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The Effects of COVID-19 on Higher-Education Teaching Practices

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Abstract: In 2020, Canadian higher education institutions shifted to online teaching due to the COVID-19 pandemic. While many instructors were unfamiliar with online teaching, this transition resulted in widespread innovation in the use of digital technologies and pedagogical practices. This research study focused on the significant impact of the shift to online teaching on three areas: digital tools use, immediate teaching practice, and future teaching practice. Data from 35 survey respondents and six focus group participants indicated that most instructors were comfortable with the new tools they used online, but experienced specific challenges with breakout rooms and students understanding their role in the learning process. Specific changes in immediate teaching practice included co-creating learning spaces, different ways of connecting with students, and the democratization of learning. Perhaps the most significant impact of the COVID-19 transition period was on future in-person teaching including increased use of digital tools, structural reorganization of classes, enthusiasm for teaching, and an increased appreciation for in-person environments.

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Keywords: community of inquiry, communities-of-practice, COVID-19, diffusion of innovation, digital innovation, faculty supports, fully online learning community, online teaching, pandemic, professional development, TAM, TPACK, transactional distance theory, UDL, universal design for learning

Les effets de la COVID-19 sur les pratiques pédagogiques dans l'enseignement supérieur

Résumé : En 2020, les établissements d'enseignement supérieur canadiens sont passés à l'enseignement en ligne en raison de la pandémie de COVID-19. Alors que de nombreux enseignants n'étaient pas habitués à l'enseignement en ligne, cette transition a donné lieu à de nombreuses innovations concernant l'utilisation des technologies numériques et les pratiques pédagogiques. Cette recherche s'est centrée sur l'impact notable du passage à l'enseignement en ligne dans trois domaines : l'utilisation des outils numériques, la pratique immédiate de l'enseignement et la pratique future de l'enseignement. Les données issues de 35 réponses à un questionnaire et de six groupes de discussion ont montré que la plupart des enseignants étaient à l'aise avec les nouveaux outils qu'ils utilisaient en ligne, mais qu'ils rencontraient des difficultés particulières avec les salles de réunion et la compréhension par les étudiants de leur rôle dans le processus d'apprentissage. Les changements apportés à la pratique immédiate de l'enseignement comprenaient la co-création d'espaces d'apprentissage, différentes façons de se connecter avec les étudiants et la démocratisation de l'apprentissage. L'impact le plus important de la période de transition relative à la COVID-19 est peut-être celui concernant l'avenir de l'enseignement en classe, notamment l'utilisation accrue des outils numériques, la réorganisation structurelle des classes, l'enthousiasme pour l'enseignement et l'appréciation accrue des environnements présentiels.

Mots-clés *:* Communauté d'enquête, communautés de pratique, COVID-19, diffusion de l'innovation, innovation numérique, soutien aux enseignants, communauté d'apprentissage entièrement en ligne,

enseignement en ligne, pandémie, développement professionnel, TAM, TPACK, théorie de la distance transactionnelle, UDL, conception universelle de l'apprentissage,

Introduction

Following a rare, world-changing pandemic, education systems in Canada and around the globe had to adapt to meet student needs rapidly. The COVID-19 pandemic resulted in a historic disruption and educational crisis that affected over 1.6 billion students worldwide, forcing remote education opportunities through television, radio, and, most commonly, online (The World Bank et al., 2021). While broadly used, the term *online learning* in this study refers to education, including both teaching and learning, that is delivered digitally through the internet (Singh & Thurman, 2019). In terms of global responses, educator and student access, experience, and quality varied based on funding and access (Gamage et al., 2020; The World Bank et al., 2021).

With access to funding and infrastructure support, Canadian universities pivoted to online learning to support student learning in early 2020 (Masri & Sabzalieva, 2020; Rapanta et al., 2020; Statistics Canada, 2020). While the shift accommodated many student needs, some aspects of the transition were disruptive due to restrictions on experiential learning, access to digital technologies, and the internet bandwidth required for whole households to be able to work and study simultaneously (Statistics Canada, 2020, 2021). People in the educator role including professors, instructors, and teaching assistants were expected to rapidly adapt to the dynamic reconstruction of higher education to

limit disruption and support student success through various digital technologies (Gamage et al., 2020; The World Bank et al., 2021).

This research investigated how the transition to teaching online impacted technological and pedagogical practice among 35 teaching faculty at two Canadian universities. This research also investigated how faculty perceived their experiences during the COVID-19 pandemic would impact their teaching practices after returning to in-person instruction. This research will be useful to administrators, policy-makers, and others who plan and support online teaching and learning programs, and who support faculty needing to shift to online teaching.

Literature Review

Research from this study was situated in four key areas: diffusion of technology innovation, instructional design frameworks for online education, Universal Design for Learning principles, and supports for faculty learning. The instructional design frameworks for online education included the Transactional Distance Theory, the Community of Inquiry Model, and the Fully Online Learning Community Model. Each of the four key areas will be discussed in turn.

Technology Diffusion in Canadian Higher Education

While Canadian higher education institutions are amongst the first to adopt new digital technologies, their educators are typically not prepared and

require further exposure and training, which has historically resulted in a low rate of adoption (Jean-Louis, 2015). Early adopters are individuals or entities that rapidly integrate a new innovation. Adoption rate refers to the pace at which a new technology is acquired by a target demographic (Rogers, 1976, 2003). The rate and stage of adoption are aspects of diffusion, which is the process of dynamically creating and sharing information about an innovation with others in a channel within a social system (Rogers, 2003).

Another issue that inhibits educator adoption of new technologies is the need for coherent and cohesive support and guidance because national, provincial, regional, and institutional initiatives are often fragmented or sporadic (Borokhovski et al., 2011). More recently, educators have also noted that a lack of funding to learn about and integrate new technologies has been a limiting factor in using new technologies (Irhouma & Johnson, 2022). However, the insight extends beyond Canada because the diffusion of online learning before the pandemic was similar worldwide.

eLearning Diffusion Factors

Higher education institutions have traditionally lagged behind the rate of digital technology use in mainstream society (Singh & Hardaker, 2014). While the COVID-19 pandemic and "the resulting pivot to online learning in higher education increased mainstream adoption of many education technology tools" (Kelly, 2021), Paykamian (2022) notes that "many institutions will need to adjust

priorities in order to scale up tech adoption" to meet the continued demands of students and other stakeholders.

Prior to the pandemic, Singh and Hardaker (2014) conducted a systematic review to explore the macro- and micro-level insights that have influenced adoption from over 300 articles focusing on education through digital technologies (in other words, eLearning) in higher education globally. The authors found that strategy development, organizational cultural configuration, motivation, and support are the most critical aspects of eLearning diffusion. These factors continue to play prominent roles in organizational technology adoption, with cultural configuration influencing individual faculty motivation, and support influencing faculty trust and perceived ease-of-use of new technologies (Garaika & Margahan, 2020; Power & Kay, 2023).

First, all levels of education stakeholders develop strategies to address critical requirements at multiple levels to ensure each stakeholder can take ownership in the decision-making process. The ability to influence the decision-making process then reflects organizational cultural configuration. Specifically, top-down or bottom-up approaches can position obstacles to success through a lack of awareness or ownership (Singh & Hardaker, 2014). For example, a top-down decision may reflect a need to meet regulatory requirements; however, the importance of the insight may be unknown to those receiving the information. In contrast, a bottom-up approach may focus on the immediate needs of the situation, but lack the context of administrative budgets or

licensing agreements. The lack of communication can then inhibit psychological and pragmatic motivations (Singh & Hardaker, 2014). As a result, the breakdown of communication, understanding, and motivation often reduces the support required for eLearning success (Singh & Hardaker, 2014).

Instructional Design Frameworks

Online Learning Communities

With the emergence of digital technology in the 1980s, two influential instructional design models began to evolve to support best practices in teaching and learning. First, the *Transactional Distance Model* proposed by Moore (1991) describes the need to reduce perceptions of the relational distance between students and their instructors, peers, and learning content to maximize engagement for distance learning. Building on the concept, Garrison et al. (2000) realigned the model into the *Community of Inquiry* framework. The Community of Inquiry framework includes an online context and promotes presence within the *Teacher, Social,* and *Cognitive* domains (Moore & Miller, 2022).

In the following decades, the Community of Inquiry Model has formed the cornerstone of research and professional development of effective online teaching and learning (Athabasca University, n.d.; Garrison et al., 2000; Kineshanko & Madelaine, 2016; Moore & Miller, 2022; Power, 2023a). Another Transactional Distance Theory variation is the *Fully Online Learning Community Model* (Blayone et al., 2017; Webb et al., 2019). The Fully Online Learning

Community Model highlights the importance of social and cognitive presence, and promotes the critical role of instructors and students in co-creating digital collaborative learning spaces.

Figure 1: The Fully Online Learning Community Model (EILAB, 2022)

Universal Instructional Design Principles

Universal Design for Learning was first proposed in the 1990s (CAST, 2022a, 2022b; Orkwis & McLane, 1998). It focuses on three pillars of instructional design: the *why*, *what,* and *how* of learning. Universal Design for Learning aims to promote complete access to meaningful and effective learning experiences for diverse student audiences (Power, 2023b), and to "allow all learners to achieve their optimal learning experience" (Navaitienė & Stasiūnaitienė, 2021, p. 22). As the three pillars in Figure 2 show, learning design should provide students access to multiple means of engagement, representation, and action

and expression. For each pillar, Figure 2 describes three critical areas where online educators should provide options for students.

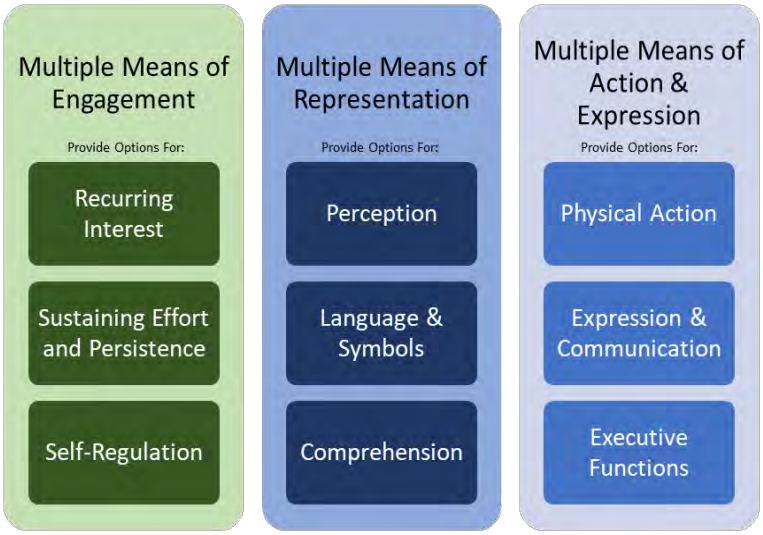

Figure 2: The Pillars of Universal Design for Learning (Adapted from CAST, 2022b). Image description available.

Supporting Faculty Learning

Drawing upon the *Technology Acceptance Model* (Davis, 1989) and the *Technology, Pedagogy, and Content Knowledge Model* (Cavanaugh et al., 2013; Finger et al., 2010; Koehler & Mishra, 2006, 2008; Power et al., 2016; tpack.org, 2021), Power (2015, 2018a, 2018b) reported that educators increase their confidence with technology-specific skills through informal support networks, communities of practice, and curated just-in-time resources. Furthermore, participation in formal professional development focused on instructional approaches can increase the willingness of higher education faculty to innovate

with technology (Power, 2015, 2018a, 2018b). Finally, pedagogical innovations that reduce transactional distance (Moore, 1989, 1991) promote the establishment of Communities of Inquiry and draw upon the principles of Universal Design for Learning (Power, 2015, 2018a, 2018b).

Statement of the Problem

This study outlines faculty reflections at two Canadian universities following the emergency shift to online learning during the COVID-19 pandemic. Furthermore, it explores adopting new digital technologies and adapting professional practice. Research guides include a pragmatic philosophy that seeks practical insight for future application and the *Population, Exposure, Outcome* framework. The Population, Exposure, Outcome framework helps formulate an answerable question for qualitative research (Bettany-Saltikov, 2016). Our guiding research question was: *What are educator* (P) *perceptions of using new technologies during the COVID-19 pandemic* (E), *and how did and will it impact teaching practices* (O)*?*

Methodology

Design

This study follows a two-stage convergent, mixed-methods design, combining qualitative and quantitative approaches to better understand the study focus (Creswell & Creswell, 2018). Qualitative and quantitative data

collection occurred in stage one through an online survey. This data then provided context for further qualitative data collection in stage two, the focus group.

Ethical Considerations

The authors completed van der Steen et al.'s (2018, 2019) taxonomy of bias determinants and reported low potential bias. Also, faculty participation presented minimal risk, given that the data collection process did not pose any potential harm greater than what the participants might encounter daily (Cavanaugh et al., 2013). There was not any financial compensation for responding; the only benefit was the opportunity to share insight into personal experiences with the rapid transition to online learning during a global pandemic.

Throughout the study, participants had "free, informed, and ongoing consent" (Canadian Institutes of Health Research et al., 2022, p. 6). For the survey, participants received a survey link and an explanation indicating that they were not required to participate. They could withdraw at any point without repercussion by closing the browser tab and the survey would not capture any identifying information. Only after completing the survey, were respondents invited to share their contact information if they wished to participate in a focus group session. The focus group session targeted a more qualitative exploration of themes and issues related to changes in the respondents' instructional

practices while teaching online. The participants' contact information was not linked to their survey responses. Participants who opted to provide their contact information were invited to one of two focus group sessions held in Fall 2021. There was one session for faculty affiliated with Cape Breton University (CBU) and another session for faculty affiliated with Ontario Tech University (OTU). People invited to focus groups were again allowed to provide informed consent and withdraw from participation at any point. (They were told that if they withdrew, their responses during the live focus group sessions would be deleted from the session transcripts.)

Organizational Context

Participants in this research study came from CBU and OTU. Each institution is located in a different Canadian province and has a different pre-pandemic history with online courses. Founded in 1974, CBU is located in Sydney, Nova Scotia. As of March 2019, CBU had 227 full-time teaching faculty, and enrolment for the 2021 academic year of 4,478 students ("Cape Breton University," 2022). Most of CBU's undergraduate programs were delivered in person before the COVID-19 pandemic, with some graduate-level programs offered through online, asynchronous courses (Cape Breton University, 2023).

Founded in 2002, OTU is located in Oshawa, Ontario. It has 341 full- and part-time teaching faculty (Ontario Tech University, 2023c) and over 10 thousand students ("Ontario Tech University," 2022) enrolled in programs offered through

seven faculties (Ontario Tech University, 2023a, 2023c). Pre-pandemic, many of OTU's programs were traditionally delivered on-campus. However, the university does have several undergraduate, graduate, and continuing education programs offered partially or entirely online (Ontario Tech University, 2023d).

Participants

The target participants for the Phase 1 survey instrument were teaching faculty from CBU and OTU. The survey invitation was forwarded to faculty at CBU by the Deans of the five academic Schools. The survey was sent directly to faculty at OTU using an email distribution list compiled from the university's publicly available faculty directory (Ontario Tech University, 2023b). Primary survey participants were given the option of providing their contact information if they wanted to consent to participate in a follow-up focus group. However, there was no way for the researchers to connect data from the primary survey instrument to the contact information provided for focus group participation.

Instruments

Survey

A survey invitation was forwarded to faculty at the former institution by the Deans of the five academic schools and through a public email distribution list for the latter. The survey included questions about basic demographic data, and open-ended questions to solicit qualitative data on participants' adoption of

technology and new pedagogical approaches. Survey participants were given the option to provide their contact information if they wanted to consent to participate in a follow-up focus group in Fall 2021.

Focus Group

The focus group sessions further explored the research questions related to changes in the participants' teaching practices during the COVID-19 pandemic and anticipated changes to their teaching in a classroom environment. Two online focus group sessions were held during Fall 2021. One session for faculty affiliated with CBU was facilitated virtually using the Microsoft Teams (Microsoft, 2023d) web-conferencing platform (the platform used to facilitate synchronous online classes at CBU). A second session for faculty affiliated with OTU was facilitated using the Zoom (2023) web-conferencing platform (the platform used to facilitate synchronous online classes at OTU). To avoid perceptions of conflict of interest or potential influences on participants' responses, each session was facilitated by one researcher who was affiliated with the other institution. Each session was recorded with automatic transcription features enabled, and the transcripts were extracted from the recordings after the conclusion of each session. Automatically generated transcripts were manually verified for accuracy by the researchers using the session recordings.

Data Analysis

Microsoft Excel (Microsoft, 2023c) was used to sort and analyze the survey data according to demographic variables and the respondents' level of comfort with various technology types and applications. Transcripts were exported from Microsoft Teams (Microsoft, 2023d) and Zoom (Zoom Video Communications, 2023) to analyze focus group responses. The researchers manually verified transcripts by comparing text transcripts to session recordings. Transcripts of the sessions were then organized based on participants' responses to specific researcher questions and coded according to themes related to participants' expressed levels of comfort with different technologies, the pedagogical approaches employed, the benefits realized, the challenges experienced, and plans for future use of tools and pedagogical approaches.

Results

Demographic Data

In the first data collection phase, 35 responses to the survey were completed by the combined faculty from CBU (*n*=20, response rate = 9%) and OTU (*n*=15, response rate = 4%). Six of those respondents further participated in one of two focus group sessions in the second phase. With respect to overall teaching experience, 46% (n=16) of faculty had more than 15 years, 17% (n=6) had 10 to 15 years, 17% (n=6) had 5 to 9 years, and 17% (n=6) had 2 to 4 years.

Regarding prior experience, 65% of respondents from CBU (*n*=13) and 47% from OTU (*n*=8) indicated that they had taught online courses before the pandemic. In summary, the sample consisted of experienced instructors, 60% of whom had previous online teaching experience.

Digital Tool Use

Comfort Level

Participants were asked to list the digital technologies they used in their teaching during the COVID-19 pandemic. Most respondents said they had used one or more virtual classroom or meeting applications such as Google Meet (Google, n.d.), Microsoft Teams (Microsoft, 2023d), Zoom Video Communications (2023), as well as learning management systems such as Blackboard (Anthology, 2022), Canvas (Instructure, 2022), or Moodle (2020). Other frequently used digital tools included video creation and sharing applications and collaborative document creation tools.

Most respondents (*n*=24, 69%) indicated they were comfortable using learning management systems as they transitioned to online teaching. A similar number (*n*=23, 66%) also indicated they were comfortable using video conferencing or virtual meeting software to host live classes. During a focus group session, Participant C, who self-identified as a "complete neophyte in terms of online teaching" described how comfortable they had become with the

use of the core features of virtual meeting applications to host synchronous classes:

> *I would say that my Zoom abilities have gone from minimal to average. So, I think I'm quite comfortable with it now. I don't utilize all the tools yet but I'm, you know, quite comfortable running online courses and we are using it both in a hybrid model and a totally online model.*

Overall, most instructors felt comfortable using digital tools for online teaching. This result may not be surprising given the online expertise level of the sample. About one-third of the instructors (*n*=10, 29%) indicated that there were no tools that they did not feel comfortable using. Another 20% (n=7) noted they were uncomfortable using various miscellaneous proprietary tools. Twenty percent (n=6) remarked they were uncomfortable using virtual meeting software, including breakout rooms. Finally, about 15% (n=4) of instructors felt uncomfortable using Flip (Microsoft, 2023a) video creation software or Microsoft Office (Microsoft, 2023b).

Table 1: Comfort Level of Higher Education Faculty Using Online Digital Tools (n=35)

Tool	n	% Not Comfortable with Tool
All digital tools used	10	29%
Miscellaneous tools	7	20%
Virtual meeting tools	7	20%
Flipgrid	2	6%
Video creation/use	2	6%
Microsoft Office	1	3%

Most survey respondents with more than 15 years of teaching experience (*n*=15) reported that they were least comfortable using specific digital tools for online teaching, most commonly citing learning management system platforms (*n*=3). Faculty with 5 to 10 years of teaching experience (*n*=4) were the most likely to indicate that they had no digital tools they felt uncomfortable using. There were no differences in the frequency of respondents indicating comfort or discomfort with using specific digital tools, based on their reported home School/Faculty or subject area specialization.

Challenges

Focus group Participant A described their struggles with using the breakout room features of virtual meeting applications while hosting synchronous online classes:

> *I would say one of the greatest struggles that I've had in terms of using a technology or perhaps part of a tool would be . . . the actual breakout rooms. And perhaps it works well at, say, [at] a graduate level. But for undergraduate students, and especially when I'm teaching first-year and second-year students, I think the learning curve almost for them as they try to adapt to some of these teaching technologies and digital tools that we may introduce to them, like something like a breakout room where you're actually expecting students to communicate with each other . . . I find that to be a struggle.*

The participant elaborated on how technical glitches and students' lack of familiarity with the expectations of using breakout rooms impacted their actual use of those tools:

> *Initially, I found the breakout rooms difficult to use, but I think that was just the initial introduction of Kaltura (2022) Classroom had a lot of kinks in it that other faculty had reported as well. It wasn't just me. And so, I avoided it during the first term or the first couple of terms with the pandemic. But then this year, I actually, or this fall, I've actually revisited it with Google Meets, and I have found it to be successful on my end. But perhaps not as successful from the student perspective. Some students like it. Others, I don't get the sense that they're actually communicating and doing what they're supposed to do.*

Focus group Participant B summarized a similar observation, noting, "I got the impression it wasn't necessarily the technology that was the issue. It was the students to actually engage with the kinds of activities that you were putting in front of them." Participant C explained that their frustrations stemmed more from a "nuts and bolts piece, rather than a program piece" when it came to transitioning between activities and resources during virtual class sessions:

> *For me personally, it's more of the transition from, you know, whatever activity we're doing to a different technology and back . . . and, you know, practising something at home in my program, and then getting it there and then it doesn't quite move as smoothly as it did when I was doing it at home. And it just becomes easier to sidestep some of them. So, it's more of a fluency issue, rather than individual program issue.*

Impact on Teaching Practice

General

Faculty from both universities indicated that the transition to online teaching during the COVID-19 pandemic impacted their teaching practices. Some survey respondents (n=5, 14%) noted that the change had made teaching more difficult and time-consuming, with much more time needed for preparation ahead of a live class and follow-up after a class. Respondent H stated that their "entire course delivery had to be re-planned", and that the "methods of evaluations were changed as well." Respondent N described how they have "spent a lot more time working through videos and trying to create more engaging slides (through animations)" and how they "also spent a lot of time setting up quizzes and activities on Moodle."

Two faculty indicated that they found it "reasonably easy to switch from in-classroom teaching to online teaching," with Respondent I noting that they were "fairly new to teaching labs" before the pandemic, so they "didn't have any particular habits that I couldn't break to be able to teach online." Some respondents described how they were able to try new tools and new approaches, with Respondent D noting that the transition "has made me focus more on flipped classrooms and constructivist approaches to learning." Respondent J described how the transition to online teaching has given them "many more options for how courses could be delivered . . . broadened my

perspective in terms of what is acceptable learning modalities or assessments . . . and encouraged me to accommodate learners consistently and in different ways." Finally, Respondent R noted that teaching online has "increased my awareness of the need for flexibility for both students and myself," while Respondent Q indicated that, "It made us question everything and build a better system as a result."

Co-Creation of Teaching and Learning Spaces

Focus group participants elaborated on how their practices had evolved while teaching online. For example, Participant C highlighted how they drew upon student collaboration and co-creation to expand their own skill sets, explaining that "three of our students each week present[ed] a tech tool, so . . . while they're building up their repertoire of tech tools, so am I."

Focus group Participant D referenced the Fully Online Learning Community Model (Blayone et al., 2017; EILAB, 2022; Webb et al., 2019) to highlight how the impacts of transitioning to online teaching during the pandemic extended beyond gaining comfort with using digital tools and altered the actual nature of interacting with students:

> *We can't continue to have a hierarchical structure within the educational context. And as a consequence, what we're trying to do is develop the skills of everybody within the community simultaneously, while doing some modelling at the beginning, so that you actually take on those kinds of roles in assessment, providing critical feedback, allowing individuals to*

> *actually take a facilitation kind of role within their small teams, etcetera . . . so that collaborative kind of piece extends, not only to the use of technology, but also to all of the other pedagogical aspects of learning within a community.*

Connecting with Students

In contrast to survey respondents and focus group participants who described the positive changes they had seen from online teaching during the pandemic, some survey respondents described feeling less confident in their teaching practice. Respondent J noted they "feel less confident in the learning assessments, less connected with students, and it has reduced my ability/confidence to manage large classrooms." Respondent J noted that part of their teaching "needs to be very hands-on, and so it was difficult to create lived/relatable experiences virtually in many cases."

While some survey respondents indicated that they felt "connected more with individual students" while teaching online, Respondent F speculated that the "bond between students . . . was no doubt much weaker." Focus group Participant A explained that making connections has proven most difficult with first-year students:

> *I have found it somewhat difficult at points to make contact with first-year students to understand their level of understanding or their level of engagement. To being able to reach those students who are in difficulty or perhaps having more challenges than others during the pandemic. I've tried to make a number of attempts to closely monitor students that I*

> *know that are at risk. But how do we really know who, especially when you have larger classes . . . And how can students within your class feel comfortable making connections when all they've really ever know[n] is kind of a remote classroom at the university level? And, so I think that's been a difficult or challenging piece for me to address.*

Participant B also noted issues with engagement levels, but speculated that it was not always the result of barriers created by the affordances of technology such as virtual meeting tools:

> *I'm convinced it's not necessarily about the technology. It probably is more about their particular circumstances. The situation that they find themselves in that maybe their education is not necessarily the highest priority, or that has been overtaken by other things that have occurred within their lives, you know, family member falling ill, or something along those lines. So that question of how to actually bring them in is still very active.*

Classroom Democracy

Survey Respondent Q explained that online teaching has helped them recognize how innovative use of technology "means the end of serial form, Socratic Q+A in class" because "it is replaced with virtual whiteboards where students can answer questions publicly in parallel." Similarly, focus group Participant A noted, "the other piece to this, and I think you're touching on it with this whole idea of the flipped classroom, is the opportunity to extend educational context beyond just the classroom." Survey respondents noted that their experience with online teaching during the pandemic has "really underlined

the two-way nature of teaching," that it has helped them to be "more conscious of the students who attend, but don't fully participate," and that it has underscored the importance of developing "new strategies to engage more of this sub-set." Respondent B indicated that they "will make more extensive use of online interactions as a supplement to what happens in the classroom" because they "think this will have particular benefit in reaching/encouraging students who are reticent about participating in the classroom, but are more comfortable sharing their thoughts and opinions in a class forum." Some faculty members expressed the importance of flexibility, especially for "students that may struggle with a traditional university experience." Focus group Participant A stated, "I think that's where we're going. I can never see myself ever having a situation where I will have a classic in-person class that puts it as there's no other option, whether you can travel to where I am." Participant C described how the experience of teaching online highlighted possibilities for greater use of online delivery methods to increase student access and equity in higher education:

> *I know there's always certain courses we could do online because we had a semester that was online. But there are significantly more courses that we're doing that we have completed online that I could see staying permanently online and maybe cutting the number of days that our students have to come into campus. That allows them sort of the flexibility to work more . . . so not having to come in for some of the courses has been probably an equity issue, and I think it allowed more students to have a better quality of personal life.*

Survey Respondent R indicated that they would "use online tools more and try to keep flexible assignments and deadlines," while Respondent Q noted that "the normalization of online learning" and technology used to facilitate assessments "renders final exam dates almost meaningless. Instead, students can write final exams when they are ready (but before the deadline)."

Future Impact on Teaching In-Person Classroom

General Impact

The final survey question asked faculty to speculate on how their experiences with online teaching during the COVID-19 pandemic would impact their future teaching practices for in-person classrooms. The majority of the responses reflected themes expressed by Respondent G who stated, "I will carry forward much of what I learned," and Respondent N who explained, "I think I will keep some aspects of the online classroom for some activities and assignments." Respondent M stated that "it will improve how I use Moodle and other technologies, and I will continue using some of the pedagogical methods I explored last year." At the same time, Respondent I noted that "I believe my communication skills have greatly improved, [e]specially when trying to create course content that is for universal learning."

Digital Tool Use

Many respondents indicated that they felt more confident using a variety of specific digital tools in their teaching now, with Respondent Z stating that, "it brings my teaching practices closer to the skill sets my students already have." Focus group Participant A described how beneficial the use of technology during the pandemic has been for students and how important it is to continue integrating technology even in classroom-based teaching by stating that:

> *The skills that they have developed and are now using fluently . . . they like likely wouldn't have had those for five or 10 more years if it hadn't been for the pandemic and, you know, necessity being the mother of invention.*

Regardless of any frustrations or difficulties encountered while teaching online, survey respondents expressed that they saw benefits to integrating some of the digital tools and pedagogical approaches they had used into their classroom teaching practices. Respondent K explained that "one complements the other. I know that I want my students to communicate, collaborate, and learn from each other. I make these situations happen in the classroom and in the online experience." One beneficial strategy noted by respondents was increased use of pre-recorded mini-lectures, representing "more efficient use of time for me" and allowing them to "utilize class time as case or problem time." Respondent P noted that they "may pre-record all lectures in future and do more active learning, small-group activities, and review during synchronous

class." Focus group Participant B indicated that they are delivering a course with two online sections and one on-campus section. While they explained that they have not yet started recording their in-person sessions, they have taken to live-streaming the last in-person session each week to increase access for their online students.

> *I have started streaming that class. It wasn't scheduled, and it's not mentioned in the Course Guide as an in-person class. But I'm in a room where I can stream, so why not? So, if you miss a class earlier in the week, at that time, you can come take an in-person class.*

Participant B also explained that they continue to use Nearpod (n.d.) to increase engagement during in-person classes and post those resources online so that students can revisit the in-class resources and activities as often as needed.

Structural Organization

Survey Respondent D stated that their experiences with online teaching "have made me think more structurally about my course offerings," including the importance of "ensuring that scaffolding is clearly used." Focus group Participant C described how they had used their experience with online teaching to rethink how they scaffold courses to meet their students' individualized learning needs and goals. They explained that integrating technology has made it easier for them to facilitate individualized learning pathways:

> *I came up with this idea that students can choose your own grade. So I developed pathways. I call it co-ordinated advanced pathways. And a core pathway gets you to a "C." And you do this amount of work, you get to "C." And then, I developed this advanced pathway. So if you do . . . core work, and then do the advanced work, you can get an "A" or a "B." You make the choice. It's entirely up to you. There's nothing . . . embarrassing about getting a "C" in this course.*

Focus group Participant D described the impact that this use of core and advanced pathways has had on the amount of content available to students in their courses:

> *So, whereas all my colleagues were concerned because going online . . . I can't get as much volume of content into the course online as I could when we were in person . . . I've actually added 50 percent content to my course because I didn't realize it. So, I have a two-for-one. I have a core course, and I have an advanced course. It's actually a lot more content in my course, and it's working out extraordinarily well so far.*

Appreciation for In-Person Teaching

In addition to expressing increased comfort with the use of digital tools and recognizing benefits to the use of new pedagogical approaches, some faculty noted that they would "cherish in-classroom sessions more than before" and that their experiences would "probably strengthen my ability to teach virtually while also highlighting the important aspects of in-person teaching such as student engagement." Respondent H indicated that they "will use a combo of my classic teaching methods with the online tools." Others expressed a growing

appreciation for the conveniences of using digital platforms such as a learning management system. They "will be more inclined to use online assignments in favour of paper ones."

Enthusiasm for Teaching

The majority of faculty respondents expressed positive online teaching experiences and optimistic appraisals of the impacts of those experiences on their future classroom teaching. Respondent X stated that they are "better for the experience," while Respondent Y indicated that they felt it would "enhance student learning." However, two survey respondents indicated that their online teaching experiences would not likely impact their classroom practices. Respondent U noted that they "do not have the same energy and enthusiasm as I had before," but indicated that they would "probably use some of the tools, such as posting videos and having some lessons completed online" and that they "may offer at least part of an exam as an open-book online section so that students can use their computers to complete the questions, and so that I can ask more in-depth programming questions."

Discussion

Following insight from 35 faculty from two Canadian universities, this research built on the question: What are educator perceptions of using new technologies during the COVID-19 pandemic, and how did and will it impact teaching practices? The findings presented in this paper highlight changes in

teaching practices during the pandemic and participants' perceptions of how these innovations will impact their post-pandemic teaching. The pedagogical innovations include practices that reduce transactional distance, promote the establishment of online learning communities of inquiry and presence, promote the co-creation of digital learning spaces, and draw upon the principles of Universal Design for Learning. This research is helpful to stakeholders such as administrators, policy-makers, and faculty involved with planning and supporting online teaching and learning programs in unique and traditional scenarios.

Diffusion of Innovation

As with adopting any innovative tools or practices, Rogers' (1976) Diffusion of Innovation Model tells us that some higher education faculty will be more eager and willing than others to integrate digital technologies and online teaching pedagogies. Even in a context such as the COVID-19 pandemic, where faculty were forced to innovate by practical necessity and organizational mandates, the presence of what Rogers described as "innovators" and "early adopters" was evident. This can be seen in comments from focus group participants who expressed their willingness to allow students to take the lead on introducing new technologies, and their eagerness to build their digital toolkits and "explore what can this thing do, what are the affordances of this particular tool that I haven't come across before."

Innovations in Online Teaching Approaches

Access to informal and formal supports did translate into technological and pedagogical innovation for faculty at both CBU and OTU. Those innovations exhibited characteristics of effective online pedagogy described by Transactional Distance Theory, the Community of Inquiry Model, and the Fully Online Learning Community Model. They also included the principles of increased access espoused by Universal Design for Learning. Survey and focus group responses indicated a greater appreciation for providing students with more communication channels and integrating greater flexibility into the range of learning resources, assessment methods, and grading practices used. While some participants lamented the challenges of forging connections with and between students in an online learning context, others expressed an appreciation for the affordances of technology to promote increased engagement. Focus group participants elaborated on how online teaching has allowed their students greater flexibility to engage with content, and transfer their knowledge and skills to their contexts. Focus group participants also noted that they could enhance social and cognitive presence when working with some courses. However, they also noted that they found it challenging to increase engagement when using specific approaches with novice students, such as collaborative breakout room activities. Overall, participants described changes to their teaching practices during the pandemic that positively impacted their students' learning experiences. Survey Respondent P also noted that their

experience with online teaching during the pandemic had left them eager to undertake a "more in-depth evaluation of teaching practices" in the future.

Innovations in Classroom Teaching

Faculty indicated that their experiences during the pandemic would impact how they approach teaching in an in-person classroom. For example, some participants described how they would use pre-recorded instructional materials to integrate more flipped learning approaches into their classrooms and provide students with increased flexibility and access to the resources for review purposes. Focus group Participant C outlined how their experience and use of technology have transformed their approach to delivering their courses by enabling scaffolded differentiated pathways for students to meet their learning goals. Survey Respondent E indicated they would continue using digital tools to create and submit assessments. At the same time, survey Respondent Q explained that the innovative use of digital tools had rendered traditional examinations and due dates "meaningless," allowing students in online or in-person contexts to complete assessments at any point before the end of the term. Participant A described how tools, such as Nearpod, were valuable to increasing engagement and formative assessment for online teaching and would be of equal value in an in-person classroom. While participants described numerous ways that the use of online teaching and learning technologies enabled them to be innovative, focus group Participant A drew upon the Fully

Online Learning Community Model to explain that going forward, it was no longer a question of knowing how to use specific tools or what those tools could do:

> *I don't think it's the technology or the ability of the technology to do certain kinds of things. It's the opportunities that students have and that all of us have to actually reconceptualize the way that activities can actually be undertaken using the technologies as a moderating or a facilitating kind of force that is available. So that's the piece that I think that we all need to struggle with. How do we wrap our heads around the abilities that are present within the technologies, so that we can make good use of them to carry out whatever activity, collaborative or otherwise, that we actually have in front of us?*

Participant A's observations are significant because they demonstrate that in the aftermath of the pandemic shift to online teaching, faculty have changed their focus from technical features and capabilities towards pedagogical affordances and support for relationships within learning communities.

Limitations

While insights from this study are beneficial for future research into online learning and emergency educational scenarios, we recognize three primary limitations:

1. The findings may only be generalizable in the context of Canadian institutions.

2. Given the extraordinary impact of the COVID-19 pandemic, results may not apply to traditional higher-education learning scenarios.
3. Our survey response rate was low and may not reflect the experiences of some unresponsive university faculty.

However, insights from this study are beneficial for future research evaluating emergency preparedness and responses, along with the diffusion of innovation in higher education.

Conclusions and Recommendations

Individual success with technological and pedagogical innovation depends on whether faculty perceive digital tools and pedagogies to be helpful. So too does the success of higher-education institutions with achieving critical mass for widespread innovation. Innovation also requires faculty confidence in using digital tools functionally and pedagogically.

Findings from this study reflect pre-pandemic research on eLearning and online learning as outlined by Singh and Hardaker (2014). Notably, a lack of a cohesive technology diffusion strategy or communication between various university stakeholders can be disruptive to providing effective learning experiences. However, peer and student insight can be positive motivational factors for educators adopting new technologies through informed support.

Furthermore, findings from this study resemble those described by Power (2018a; 2018b) in pre-pandemic studies. Notably, faculty members' self-efficacy

increases with innovative teaching approaches such as promoting Communities of Inquiry or Fully Online Learning Communities, or integrating Universal Design for Learning principles. Higher education institutions should provide access to longer-duration formal or semi-formal professional development programs that focus on pedagogical and instructional design best practices for online teaching to support future best practices.

Recommendations for Further Research

This research reflects the experiences with online teaching of faculty from two Canadian universities. Further research is recommended to explore faculty experiences from other higher education institutions. This research could provide insights into the impacts of unique contexts on faculty members' adoption of technology and innovative teaching practices for online teaching during the COVID-19 pandemic and beyond.

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Image Descriptions

Figure 2 image description: An illustration of the following pillars of UDL:

- Multiple means of engagement: recurring interest, sustaining effort and persistence, and self-regulation
- Multiple means of representation: perception, language and symbols, and comprehension
- Multiple means of action and expression: physical action, expression and communication, and executive functions

[Back to Figure 2]