVD videos, I can take YouTube videos, that type of thing—these are really quick. I can be thinking about it, and while I'm talking, I can be pulling that video, or that resource material, and that picture will show up on screen. It comes back to my experience with film because I'm also a filmmaker. And so what I'm trying to do is create an environment where they hear me talking, and a picture comes up—then I talk about this and then a video comes up and I talk about that. It's like you're watching a television show. Yeah. Watching a film. It's because I have quick

responses. I have the multimedia, I can control it. I tried to keep that nice smoothness, so that it maintains people's attention.

Interviewee P7G is seen to be highly competent in using multiple digital tools and platforms in real-time via a digital meeting room, showing a high level of digital literacy, and providing learners with an engaging learning environment. The instructor is placed at the centre of learning in this environment.

Low-tech Learner Centred. At the other end of the technology/pedagogy continuum, we found teaching and learning approaches that we categorize as low-tech learner centred. These were approaches such as one shared by Interviewee P9I, who stated,

I enjoy using Zoom. I meet with my students each day for about 4 hours. It's easy to use and I like the breakout rooms. I usually put two to three people in a group to work on quizzes or problem-based activities. I find if the group is too big, not all students contribute, or they don't get the chance to speak up. I've also developed several authentic assessments this past year that students get to work on together in these groups. Another idea used is to have students co create PowerPoint slides—have them searching and finding the information, then problem solving and organizing into slides.

Students in this virtual setting are seen to be active and placed deliberately at the centre of the learning environment through the design of the classroom activities. Technology is not a dominant feature in this digital classroom, rather the learners' contributions are. All activities are being carried out with the use of Zoom meeting and breakout rooms and with Microsoft PowerPoint slides. This model we consider to be low-tech learner centred.

High-Tech Learner-Centred. The last category we describe as high-tech learner centred. A survey participant provided an example of this model in response to the survey Question 9: Please tell me about your biggest success in using digital technology in your teaching. This survey participant stated,

My LMS is set up in a way that allows the student to be self-directed. It has pre-recorded lectures and demonstrations, and a series of problem based activities and quizzes. I also created a YouTube channel where I upload video lessons for trades math. I find having videos that students can pause and re-watch allows them to work through their problems at their own pace. This is also a win for me because it opens up time during short synchronous sessions where the students and I can work on specific issues. I watched as learning outcomes were completed without direct involvement from me. This was surprising and eye opening for me!

This model demonstrates a high-tech learner-centred pedagogical approach, showing both a high level of digital literacy associated with the knowledge and skills of digital tools and digital fluency that reflects alignment between curriculum and pedagogy.

Instructors' Perceptions of the Student Experience

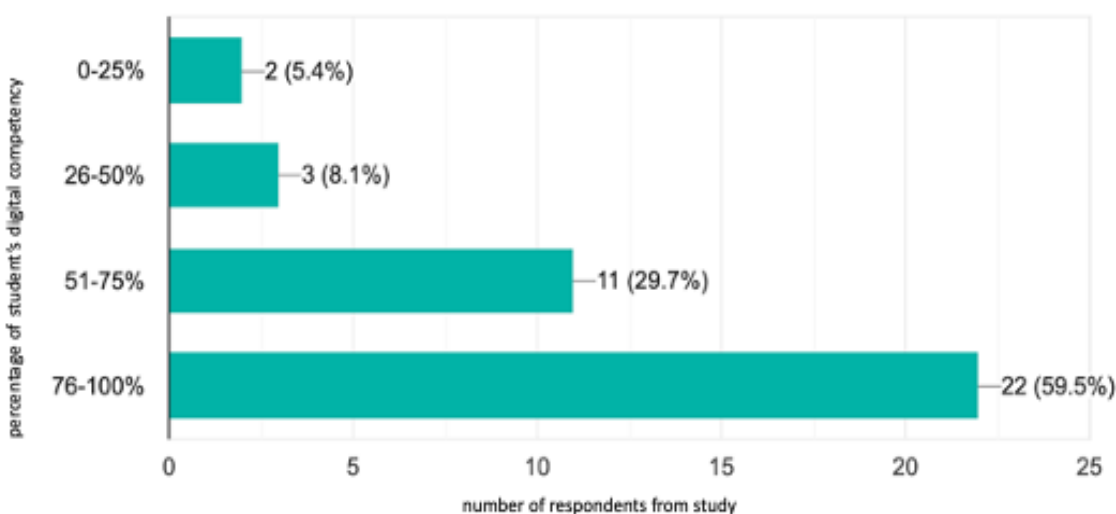
The focus of this study was to capture the perceptions of TVET instructors in BC in regard to digital teaching and learning. The methodology chosen allowed us to hear instructors' values, beliefs, and opinions through their own voices. For these reasons we chose to focus on instructors' perceptions in relation to the student experience, as opposed to the student's voice.

Limited Digital Literacy

We began our inquiry by asking participants what percentage of their students are competent in using digital technology. We learned the largest group of participants 59.5% ($n = 22$) gave their students the highest rating of 76–100%, compared to the next group of participants 29.7% ($n = 11$) who rated their students between 51–75% competent, leaving 13.5% ($n = 5$) of participants who ranked their students between 0–25% and 26–50% range of competency (see Figure 6).

Figure 6

Percentage of Students Who are Competent in Using Digital Technology



Although the survey showed 89.2% ($n = 33$) of participants rate their students' level of digital competency between 51% and above, the interviewees provided a deeper view into these findings, which we shall discuss in this section. It appears that student digital skill sets are wide

and varied. Although the participants in this study deemed their student body digitally competent overall, challenges occur when students are asked to perform certain digital tasks that are unfamiliar to them. For example, participant P9I stated,

All of them can navigate D2L really well. Where it becomes an issue is with Word documents and PDFs, and depending on what they're using, what type of computer they're using or programs they're using, some of them have trouble filling out documents, saving them, and sending them back via email. If they take the time to learn it, it's okay. To be honest, I've been pretty shocked at how many students cannot perform simple tasks on the computer.

Consistently, we heard similar stories from interviewees about students struggling with basic computer skills, such as saving and uploading files, especially video and photos files. We also heard much about the continuous struggles students have logging into the LMS and navigating their way around. This included struggles accessing quizzes, grades, watching videos, and doing homework. Generally, interviewees claimed to be somewhat surprised by students' lack of digital skills in relation to online learning. Interviewee P6F stated,

They call them Digital Natives, and I don't think that's true. My students know how to use their phones and tablets—they can do stuff I had no idea about, but ask them to do something on a computer, or a printer, they just cannot do it.

We found the issue was not so much that students lack all digital skills, rather they lack the digital skills required for the kinds of remote delivery/online learning that has occurred since March 2020 and is continuing today. Instructors were quick to recognize there is a need to provide students with these skill sets early on in their online/remote delivery courses, if they are to ensure student success. We noticed a genuine sense of empathy from interviewees around supporting students through this learning curve. Interviewee P1A claimed,

Students have a lot of anxiety around the technology—at least half of the class are struggling trying to figure out the LMS. It's a different learning curve than they were expecting. So now, not only are they having to learn their practical skills and studying theory, they are having to learn to use the technology. For some, this is really stressful. I've been spending time one-on-one with students, talking them through the steps. I've also given them my phone number which I don't usually do.

While many participants spoke about providing one-on-one to students, we also heard from others that had created orientation modules for students. Interviewee P2B claimed,

I have restructured Week 1 learning outcomes so that all students practice the necessary digital skill sets that the course requires. I give them fun, low risk, assignments with options for submissions, such as a slide presentation, or a video. I also give them options

to use [different platforms] and I make short ‘how to’ screencasts for them. I launch the week with a welcome Zoom session, then it’s all asynchronous from there—it’s working so much better for them, and for me.

Limited Access to Technology

Lacking digital skills is only the tip of an existing barriers-to-digital-learning iceberg for students. We learned of a far deeper issue that instructors believe is preventing students from being successful in the online learning environment. This issue relates to access, including access to (a) computers, hardware, and software; (b) wi-fi and/or adequate wi-fi; and (c) a safe and suitable learning environment.

Many participants reported accounts of students trying to complete courses using only cell phones. This was not unusual. It seems that many instructors have experienced students arriving unequipped with inadequate technology to fully participate in their courses. One survey participant claimed, “My trade is very hands-on and the majority of apprentices don’t have computers or tablets to do the course work. They won’t need them in industry, so they have no interest in purchasing them to study.”

This statement correlates with others’ views around inadequate technology. We found a general sense amongst the participants that they are not okay with continuing to operate in an emergency mode and make excuses and accommodations as they did during the initial pivot to online. One participant claimed that we, as educators, now have a responsibility to inform students that they require a laptop to participate and complete the course. Interviewee P3C stated,

We have so many students that come in and they think they can do the whole thing on one of these little devices. They’ve relied on their cell phones for so long that they don’t know it’s not going to work in the digital classroom. We need to prepare them for this and require a PC or laptop, but not a Mac. Students consistently have problems with Mac because of its operating system. It’s our job to let them know what they need.

Several participants suggested that digital tablets should be provided and included in the cost of tuition. We also heard of post-secondary institutions (PSIs) providing students with access to digital devices while they are enrolled in the program.

We found evidence of inequities prevalent in the digital classroom. These include access to wi-fi and/or adequate wi-fi and to uninterrupted, safe, working spaces. Interviewee P5E shared their observations having taught remotely for the past year:

So there’s definitely students that are a little bit better off financially. Usually, you know, they will have the laptop with the built in camera and the microphone and the headset.

And that's great to have all that and they have a decent Wi-Fi connection. And then there are students who are trying to do it all on their phone, you know, in a dorm or something and with spotty Wi-Fi. It's really challenging, right. They try to do these things and read all the material on a little phone. So I would say there's definitely financial barriers to having the proper equipment. I don't feel students can fully engage in the material without quite a bit of frustration on a phone. They can go to the library for better Wi-Fi and equipment, but they can't sit there for 5 hours. I think we have to find ways to provide students with bursaries or financial aid so they can purchase something that is going to make the experience more fruitful for them.

While we agree access to digital devices needs to improve and that PSIs have a role to play for this to happen in order to reduce some of the barriers students are currently facing, we learned that some students will continue to face other challenges around access.

Other inequalities shared with us related to students' access to suitable working spaces. While we heard reports of students Zooming into class from cars while driving and boats while fishing, these situations were not related to access. There were several reports, however, that spoke specifically to students struggling to learn in less than ideal learning environments. This included reports ranging from students without access to a workspace large enough to balance a laptop and notebook, others having to perch their phones and balance notebooks on their knees, to other situations in which the distractions in the room were visible to the class. Interviewee P7G said, "I remember one guy, he would have his screen open and regularly there would be a bunch of people behind him. I could see people sitting on the couch watching the TV—watching a soccer game or something." Although this particular example wasn't the norm, other examples shared reflected similar levels of disruption occurring during the Zoom. These included frequent interruptions from barking dogs inside the house or from additional adults and/or children being in the same room also phone calls. We learned that some students are comfortable taking phone calls and carrying on conversations during class, which participants said did not happen in the F2F classroom.

Distracted and Disengaged Learners

We found that our interviewees tended to shift from the topic of distractions in the learning environment to that of distracted learners. We heard many reports about students being easily distracted during Zoom sessions, which correlates with subsequent findings in this report under the heading *How to Engage Students* where participants speak about their interests to learn new approaches that purposely aim to engage students in the digital classroom. In doing so, they

acknowledge that the level of student disengagement is a concern, as students are often distracted during Zoom sessions.

While participants provided a range of reasons as to why they believed students were disengaged and/or distracted in the Zoom classroom, the majority spoke to the long hours spent in Zoom, noting that the amount of time was beyond reasonable. Interviewee P8H said, “Students are spending a wicked amount of time in Zoom, which is just not healthy. They are miserable.” This concern was shared by many other participants who spoke to the physical and mental health impacts on students who were having to sit for up to 6 hours a day and face a screen.

As we continue this discussion, we want to state that we find it of interest how access to virtual meeting room technology, such as Zoom, has reshaped the landscape of online learning during 2020. Prior to this time, the concept of online learning had a tendency to prioritize asynchronous learning over synchronous, with minimal to zero hours spent in real time virtual meeting rooms. This is no longer the case. From this we conclude that the term online can no longer be used without clarification as to its unique structure.

Regular Check-Ins

We were interested to learn how this 2020 Zoom-dependent model of online learning influenced student learning outcomes. We learned that most interviewees had chosen to check-in more regularly with their students to find out what was working and what was not during the 2020–2021 school year as compared to previous years. A variety of approaches were used for check-ins including the LMS survey tools, Google JamBoard in real-time, and Zoom polling option. From a series of informal check-ins, interviewee P4D found that their students liked assignments that had grades attached. In fact, the students were so keen to get 100% on all tests and assignments the class requested the option to have two attempts on any of the items that were to be graded. The interviewee told us that this approach reaped great benefits in the short term. The majority of students were found to be spending the extra time to take the second attempt, plus they were taking time to revisit the study materials before returning for take two. In addition, we learned that students formed an online mentorship group in which they shared short video tutorials with each other and offered feedback.

According to Interviewee P4D, all seemed to be going well in the online classroom. Their perception changed following one of the few hands-on lab sessions during the final days of class.

In compliance with requirements set by the Public Health Officer, students had been given permission to attend campus to complete certain course competencies. This included electrical students. When the students arrived, the labs were already designed and set up. The instructor invited the class to look at the labs and lab books, and were then told to “pick the labs you want to do depending on the theories you want to test out, and what you want to learn.” The response was not what the instructor had expected. We learned that most students stood around rather than responding. The instructor said, “They just went limp. And then a few students asked, “What do you want us to do?” From the interviewee’s explanation, we understand this response is not considered *typical*, stating, “Compared to previous years, when students have been on campus daily for the full program, they respond very differently to this invite. They are excited and get straight in there to test and disprove theories.” The instructor reported, “I felt like I’d disabled them. I haven’t made them/supported them to become self-directed learners. I’ve shaped them to ask, “What do I have to do to pass this test?” The instructor shared with us that this experience was pretty disheartening: “All that hard work hasn’t produced the type of student that I would be proud of. What can I say, they are good at passing tests!”

We learned that these electrical students had spent 4 hours per-day in a virtual F2F classroom during their past semester. So, what was so different? We were curious to learn *what* it is that students are missing in the F2F online experience that is present in the physical classroom, particularly as their grades had reflected a positive outcome. Interviewee P8H spoke of a similar experience and shared their perspective as to possible underlying causes:

I think the problem is that the most important skills I teach students might *not* actually be how to cook. The things that I teach them are *how* to talk to people, *how* to engage with their teammates, *how* to clean. I teach these skills way more than how to use a knife and make a nice goulash. I teach personal skills! But I can’t teach personal skills online. I can’t make eye contact with students online, but in the classroom I can literally walk up to them, say hello, connect with them, then start working on eye contact.

These two examples drew us to consider Aoki’s (1990) notion of the “curriculum-as-planned and curriculum-as-lived” (p. 181), recognizing that although learning outcomes were being taught, learned, and achieved in the online environment, the collective suite of graduate attributes that are typically embedded throughout the students’ F2F experience, but not measured upon graduation, are not. Our stance is that to embed soft skills into an online learning environment requires a high level of digital fluency. That being said, digital fluency is not something that can be easily taught; rather, it represents a collection of knowledges, skills,

values, and beliefs acquired by individuals that dedicate many hours to grow these skills and understanding with the intent to teach online. It would be unreasonable to expect instructors who had been thrown into the online environment due to the COVID-19 pandemic to arrive with such a skillset.

Learner Characteristics

We suggest, however, that instructors' approaches to online learning, their pedagogy, course materials, choice of technology and its uses, although a critical part of the learning environment, are only part of the equation. Learners, whether they realize it or not, are key members of this symbiotic relationship between teacher, outcomes, and students.

Self-Directed Learners. We heard from many interviewees about the type of students who thrive in the online learning environment. Interviewee P9I stated, "The ones [who] do well, they'd do well in any environment. They are organized, self-disciplined, they know how to manage their time and how to study, and they are willing to put the time and effort-in to be successful." This collective description of student characteristics, categorized as self-directed, were consistently expressed by many participants throughout this study and can be seen as core principles for student success in the online learning environment. Concurring with this notion, Interviewee P8H claimed, "I think it needs to be the right student for online learning—and if you have 100 students, this environment will be right for the top 15."

While the learner characteristic identified as most desirable for online learning is being self-directed, many participants in this study spoke more about the characteristics of students at the other end of the continuum—the ones identified as struggling students. In general, a struggling student was seen to lack self-motivation, showed poor time management skills, demonstrated the inability to study independently, and avoided asking for assistance when it was needed. While instructors agreed that these learner characteristics are not new to their classrooms, their ability to identify and support these students in the online environment was severely limited by this modality. Interviewee P8H claimed,

If you're not in the classroom, it's harder to keep your finger on who's struggling. Right? It's not obvious in Zoom. Whereas, in the physical classroom I wander around and I see how they're doing. I can check-in, ask a few questions, listen to their conversations, help them out as I go, then I know where each student is at. It is way easier for the student to ask questions too—they are not so 'on show' as they are in zoom. I think the saddest thing is that they [struggling students] are having a really tough time learning like this—which may put them off learning completely.

Adapting student support approaches. Although this quote captures only one participant's voice, we heard similar messages consistently throughout the participant group. Along with this theme we heard solutions. Many instructors included additional Zoom sessions to meet with students one-on-one as a way to replicate their traditional classroom check-in approaches; they also implemented individual oral assessments. These initiatives were not without complications, as we heard from interviewee P7G:

I tried to get through to everybody in my class individually. I tried oral assessments and one-on-one meetings. Both can be challenging because you've got to watch your time. The good thing about D2L [an online LMS product] is that you can track how much time students are spending on the materials. If they're not putting the time in, then that becomes part of the conversation. I really made an effort to connect with the students verbally. I want students to know I really care about them—just a lot of empathy by recognizing the challenges they are facing.

From this discussion, we conclude that, as in all learning environments, the strengths held by self-directed learners lead to success, whether online or otherwise. While those students lacking such skill sets are supported and managed successfully in the F2F classroom through well-practiced, in-person approaches, the online learning environment requires something quite different. An approach that we believe requires a digital frame of mind, one that thinks in the digital, rather than transposing analogue practices into the digital domain. This approach, we believe, is grounded in the philosophy and practice of digital pedagogies, encompassing practices such as the use of OER and OEP.

Pedagogy Shaped by Resources

It became evident when discussing resources with the interviewees that different institutions used different resources. As most trades have technologies that are rapidly changing, it is hard for the curriculum to keep up with industry. Many of the institutions use the material that is provided by the Industry Training Authority (ITA), yet some other institutes have chosen to use resources that have been provided by commercial publishers. Neither option was cited as a solid solution to the issue of providing current information for the students. While there were benefits cited to both, there were also issues that were raised that were problematic.

Commercial Textbooks

When dealing with commercial textbooks, some instructors thought the information was beneficial, as Interviewee P7G stated, "There's a lot of valid information ... in that particular

book.” The same participant noted that perhaps not all students would get the same value from as the books cover more information than may be necessary: “The thing is, some students will not necessarily go fully into certain parts of the trade... I just use them specifically in spots where it is going to be necessary for that” (Interviewee P7G). Another instructor, from the same trade took issue with the content from the commercial publications. Interviewee P3C stated, “It’s woefully inadequate, especially as I don’t like the material to begin with.” Context was another issue raised by interviewee P6F, who noted, “They’re made in another country. So they deliver things that aren’t really valid in our particular markets. You know, and in my trade, the hairstyling being a Red Seal trade in BC and soon to harmonize across Canada.”

Industry Training Authority Resources

The resources provided for by the ITA also raised some concerns with interviewees. As many of the trades progress through harmonizing their curriculum, issues were raised such making sure everything is current, as Interviewee P4D’s commented, “I guess it’s a quagmire right now.” While the harmonization initiative is seen by many instructors to be a benefit to trades education in general, some find the process confusing and riddled with issues. Participant P4D noted that there are many issues to clean up in the ITA binders, even after they had been reconfigured for harmonization: “The committee’s going back and then fixing mistakes in [Years]1, 2, 3, and 4.” It would seem, in fact, that some instructors are not even aware of the process that is occurring or how the ITA resources are created. Interviewee P3C, when discussing the link between the ITA, Trades Training BC (TTBC), and the curriculum, stated, “But my understanding is that many instructors don’t even know that TTBC exists.” This same interviewee went on to note that while instructors have access to the ITA modules through TTBC, they are not necessarily the most current and updated: “but it’s not all the modules it is just some of the updated ones because of harmonization” (Interviewee P3C).

Open Educational Resources as a Solution

Context, currency, and content are all issues that were raised among interviewees. Some choose to work within the confines of what they have available for the benefit of their students by supplementing with other resources such as videos. Though when looking for other resources for their specific trade they found it wanting, as Interviewee P6F stated, “I personally haven’t found a ton of resources for the hair profession.” Some interviewees created their own resources to provide assistance to their students. When discussing resources and textbooks Interviewee

P7G noted, “Now what I’ve done is I’ve just written my own.” Much of this work is being done off the side of these instructors’ desks on their own time. When dealing with these issues, Interviewee P3C noted all the resources available for the students should be OER: “You know it should all be open resource.” If the resources were OER, then it is suggested that the content could be updated and kept current. If instructors had access to resources for editing or making suggestions for edits, P3C suggested, “If they were put into open resources, they would be updated. People could get on there, they can work on it, they could update it, they could change them, they could do whatever they want. It would just make so much more sense.”

Faculty Perceptions of Open Educational Resources

Although 45.9% ($n = 17$) of participants agree, and 18.9% ($n = 7$) strongly agreed that a key benefit of OER is the ability to share resources with other instructors and the ability to adopt and adapt for their own use, we found only five participants (13.5%) with firsthand experience. Their collective experiences consisted of the authoring of two open education textbooks in 2020–2021 in collaboration with BC Campus; the co-authoring of an OER, the implementation of open educational practices through the use of a WordPress blog site that resulted in an OER, and the adoption of two existing OER.

Faculty Perceptions Regarding Open Educational Resources

With so few participants with actual firsthand experience with OER, yet evidence supporting the notion that 64.8% of participants ($n = 24$) believe the use of OER will enhance their practice and ultimately enhance student learning outcomes, we wanted to know which barriers prevent this from happening. Interviewee PJ1 claimed,

OER—it’s definitely where we’re going in the future. I just think that not enough people know about it. It’s the same with TTBC—instructors just don’t know about it. We’re all working in isolation and keeping things closed to ourselves.

This participant’s claim was reflected throughout the interviews. In addition, we found 24.3% ($n = 9$) to 32% ($n = 12$) of participants selected “neutral” to the survey questions related to OER. Although a neutral response can be perceived in many ways, we filtered this finding through the voices of the interviewees, concluding that this percentage of TVET instructors are unaware of OER and its uses.

Quality, Literacy, and Collaboration

Although experience with OER was limited within the participant group, those who had some experience spoke to various concerns. Interviewee P1A claimed, “Quality is a big concern. My videos are fine for me, but they are not polished—my arm is blocking the screen, and my bracelet’s jangling. It’s okay for my students, but the OER standard needs to be higher.” The concern for quality was reflected by others. Interviewee P5E stated, “Literacy is an issue. Not for all. But trades instructors on the whole are not known for their literacy levels—they don’t have to write as part of their job.” The same participant sensed that some instructors feel that they don’t have enough to offer; they don’t know enough to write a book. Interviewee P6F concurred with this notion having taken on the authorship of an OER:

I needed input from others and I just didn’t get it. I realized that I’m not an expert in every topic in this book. And then using the technology—I found having to upload everything into the software overwhelming and I couldn’t get help. Even the T&L Centre [Teaching and Learning Centre] didn’t know how to use it.

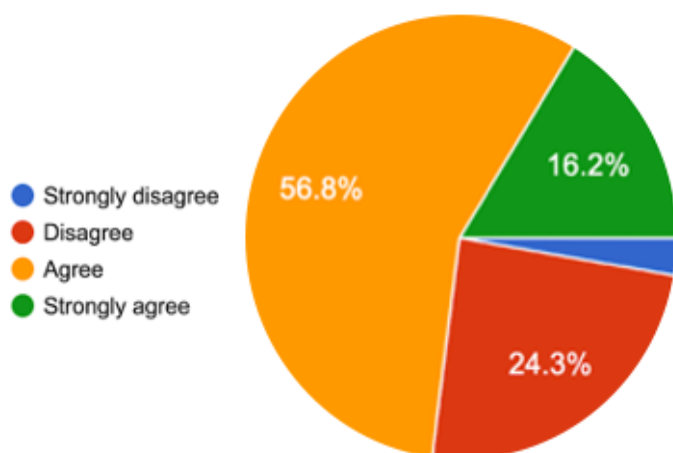
The same participant concluded, “It would have been helpful to have more contributors—if there were two or three people, you could break it down into pieces” (Interviewee P6F). Likewise, Interviewee P5E suggested, “A collaboration would work well. Somebody in the group that is an accomplished writer could do the actual writing, yet the ideas and the practices are coming from the instructors.” Consistently throughout the data collection we found participants forthcoming with the notion of collaboration as a way forward, intertwined with a passion for continuous improvement.

Workload

Time, money, and energy were also issues presented by participants. Interviewee P5E stated, “Instructors work hard. And you know, they do so much already off the side of their desks.” Statements such as this were reinforced by the survey results that showed 56.8% ($n = 21$) participants agreed 16% ($n = 6$) strongly agreed that preparation time working with digital teaching and learning tools and technologies is an issue (see Figure 7).

Figure 7

Participants' Responses to the Following Statement: The Amount of Preparation Time is an Issue for me When Considering Working with Digital Teaching and Learning Tools and Technologies



We heard several frustrated accounts that relate to the limited resource of time and how the digital world has increased workload. Although these findings are not specific to the use or development of OER, we feel that they are related. One survey participant stated, “The workload of grading and providing feedback on assignments while trying to build an online course, deliver it, and keep up with marking, was overwhelming.” Although we see this statement referring to the development of an online course while teaching full time, we drew a correlation between this task and that of developing OER alongside teaching. Another survey participant spoke to the amount of time required to set up an LMS, stating, “This system is huge and takes a ton of time to set up properly. It has taken a year just to create templates for the 5 classes that I teach and I still feel like they are just a shell of where they need to be.”

From our own experiences as educators, we agreed with such claims. Designing, developing, and setting up online courses takes an incredible amount of time, knowledge, and expertise. Time that needs to be recognized as an integral part of the digital educator’s work, and, therefore, this work should not be done off the side of a desk. At the same time, however, we see how this task has been exacerbated by the lack of OER available to those developing online courses. Consider interviewee P5E’s comment,

Imagine if you could go to an open education resource and find things that you can use and adapt. It gets you thinking.... Instead of there just being a sea of nothing, suddenly there's a little island out there! And you can change things a little bit, or add to it. It gives you a starting place—a jumping-off place.

This participant spoke about the short-term benefits of having such an OER repository to support new instructors as well as the long-term benefits, which they believe will improve the overall quality of education, especially learners' experiences, when resources are readily available (Interviewee P5E). This same interviewee further claimed that, were that true, instructors will no longer be endlessly searching the Internet for digital resources (Interviewee P5E). Interviewee P2B concurred with this notion having recently adopted an OER textbooks for Hair Colour and Barbering:

We needed something more advanced in both these areas. The standard textbooks don't go beyond the fundamentals and lots of information is missing. And you know, there's no financial barriers for students—when I assigned these, I was super proud to say “and they are open and you can have them for free!”

Commercial Pre-Packaged Online Curricula

While the development of quality OER was seen to provide students with a zero to low cost option for instructors and students, other participants found themselves using commercial prepacked online curriculums as a solution to improving their online courses. For example, seven of the nine interviewees embraced the use of commercial online learning platforms, which comes at a cost to the institution and to each individual student. We learned from the participants in this study that such digitized curricula are available for culinary arts, baking, welding, electrical, hairstylist, and automotive programs.

We wanted to explore why instructors were keen to use these resources over the option to develop OER where the benefits of longevity are woven in due to Creative Commons licensing and the five Rs of OER (retain, reuse, revise, remix, and redistribute); (Wiley, ND). Interviewee P9I explained,

In automotive the students are able to access pretty high level simulations and animations with detailed information through the online course. They can interact with it—move stuff around and perform different calculations. I think it would be tough for instructors to create that kind of stuff—it would take a pretty big development team and a lot of time to make all those things. We create lots of assignments—and I've made authentic assessments to support what they do online, but I don't see us being able to make that kind of stuff.

This participant's comment resonated with those we heard from other fields such as electrical and welding, where the need for leading edge technology and skills are required to create such digital resources. Hence their use of commercial pre-packaged online curriculums.

Co-Creation

Despite participants' lack of use and development of OER, the survey results showed 43.2% ($n = 16$) participants agree, and a further 27% ($n = 10$) participants strongly agree that working collaboratively on developing OER can provide richer educational experiences for learners. Further to that finding, the survey found 43% ($n = 16$) participants agree, and an additional 21% ($n = 8$) strongly agree that it is important to invite learners to be creators and contributors of openly accessible public knowledge.

Interviewee P7G concurred with this notion stating,

They say the one that is leaning most in the classroom is the teacher. And so, when the student starts to create the material, I think the learning and retention become higher. In my mind, I've always thought this whole group of students is a huge resource of experience and knowledge, and we're not tapping in to that. I'm very interested, but I don't know how to do it.

While this participant was keen to explore Open Educational Practices, they did so with one caveat, stating "I don't see this working with the apprenticeship classes. They have too much to cram in. But I'd try with foundation classes". We heard this concern from other participants. It appears that Apprenticeship courses are perceived as content heavy, leaving little room for such pedagogies.

One survey participant shared their success story having co-created a Wordpress Blog with students that captured the production of a Poinsettia commercial crop. Students were required to monitor and compare the conditions, temperature, light/dark hours, moisture levels, nutrients of soils, etc., of both the commercial crops growing in the campus greenhouse with their own crops that they grew at home using grow tents. The survey participant commented that this is the first time they had tried such an approach, and despite it being a huge learning curve for both the instructor and the student, the learning has been enormously rewarding and the students can now take their blogs forward and add to their portfolios.

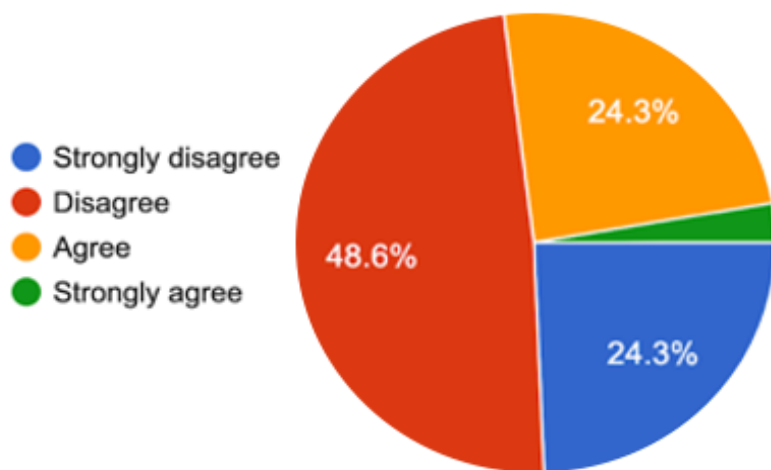
Opportunity for Professional Development

Survey participants were asked if their lack of digital skills are a barrier to teaching in the digital classroom, the survey showed 72.9% ($n = 27$) of participants disagree to strongly

disagree, compared to 27.1% ($n = 10$) of participants agree to strongly agree, showing that 72.9% ($n = 27$) of participants feel competent with their current levels of digital competency (see Figure 8), whereas 27.1% ($n = 10$) feel that the current level of digital competency is a barrier to their teaching, and therefore to their students' learning.

Figure 8

Participants' Responses to the Following Statement: My Lack of Digital Skills is a Barrier for me When Teaching in the Digital Classroom



The Relationship Between Pedagogy and Technology

When asked which areas of digital teaching and learning professional development (PD) opportunities were most needed, two distinct themes emerged: (a) a desire to learn how to teach online, which we categorize as digital pedagogy, and (b) a desire to learn about available technology and how to use it, which we have categorized as technology and tools. Although we have identified these two sub-themes, as researchers and educators, we argue that a symbiotic relationship exists between pedagogy and technology. Therefore, we find it difficult to separate participants' desire to learn about digital pedagogy from their desire to learn about the technology. In addition, we would like to add that we found the reports shared by participants reflected a wide range of experiences, knowledge, skills, and competencies in relation to these two themes.

How to Engage Students

Under the theme of digital pedagogy, the focus of many PD requests were centred on the need to enhance student engagement in the digital classroom. We heard from several interview

participants that student engagement via Zoom was their number one challenge. Many interviewees spoke about facing a wall of blank screens during Zoom lectures—the “black wall of death” as one survey respondent called it. Interviewee P4D spoke of such an experience:

I’m not really comfortable lecturing in Zoom. I’ve become accustomed to it, but I know my students are doing other things. They leave their mics on and stuff and they’re on multiple phone calls and they’re on different chat platforms—and I know they are doing Minecraft. They poke in when something catches their eye, but they are not really engaged like they would be in a face-to-face class.

Participants also spoke of ways they had adjusted their teaching practice for the Zoom classroom. This included providing regular breaks between lectures and activities, recording lectures so that students could watch later, and breaking up the day with the inclusion of a self-directed learning task. In addition to these adjustments, they also said that setting deadlines and assigning grades to all tasks increased engagement. Although these strategies were thought to help, many participants still felt student engagement in the Zoom classroom remained low and somewhat challenging.

Interviewee P6F spoke about their experiences despite having assigned self-directed tasks:

I ask the students to do work on their own, but how do I get them to actually login and do it? I need to work on making these assignments more engaging so that they will participate—I feel that participation is low unless I am actually there guiding it.

Increased Stress

Participants spoke about the stress associated with the ongoing task of trying to engage students in the digital classroom. One survey participant claimed, “It is overwhelming—I can’t keep up and I feel like I am miles behind which causes me a lot of stress and anxiety.” The majority of participants felt that “the time required to produce quality online experiences is much greater than the face2face experience, and not much time has been available” (Survey Respondent). A level of frustration was evident in many responses that we received in the survey and throughout the conversations that took place in the interviews. Despite that frustration, clearly instructors are keen to know more about digital teaching and learning so that they can improve student engagement levels. For example, interviewee P8H stated,

You ask me what do instructors need, well, honestly, I sometimes think we need to be told what the hell to do, right! I mean, just teach me! We had PIDP [Provincial Instructor Diploma Program] courses to learn how to teach in the classroom, so why don’t we have courses to tell us how to teach online?

Faculty Perception of Technology and Tools

Instructors also have a strong desire to improve their own skill sets, particularly within the field of digital video recording and editing, as they believe this will increase student engagement levels. Participants stressed the need to improve the quality of their pre-recorded tutorials, claiming that students deserve higher quality production of videos, using terms such as “more professional looking” (Survey Respondent). This ties in with participants’ desire to improve modes of assessment, particularly through the development of authentic assessment, which may include the use of video.

Technical Skills

With this keen interest to improve video editing skills, we, the researchers, were equally keen to know how participants intended to use these video tutorials and which digital platforms they intended to use to house such resources. From this point of inquiry, we gained insight into what one participant referred to as a “patchwork of platforms” (Survey Respondent). We learned that instructors are using multiple digital platforms, in some cases up to five, to teach one cohort of students. Interviewee P1A claimed to use five online platforms:

Trello for scheduling, housing of own made tutorials, and the uploading of assignments; a pre-packaged publisher owned Learning Management System, containing pre-made video tutorials and digital textbooks, learning activities, multiple-choice tests that provides grades; WhatAapp as a means of communicating directly with the class as a whole, or with individual students; Zoom for virtual meeting rooms; and email for students to submit assignments.

Learning Management Systems

We were curious to know why participants chose to use multiple platforms rather than use an LMS. Interviewee P6F stated,

I still feel like we are kind of rushed—we’re kind of working, like, in an emergency—on an emergency basis. Kind of living month to month right now. I don’t feel that I’ve got a real permanent online framework. We use Moodle and I don’t have time to learn it and teach it.

The survey results showed that 86.5% ($n = 32$) participants currently use an LMS platform, compared to 13.5% ($n = 5$) who do not. Survey participants were also asked which LMS platform they used and what they liked about using it. D2L/Brightspace is used by 93.75% ($n = 30$) of the participants who answered yes to using an LMS platform, and 6.25% ($n = 2$) use Blackboard. In addition to the survey responses, two interviewees spoke of having access to

Moodle but preferred not to use it as they found it clunky compared to the pre-packaged publisher LMS that they also had available for use.

Participants using D2L/Brightspace spoke about the ease of using this system. For example, a survey participant commented, “I like having the ability to set-up worksheets, quizzes, and grades all in one place,” which aligned with several other comments submitted to the survey. Similarly, another survey respondent offered another example:

I really enjoy the organization within the course. Setting up content for the learners to follow along is simple. The upload/drag and drop features are helpful. Creating class templates for ease of use with future classes is nice. I enjoy how I can align assignments with rubrics and grades, it is neat and tidy and that suits me.

Not all participants, however, found D2L/Brightspace user friendly, as stated in this survey submission

- Quizzes—there are at least 10 things that can go wrong when setting up a quiz.
- Email—you cannot go to the email area and select a student name from a drop down list. Instead you have to access this from the class list area.
- Due dates—there are 3-4 sections you can set up due dates for the same assignment areas and the content, assignment, grade, calendar, and announcement areas. All dates are added to the shell calendar and shown as 3-4 things due to students. This is overwhelming for students.
- Collaboration tools—It would be useful to have an online real-time collaboration tool worked right into D2L (e.g., Microsoft Teams, JamBoard, Google Docs, etc.). Instead exterior services have to be accessed and then documents uploaded into the system. This is an extra step for students and they don’t seem to be able to manage/set this up in their smaller groups.
- Rubrics – the holistic/analytical settings don’t allow ranges in the points area.
- Some students do not have the correct tools to access and use the LMS properly; however, this could be true for the entire online format as

well. For example, tablets or phones pose a challenge when attempting to navigate the system

The range of responses presented here in examples 1, 2 and 3, reflect users' experiences using an LMS platform. The examples are *not* intended to offer a critique of the tool itself, rather they are intended to reflect the range of individual users' levels of digital literacy and digital fluency and how they use the LMS system. For example, the first comment: "I like having the ability to set-up worksheets, quizzes, and grades all in one place", demonstrates the use of the LMS similar to that of a repository, to house what would have previously been hard-copies used in the classroom setting. The second example speaks to the organization of the course, and the alignment of assignments and rubrics. This shows a progression towards creating a learning experience for the student within the LMS shell. We then moved on to example 3 where the participant named many features that cause challenges for students. This example shows the instructor intends to make full use of the D2L/Brightspace full-suite of tools. Another example is captured here as interviewee P5E talks about the success they had having taken a workshop in Course Design then developing asynchronous learning modules for the students. They stated:

I put all module assignments including readings, video tutorials, narrated PowerPoints, discussion forums, and quizzes for the week under the Description tab by using hyperlinks instead of attaching files. Students often have such a tough time finding the path through the LMS and can't find the online activities, particularly when they're going from one course, to another course, from one instructor to another instructor. And so, I figured this system out, and then my colleague adopted it as well, so we had a pretty seamless approach in our online teaching, that made it easy for our students to go from one course to the next with different instructors, and made it a lot easier for them to independently work their way through all the things that they had to do. It's been a big success.

This last example differs from the others in the way that the student journey has been designed on the understanding that the student will work independently. This demonstrates an in-depth understanding of the digital tools available combined with a level of digital fluency that assumes the learner as a capable agent in the acquisition of knowledge.

The Future Professional Development

Having first explored the specific requirements for PD as stated by participants, then secondly explored the range of pedagogical approaches used in relation to LMS, we now return to the question, *what* Professional Development opportunities are most needed for TVET

instructors. We consider this question at a time in history when the TVET learning environment is evolving daily and has been forced to transition between analog and digital worlds.

It seems that we are not the only ones seeking answers to this question. Participants in this study provided several concrete suggestions such as “instructors need ‘how-to’ video tutorials to learn how to use different tools. They need to be short and easily accessible. We don’t have time to make them!”. This request is referring to a need for more digital resources. Alternatively, the next suggestion refers to the need to increase human resources to support instructors in their new digital worlds. This participant claimed:

We need a resource person at the end of the phone. We need to be able to speak to someone when things go wrong during class. We don’t have time to watch a video and figure it out when 20 students are sitting in front of us on zoom, waiting for the glitch in the LMS to be sorted. We need on-call tech support.

Similarly this next suggestion speaks specifically to the need for a new support role due to the amount of time required to upload materials to an LMS. This participant claimed

I’m spending my time developing authentic assessment and recording live video to support each activity, then designing the rubric, and I’m happy to do this. But it seems crazy that we don’t have support people that can help with uploading all of these materials—we should be able to hand over these routine LMS tasks. I see this being a new role for a support person—there is a big need.

Collaboration

While many survey participants and interviewees agree professional development today should include the offering of specific workshops focusing on pedagogy and technology, the introduction to multiple digital tools, and the resources to support them, several interviewees spoke to a much larger need, a need that would require a shift in the culture of many TVET departments. Participant P3C shares their view for the future of professional develop:

With things changing so rapidly we need to have a more collaborative approach to PD, and a more collaborative atmosphere in departments. I’ve always been in favor of coaching and or mentoring. I think some people are really good at it, and some people aren’t, and, you know, we could always improve. The thing is all departments have some great ideas—and you might find somebody in the carpentry department, or the electrical department, that has really good skills at doing PowerPoints, right? So wouldn’t it be a good idea to match some of those people up. I mean, we’re all tradesmen, and we all talk the same language. Right. So let’s, let’s get together and collaborate. It’s about fostering that community—a collaborative community. Tools yes, but community, collaboration and mentoring is what is needed.

Participants acknowledged the strengths and skill sets that exist within the departments and recognized the potential for instructor-to-instructor mentorship leading to a collaborative approach to both curricula and PD. In doing so, this participant wishes to shift the focus away from individual skill sets and move toward a new paradigm where ‘collective skill sets’ become the norm.

On a similar theme, participant P5E spoke of how they had begun to put such ideas in to practice:

I’ve had a number of instructors in my course shells. I invited them in as guests to look around to see what’s happening. Some were from my department, but many from other departments. So, you know, teachers can be mentors to other teachers. Also by doing little workshops with our colleagues, for example, you know, like coming to some kind of consensus as to how we want our shells to look, and how we want to present our online materials, means that we are not going to be facing a brave new world for each course. Having that support there within the faculty is huge. And, you know, maybe, on some of our CD days, you’ll organize a little workshop and say, here’s how I did this!

The theme of collaboration rippled throughout several interviewees’ stories with many speaking of grassroots communities of practice that had sprung up at their institution due to the COVID-19 situation. One survey participant claimed, “I need time with other people to brainstorm and to know what others are doing. This is the only way to make my teaching more dynamic. Otherwise I’ll be in a rut.” This participant is seen here to be actively seeking out collaborative learning and sharing opportunities, which was also captured in the two previous examples that spoke to mentorship and collaborative approaches. But what about those that are not actively seeking learning opportunities? The following section explores resistance to change.

Resistance to Change

The discussion on PD led to thoughts surrounding the concept of mindset and perceptions related to a characteristic known as resistance to change. These conversations included the causes behind an individual’s resistance to change as well as exploring approaches to navigate and support those in these positions. We begin by discussing reasons for resistance.

Participant P7G spoke about the fact they had always been open to learning about computers, yet they know this is not the case for all instructors:

There’s a lot of adversity to computerization. There are people that have been used to doing things on paper, which is perfectly fine, and they are not interested in any of the benefits that computerization is going to give. They are also concerned about the learning curve, and about the amount of time it’s going to take to learn.

This example of resistance to change shared by interviewee P7G captures a certain mindset held by the resistor, one that is grounded in fear of the unknown and an associated loss of competency. The interviewee describes this situation from a place of empathy, stating, “Some people that do not wish to tackle the computer, they see a kind of *dark cloud over this black box* that they don’t understand. And what they’ve been doing, they do understand” (Interviewee P7G). The interviewee then provided an empathetic mentorship approach to support fellow faculty members break through their emotional block, which is also reflective in the suggestions presented earlier relating to collaboration.

Other participants shared their perceptions about resistance to change behaviours and linked these characteristics to the notion of open and closed mindsets. There was a general theme that emerged throughout the interviews and surveys that associated open mindsets with new or young instructors and closed mindsets with long-term or older instructors. Interviewee P5E correlated closed mindsets with the “old guard” of instructors, stating, “There is quite the divide” between them and the new, young enthusiastic more technologically savvy group.

We wanted to dig deeper and explore the assumption that age was related to resistance to change behaviours and to having a closed mindset. The interviewees shared, while it is generally accepted that a correlation exists between age and a closed mindset, it was evident that participants felt there are many exceptions to this rule. For example, Interviewee P5E stated,

Everyone’s an individual and you can’t categorize. I’ve always been interested in learning new things. And you know, I was quite well along in years when I went back to school for my master’s, so were many of my classmates. It’s the mindset, right. I wanted to do it. I was interested in it and was successful at it.

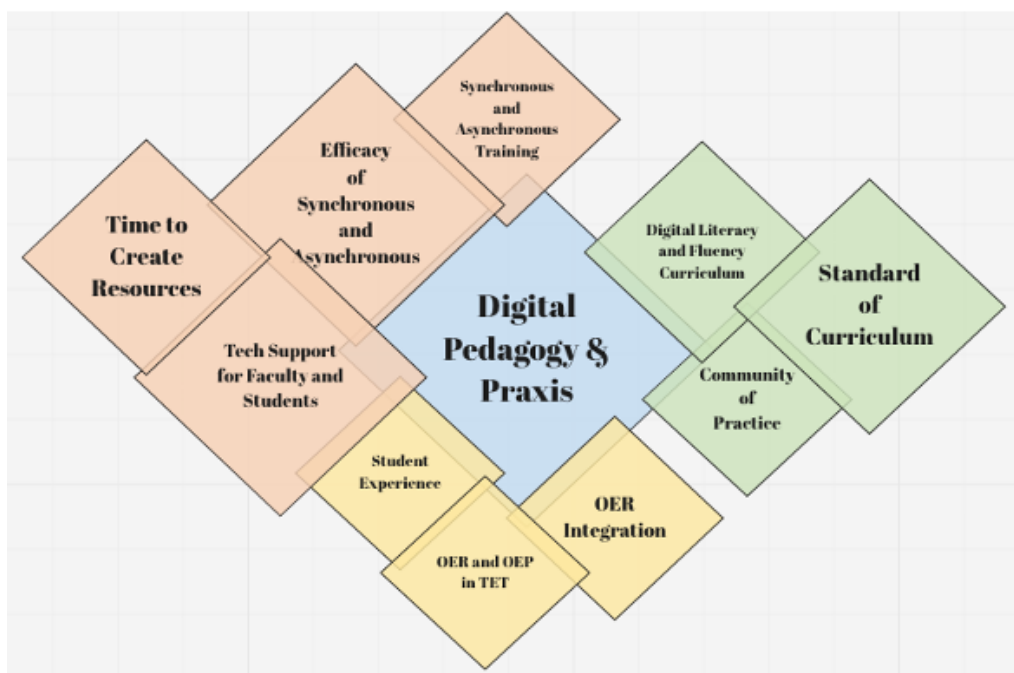
With ideas shared about the causes that create a resistance to change, the mindsets that prevent change, and ideas for implementing empathetic, collaborative approaches to support change, we close this section with a quote from Interviewee P9I: “It takes a lot of effort to change.”

Recommendations

The results of this study have offered insights into TVET instruction, particularly in the area of digital pedagogy that has rarely been explored. The line between the pedagogy and the practice (praxis) of TVET instruction is indistinguishable. As is seen in Figure 9, many of these recommendations overlap with each other. This shows the complexity and the beauty of the work that TVET has before it. There is no one thing that can address all the issues that face TVET and digital pedagogy, yet work in one area has implications for other areas.

Figure 9

Relationships of recommendations



From the results, 10 recommendations are made with the intention to provide a way forward that will support the future direction of PD for TVET instructors in BC, thereby improving student learning outcomes and their learning experiences.

Recommendation 1: Training in the Use of Synchronous and Asynchronous Instruction in TVET

All TVET instructors were thrust into an emergency online delivery method regardless of their competency in digital pedagogy due to the COVID-19 pandemic. Some had the tools

necessary to adapt their curriculum and teaching methods to this new paradigm, while others had a more analogue approach to instruction that did not translate well to the digital environment. In the time following, instructors have done the best they can with the tools at their disposal to provide exceptional training. Yet, we cannot overlook that instructors' belief and value structures have also played a part in the decisions they have made throughout this transition. Noting that instructor's "perceptions in regard to the role of the teacher and the capacities of the learner, ultimately influence what is taught and which pedagogical approach is deemed appropriate" (Vinden, 2020, p. 178). As such, we recommend that a program be developed to assist TVET instructors in digital pedagogy. As Morris and Strommel (2018) noted, "Most higher education instructors receive very little to no training in pedagogy" (p. 13). The same is true of vocational instructors. While it is the hope that trades education will return to a F2F method, few would argue that trades education has changed for good. Many found benefit in using digital tools and many more could benefit from instruction in how to design and implement these into their own practice.

Recommendation 2: Further Study on the Efficacy of Synchronous and Asynchronous Methods in TVET Instruction

Instructors across the province used both methods to varying degrees and levels of success. It could be argued that both methods have strengths and weaknesses. Trades instructors have been forced to transition from the traditional F2F instruction model to one using digital tools. Kirkman (2019) suggested, "The imperfect translation of face to face to technology can be a source of frustration, or a source of inspiration (or both)" (para. 10). A study investigating the actual effect on student experience and student grades with both methods would add a valuable contribution to the conversation of digital pedagogy.

Recommendation 3: Digital Literacy and Fluency to be Integrated into TVET Curriculum

It is no surprise that the idea of Prensky's (2001) "digital native" has been challenged. The results of this study show that students are adept at using their digital devices for social media, but many struggle with basic digital literacy skills (i.e., searching for information online). Digital literacy and fluency skills are necessary not only in a TVET student's time at school, but these are skills that are necessary for industry. A digital literacy and fluency skills component should be adapted into the ITA training outlines for the trades.

Recommendation 4: Further Study on TVET Student Experience in Online Learning

One limitation of this study was that it was solely from the perspective of the instructors. The students have a voice in their own education and could add valuable insight into the conversation surrounding digital learning and teaching and learning in TVET.

Recommendation 5: Sufficient Time to Create Resources to Support TVET Faculty in a Digital Environment

There is a deficiency of digital materials and resources in TVET. Institutions could find champions in the creation of digital resources for each trade and provide release time, financial compensation, or both for these champions to create resources. This creation must include a subject matter expert to provide the proper context as well as an expert in the use of digital tools. These skills may be found in a single individual or in a team of individuals.

Recommendation 6: Institutional Support for Both Faculty and Students in the Use of Technological Tools

Many institutes have excellent teaching and learning centres that can offer pedagogical support in the design of tools for instruction. Many trades instructors are not aware of the support that is available to them. We recommend that someone with a TVET background be seconded to teaching and learning teams to offer support in the design and creation of tools. We also recommend a learning technologies team be implemented to provide technological support to instructors and students. This team would provide just-in-time support in the use of LMSs, video conferencing, video tutorials, grade book issues, and so forth. Much of this is already done through teaching and learning centres but the bandwidth of each centre may be taxed with other issues.

Recommendation 7: Integration of OER into TVET Training Materials

When resources are created it should be encouraged that these be released with an open license (i.e., a creative commons attribution licence). The more resources are created, shared, and adapted, the greater the benefit to the trades. First, it allows for a more rigorous peer-review process. Second, materials can be adapted quickly and efficiently to address changes in technology and curriculum. Third, this will allow for a more open conversation among other institutions in the use of the resources and continue on the work to harmonize materials (at least

provincially). The use of OER has the potential to help TVET stay up to date with current technologies and trends (Flinn, 2020).

Recommendation 8: Further Study on OEP and Co-Creation in TVET Instruction

Educators are starting to see the value in an open pedagogical model (Ehlers, 2011). There is a growing repository of literature on the use of OER and OEP in education. TVET is nuanced and well suited to the use of both OER and OEP. Both TVET and open education would benefit from the perspective that trades education will add to the conversation.

Recommendation 9: The Creation of an Intentional Community of Practice for TVET Instructors

Individuals in specific trades have made various attempts to create a community of practice, with various degrees of success. It is in community that ideas can be shared, feedback given, and trust established (Rob & Rob, 2018). Due to bandwidth issues, these communities may disappear due to a champion being too busy to cultivate it. At the faculty level, we recommend that instructors are given space and time to foster communities of practice within their own faculty. In addition, this practice is then to be mirrored at the institutional level with the recommendation that an organization such as ITA, TTBC, a PSI, or BC Campus take the role of primary facilitator. Each institute could provide a subject matter expert from each of their trades to help in the cultivation of these communities of practice.

Recommendation 10: Adoption of a Curriculum Standard Among BC TVET Institutions

The harmonization initiative has been implemented to various degrees of success across the country. As found in this study, every institution uses a different curriculum to meet ITA requirements, which concurs with Vinden (2020) findings, leading to the question “how [does] the field function if people who teach in vocational education have widely differing views on fundamental curricular issues?” (p. 176). We recommend each trade create a standard of curriculum and curriculum resources that could be used by every PSI in the province. Instead of relying on other sources for curriculum, such as publishers, institutes could collaborate to create common curriculum. As Morris and Stommel (2018) stated, “Institutions shouldn’t outsource online learning ... as a substitute for developing internal expertise in and discussion about online learning” (p. 108). This type of collaboration could benefit not only the institutions themselves

but also the students. This would allow for a more rigorous investigation of the resources used and encourage perspectives that other institutions may not have considered.

Conclusion

With the sudden and abrupt shift to bringing TVET into a form of emergency distance education, there can be no dispute that this change has brought with it some challenges. It has also brought about innovation and creativity. Trades education has been permanently changed and will not be going back to “normal.” The results of this study have shown that there is a broad range of skills, ideologies, and methods for using digital tools in TVET education.

Trades instructors are working in a range from low technology, low pedagogy to high technology, high pedagogy and everything in between. The results of this study and the accompanying recommendations provide not only a roadmap but hopefully also an invitation to a much deeper conversation regarding TVET. Not only does digital pedagogy offer many tools that can enhance students’ lives but they also offer an opportunity for institutes, industry, and trades to collaborate, innovate, and create something beneficial. In keeping within the vernacular of trades, the global pandemic allowed PSIs to open the walls of trades education. There is no doubt that the bones of the structure are sound but TVET is in need of a renovation. Digital pedagogy offers the tools to help create a stronger, creative, innovative, and, in the end, more pedagogically sound systems.

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Appendix A: Online Survey

The survey can be accessed online:

<https://forms.gle/koStU2mr4XP6Rt719>

Appendix B: Interview Questions

This interview has been organized into three sections. The first section focuses on your current use of technology, the second on your perspective regarding the student experience in the digital classroom, the third and final section is on the use and curation of Open Educational Resources. In each section I have created a series of questions that I will ask you. There are no incorrect answers. I am interested to hear your opinions and learn from your own experiences. In addition to these questions, you will be given an opportunity at the end of each section where I will ask you: what would you like to tell me that I haven't asked you?

Section One: Instructors Perspective

1. Please tell us about your current experiences using digital technology in your teaching practice.
2. Which of these tools do you find is the most beneficial to your teaching? Why?
3. Which of these tools do you find is the most challenging in your teaching? Why?
4. What frustrates you most about teaching and learning in the digital world?
5. What supports do you think instructors need to reach their full potential when teaching in the digital classroom?
6. What would you like to tell me that I haven't already asked you?

Section Two: Instructors' Perspectives of the Students' Experience

1. From the students' perspective, what are the benefits of digital teaching and learning approaches?
2. Which digital tools are most beneficial to your students? Why?
3. What challenges do students face when using digital technology?
4. What support do you think students need to reach their full potential when learning in the digital classroom?
5. In regard to your students' experience, what would you like to tell me that I haven't already asked you?

Section Three: Open Educational Resources

1. What is your experience with commercially produced textbooks as part of your teaching practice in TVET?
2. What does the term open educational resources (OER) mean to you?
3. What does the term open educational practices/pedagogy (OEP) mean to you?
4. Have you ever used OER in your teaching practice?
5. Have you ever used OEP in your teaching practice?
6. Is there a place in TVET for the co-creation of resources with students?
7. If you have used OER in your teaching practice what are some of the benefits and challenges, you have encountered.

8. What are the benefits to students when OER replaces the need for a commercially produced textbook?
9. If you have NOT used OER in your teaching practice, please describe your reasons for not doing so.
10. In the context of OER/OEP, what supports do you think instructors needs in order to a) get started, b) further develop their skillsets, c) maximize their potential