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Editorial / Éditorial Volume 49 Issue 1

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The spectre of COVID-19 and its global transformational legacy on all aspects of teaching and learning overshadows this issue of the Canadian Journal of Learning and Technology. The near-universal demand for remote learning and the reliance on learning technologies not only transformed the educational environment but also shifted many preconceived notions about the interplay between the dissemination of knowledge and technology. The surge in technology's prominence in education and the quick pedagogical pivot impacted all aspects of teaching and learning with both short- and long-term consequences. This issue explores the impact of this shift, the slow recovery and the permanent transformation of the learning landscape from the institutional, teacher, and student perspectives. We invite you to review the content summary of this journal issue.

With our thanks to reviewer Brian Lamb and Book Editor Carole Sparks, the current Book Review considers the gamut of educational technology and its impact before and during the "great pivot" resulting from the global pandemic. ***Metaphors of Ed Tech, 2022****,* by the author of multiple books and articles on the topic, and professor of educational technology at the Open University, Martin Weller, surveys the encompassing complex field exploring its ebbs, flows, and sociocultural implications. The book touches on many topics, including cataloguing and curating knowledge artifacts, the importance of Open Educational Resources (OERs), and the financial consequences of increased legislative burdens placed on universities. In this comprehensive and engaging overview of the field's current state, Weller underscores technology's significant role in teaching and learning and its unique cross-disciplinary perspective while offering thoughtful insights into a wide range of practices.

The Notes Section of this issue provides insights into successful cases and experiences of distance learning hubs in China and Iran in recent years as shaped by the COVID-19 pandemic. In, ***A Narrative Case History of Distance Education Before, During, and After COVID-19 in China and Iran***, Mohsen Keshavarz and Li Yuan examine the phenomenon of educational hubs in higher education in the context of international education through online learning. The authors argue for the new opportunities presented by online and distance learning within the framework of educational hubs and propose three types of online and blended learning models that reflect the development of these hubs under COVID-19 conditions. Using insights gained from successful cases and experiences of

distance learning hubs in China and Iran in recent years, they argue that educational hubs offer global perspectives, prepare students for an interconnected world, and facilitate connections between diverse regions.

Continuing the focus on the Asian continent from the Notes Section, Greg MacKinnon of Acadia University and Tyler MacLean of the Henan Experimental High School in China explore the emergency remote English as a Second Language (ESL) teaching response due to the surge in COVID-19 during the fall 2020-2021 academic year in Article 1; ***Emergency Remote Teaching: The Challenges Associated with a Context of Second Language Instruction***. They explore the required pedagogical shift and the accompanying challenges as offshore school teachers shifted their ESL instruction of Chinese children online rather than face-to-face in China. Teachers and principals identified broad categories of factors impacting instruction delivery, including teacher lifestyle, technological hindrances, teaching practice, and pedagogical support. This study contributes to the existing literature by highlighting the importance of examining cognitive load, self-regulation, and attentional literacy in the context of ESL learning with technology, emphasizing the need for careful consideration of these factors.

Article 2, ***University Student Satisfaction and Behavioural Engagement During Emergency Remote Teaching***, shifts the perspective from the educator to the student. Authored by Necati Taşkın, Bülent Kandemir, and Kerem Erzurumlu of the Vocational School of Technical Sciences at the Ordu University in Turkey, this article examines students' online learning satisfaction in the context of emergency remote teaching during the same fall semester of the 2020–2021 academic year as the previous article. A concurrent triangulation design was employed to assess the online learning satisfaction of students enrolled in a state university in Turkey, utilizing both quantitative and qualitative instruments. The students expressed a moderate level of approval, and there was a notable correlation between satisfaction levels and academic achievement and behavioural engagement. The students frequently mentioned various themes, including a desire for face-to-face education, the inefficiency of online learning, concerns about assessment, the usefulness of the Learning Management System (LMS), technical issues, and a perceived lack of instructor support. As a recommendation, this study suggests that instructors, educational authorities, and policymakers should prioritize online student satisfaction to ensure a successful digital transformation in higher education.

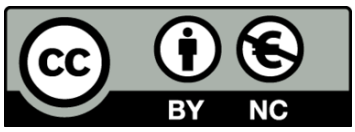
With a continued emphasis on student satisfaction and success, Shelly Ikebuchi of Okanagan College takes advantage of the unique opportunity as Canadian postsecondary institutions transition out of pandemic restrictions to examine the impact of online education on learning. Article 3, ***Accessing Education: Equity, Diversity, and Inclusion in Online Learning***, analyzes open-ended comments from the Canadian Digital Learning Research Association 2022 Spring National Survey to explore how online and hybrid learning impacted EDI. The results paint a double-edged sword that can create barriers for marginalized students while promoting EDI through increased access and flexibility. The study emphasizes the importance of pedagogy, course design, support, and flexibility in ensuring that online and hybrid learning effectively supports EDI. It also discusses the challenges of access,

pedagogy, and technology while providing recommendations to address EDI concerns in online and hybrid learning environments.

As a proposed tool to address EDI issues identified in the previous article, Article 4 looks to universal design as a remedy for multiple shortcomings in many current course designs. ***Using Google Classroom as Assistive Technology in Universally Designed Classrooms***, is authored by Stephen Sharpe and Gabrielle Young of Memorial University of Newfoundland. Here, Google Classroom is positioned as assistive technology in inclusive classrooms. Findings from a single-case study methodology at one junior high school in the province of Newfoundland and Labrador in Canada offer information about the benefits and challenges, as identified by students and intructors, associated with the use of Google Classroom within the universal design framework for learning and as effective classroom technology in meeting the needs of each learner in the classroom.

The last article, ***L'apprentissage en ligne dans le contexte de la quatrième révolution industrielle : le cas d'un module connectiviste en contexte universitaire / Online Learning in the Context of the Fourth Industrial Revolution: The Case of a Connectivist Module in a University Context*** is authored by Emmanuel Duplàa, Béatrice Crettenand Pecorini, Jonathan Weber, and Mario Blouin of the University of Ottawa. This article proposes a link between industrial revolutions, major learning theories, and online learning. The authors highlight a disconnect between learner-centred learning theories and the mass production and education systems that separate consumers from product design and learners from the design of their own learning experiences and curricula. They demonstrate the impact of incorporating a connectivist approach in a university course and discuss its potential for cultivating essential skills needed for the fourth industrial revolution.

We hope you enjoy this issue.



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Metaphors of Ed Tech, 2022. By Martin Weller. Athabasca University Press. 192 pages. ISBN 9781771993500

***Reviewed by Brian Lamb**, Thompson Rivers University*

"Just when you thought it was safe"

In *Metaphors of Ed Tech*, Martin Weller explores the field of learning technology in both the broadest and deepest senses. Weller chooses the application of metaphors as a method, and the resulting book reads more like an enjoyable set of ruminations than rigorous investigation. Weller has long employed metaphors and analogies on his blog, going back to 2006, and in this book he sets out to apply this "more playful aspect of thinking and writing about educational technology (ed tech)" across its practice and culture (p. 3).

In his previous books, Weller staked out a unique place in the scholarship of learning technology. *The Digital Scholar* and *The Battle for Open* employ an approach that is inviting to readers without sacrificing thorough treatment. Weller avoids the common pitfalls of both academic and journalistic writing about education in the digital age. He avoids hype, grand pronouncements and wild predictions, minimises jargon, and rarely goes deep into the weeds. His writing provides a picture of ed tech that encompasses its diversity of practice in a spirit of generosity and inclusiveness. This value within the broader community is evidenced by the response to his *25 Years of Ed Tech*, when a crowdsourced audiobook and a supplementary podcast was assembled with the contributions of dozens of prominent and varied volunteers.

Metaphors of Ed Tech is arguably his most lively and broadly-conceived book to date. He doesn't address metaphor from literary or theoretical perspectives, nor in terms of cognitive science. "This is not primarily a book *about* metaphors, or metaphorical reasoning, but a book *of* metaphors." (p. 12). As the brilliant *Jaws*-inspired cover art by Bryan Mathers suggests, he is setting out on a voyage of exploration largely in a spirit of fun, noting that his chosen metaphors "allow for playful thinking", even as he acknowledges that some of his choices "are rather stretched or intended lightly" (p. 12). In addition to metaphor as maps of understanding and the creative interaction between semantic fields, Weller also describes a second and more risky application of metaphor, such as how allusions to "crime" are used to shape ed tech solutions.

Novel approaches are needed when examining technology's place in learning and education, given the strange and unpredictable history of how ed tech has been practised. Weller notes that for "those of us in it, we are not even sure how to refer to it – a field, subject, topic, practice, discipline?" (p. 45). Ultimately, Weller comes out against framing ed tech as a discipline, for while it is prone to "historical amnesia and its occasional uncritical approach" it also "is rich precisely because people enter it from different fields, bringing a range of perspectives to bear, and it is applied to different disciplines that have their own requirements and challenges" (p. 48). Weller proposes ways of thinking of ed tech as an "undiscipline" via three metaphors. One, is the "ed tech suitcase" packed with different items but in service of a shared purpose (pp. 48-50). He then explores how a nation's history of art relates to its national identity, the resulting pitfalls and limitations, and how ed tech practitioners might in turn resist their own process of "museumification". Finally, Weller proposes the concept of digital mudlarking, based on those who scavenged in river mud for items of value in 18th and 19th century London. He outlines previous and ongoing waves of elearning enthusiasm – the web 2.0 bubble, MOOCs, learning analytics, artificial intelligence – and imagines each of them "as a tide, depositing knowledge artifacts that will be washed away by the next big wave unless they are carefully gathered and restored by the digital mudlarks." (pp. 55-57).

Weller approaches the practice of ed tech as an informed participant and observer, and is sceptical of big claims and quick fixes. He defends universities from attacks on their growing administrative costs, and argues "society cannot place an increasingly complex legislative and administrative burden on universities and then complain they spend more money on legislative and administrative tasks." (p. 73). He classifies the fervent purveyors of ed tech apocalypse and their miraculous solutions as "ed tech rapture", and contrasts it with pragmatic practices such as OERs (Open Educational Resources). OERs demonstrably support learning outcomes as effectively as proprietary ones while they save significant amounts of money. "These are not claims couched in a mythical future that requires revolution to be realized, but identifiable and realistic benefits for learners. They are, in short, *useful*." (p. 88).

The spectre of the "great pivot" that roiled ed tech during the global COVID pandemic, and the emerging aftereffects, loom over the book, and Weller teases that out via an extended interpretation of the 1975 film *Jaws* that may have been a prime motivator for him to write this book. The unpredictable eclecticism of his chosen metaphors is one of the readerly pleasures of the book: the construction of Castell Coch in 19th century Wales, the rewilding of ecosystems, the use of video replay in sporting events, alchemy, the Rebecca Riots, and the Hussites. At its best, the book feels like a rollicking survey of ed tech practice and significance with a fun and erudite host. Not all metaphors align perfectly well, and different readers will undoubtedly find some examples more compelling than others. But overall, the book balances an expert grasp of the relevant issues with an engaging presentation and a genial and open-minded sensibility.

Metaphors of Ed Tech is an excellent overview of the field as it exists today. It offers high-level consideration of wide-ranging practices and balances the many social and cultural dimensions that are brought to bear. It does not pretend to break new ground or provide a unifying theory. But it is a pleasurable, thoughtful, and thought-provoking read that can appeal to a wide range of readers who are working in ed tech, who are studying it, or who simply wish to understand it better.

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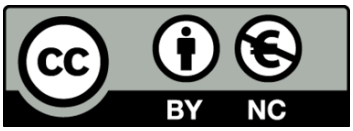

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A Narrative Case History of Distance Education Before, During, and After COVID-19 in China and Iran

Une histoire de cas narrative de l'enseignement à distance avant, pendant et après COVID-19 en China et en Iran

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Li Yuan, *Beijing Normal University Zhuhai Campus, China*

Abstract

Educational hub refers to centres of excellence in higher education and research whose aims are to provide high-quality education for both national and international students to enhance the competitiveness of the country. These educational hubs provide an opportunity for knowledge exchanges and innovation in local regions through education and training. In response to the COVID-19 pandemic, rapid shifts were made towards online learning in education around the world. Although the lockdown is over, remote learning will likely play an increasingly prominent role in education. The adoption of scaled remote learning during the pandemic provided evidence of the importance of online learning. They offer an insight into global society, helping prepare students for an increasingly interconnected world by facilitating links between different regions. Educational hubs can be tied to distance learning and are successful in attracting international students when offering a combination of distance learning methods and innovative programs. This paper examines the phenomenon of educational hubs in higher education for international education through online learning with digital technology. New opportunities for online and distance learning within the definition of educational hubs are analyzed, and three online and blended learning models that reflect the development of educational hubs based on COVID-19 conditions of education are offered. In addition, the successful cases and experiences of distance learning hubs in China and Iran in recent years are described.

Keywords: educational hub; COVID-19; Iran; China

Résumé

Le pôle éducatif fait référence aux centres d'excellence dans l'enseignement supérieur et la recherche dont les objectifs sont de fournir une éducation de haute qualité aux étudiants nationaux et internationaux afin d'améliorer la compétitivité du pays. Les hubs offrent une opportunité d'échanges de connaissances et d'innovation dans la région par le biais de l'éducation et de la

formation. En réponse à la pandémie de COVID-19, des changements rapides ont été opérés vers l'apprentissage en ligne dans l'éducation dans le monde entier. Bien que le confinement soit terminé, l'apprentissage à distance jouera probablement un rôle de plus en plus important dans l'éducation. L'adoption de l'apprentissage à distance à grande échelle pendant la pandémie a prouvé l'importance de l'apprentissage en ligne.L'impact sera différent pour chaque élève. Les hubs peuvent également offrir un aperçu de la société mondiale, aider à préparer les étudiants à un monde de plus en plus interconnecté, ainsi qu'à faciliter les liens entre différentes régions. Dans le contexte de la COVID-19, il n'y a plus de présence sociale dans les universités. Les centres éducatifs sont liés à l'apprentissage à distance et réussissent à attirer des étudiants internationaux lorsqu'ils offrent une combinaison de méthodes d'apprentissage à distance et de programmes innovants. Cet article examine le phénomène des pôles éducatifs dans l'enseignement supérieur pour l'éducation internationale par l'apprentissage en ligne avec la technologie numérique. De nouvelles opportunités d'apprentissage en ligne et à distance dans le cadre de la définition des centres éducatifs sont analysées, et trois modèles d'apprentissage en ligne et mixtes qui reflètent le développement de centres éducatifs basés sur les conditions d'éducation COVID-19 sont proposés. En outre, les cas et expériences réussis des pôles d'apprentissage à distance en Chine et en Iran ces dernières années sont décrits.

Mots-clés : centre éducatif ; COVID-19 ; Iran; China

Introduction

The COVID-19 pandemic resulted in the replacement of traditional face-to-face campus-based education with online distance education, forcing universities worldwide to rethink existing operational models. Most educational organizations adopted a blended model, combining remote/online teaching and small group face-to-face teaching on campuses as their response to the disruption caused by the pandemic (Bates, 2022). As a result, universities are facing significant financial challenges in terms of revenue loss from international students, although there may be opportunity for universities to take advantage of digital technology and online learning. In this regard, universities can explore new models and approaches to deliver on-campus programs such as online educational hubs which are more flexible, effective, and efficient in a post-pandemic world.

According to UNESCO, there were about 5.3 million international university students in 2017. The health concerns raised by COVID-19, which prevented students from leaving their home country to pursue studies abroad, may have disrupted international education on an unprecedented scale. In response, universities moved to online learning and remote teaching, closing their campuses whilst doing so.

Hodges et al. (2020) defined remote teaching as:

> a temporary shift of instructional delivery to an alternate delivery model due to crisis circumstances. It involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses and that will return to that format once the crisis or emergency has abated. (pp. 8-9)

The IAU Global Survey (2020), regarding COVID-19's impact on higher education, noted that university responses worldwide to COVID-19 was to adopt contingency plans, providing a way forward for international students to participate remotely. These plans were put in place either at the institution itself, at partner institutions abroad, or both (Marinoni et al., 2020).

During the pandemic, institutions had to reorganize their teaching and learning activities on campuses following social distance regulations and explore innovative ideas to deliver their programs to support and help academics find new ways of engaging their new online learners. The existing transnational education activities, such as overseas campuses, joint and dual degree programs, double awards, and "fly-in" faculty were seriously curtailed due to the imposed travel constraints. Universities also needed to both design and deliver effective, flexible, and affordable international education programs. The approach taken by most universities was to bring about blended learning, mixing both synchronous and asynchronous learning, thus adopting a more flexible learning model (Bates, 2022).

One practical way for universities to achieve this goal was to develop online courses and, in some cases massive open online courses (MOOCs). During COVID-19 restrictions, students could participate in online courses and higher degree programs from United Kingdom universities without leaving their country and university. This resulted in universities offering an alternative for global students that was both low-cost and flexible: students could study at universities in their home countries while gaining a valuable international experience by taking online courses fully integrated into their home university's curriculum.

A global remote/online teaching and learning experiment ensued where open educational resources (OER) and MOOCs came to play important roles in supporting online teaching and learning. For example, to overcome the problem of limited time to prepare online learning content and online courses, universities in China were able to both reuse and repurpose OERs from many sources, including those available in national and international repositories as well as those published by the Ministry of Education. Teachers were given special training to help them make full use of these resources. The Chinese MOOC platform *xuetangX* has provided 1,600+ free credit-eligible courses for universities. Blended learning models, flipped learning approaches, asynchronous or synchronous learning, social learning, mobile learning, and various technology-enabled pedagogical approaches have been used and explored to provide a better-quality user experience of remote teaching and learning through online delivery.

New Models for International Education in Post-COVID Universities

International university education post-COVID may continue to be influenced as students may not be able to travel abroad to study as before. New models and approaches need to be developed to reach more international students. However, there are key issues and challenges that Western universities will need to overcome if they are to succeed in providing high-quality teaching and learning online to the potentially huge Chinese market. These challenges include: (1) technical constraints that place limits on or prevent learner access to courses; (2) appropriate versions of courses - in a pedagogical sense given the different approaches to finance education; (3) the differences in language, cultural values, and educational settings; and (4) the development of business models that are sustainable long-term. A partnership model is one possible solution to help

universities in China and abroad design and deliver affordable, flexible, and effective international education through online or blended courses, as described below.

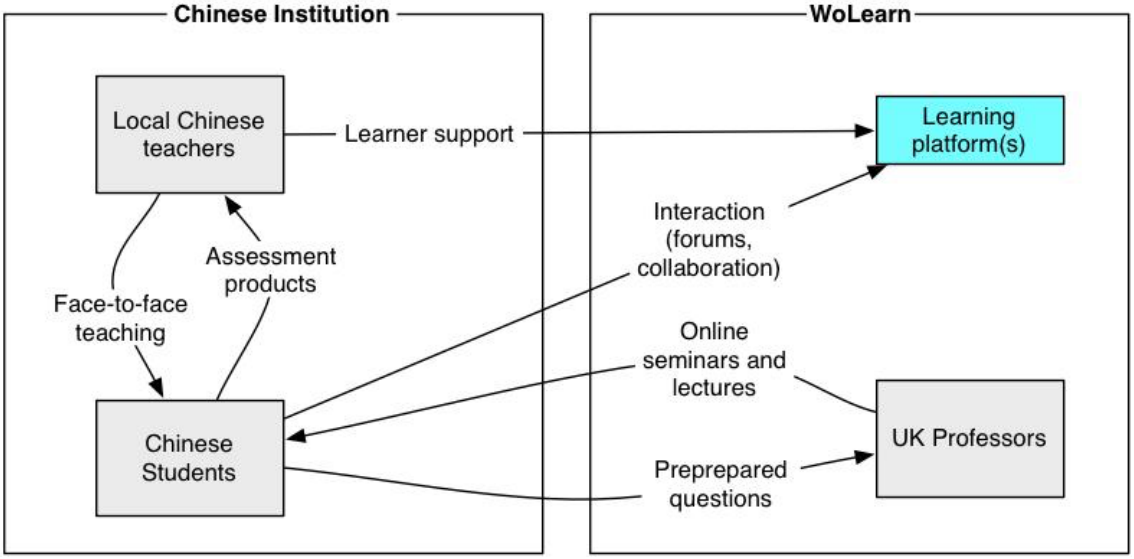
Through the promotion of openness, collaboration, and innovation in higher education, the market potential of education in China can be unlocked. This unlocking has been demonstrated by the UK and Chinese institutions jointly and collaboratively developing online and blended teaching and learning packages. A teaching and learning model has been created to capitalize on unpacking and repackaging courses. This model allows Chinese universities to buy additional services, such as online lectures and seminars, as well as access online course content provided for free. United Kingdom universities produce content which can be adapted for local use before being introduced to the Chinese education market. The website *WoLearn*[1] is one example of an open online learning platform, based in China, which provides a gateway to MOOCs/open courses from Western universities. WoLearn builds relationships with UK partners by identifying universities that have not only produced OERs, open online courses, and MOOCs but also wish to grow their international business. It seems inevitable that this approach will lead to partnerships between UK and Chinese universities resulting in stronger institutional collaboration through the integration and delivery of identified courses.

The Partnership Model

The approach called for a clear separation of the respective organizations' responsibilities. The Chinese institution carried out the bulk of the work, to reduce expenses and keep costs manageable, given that UK institutions charge significantly more for work. Also, WoLearn, the startup company, performed the organizational and coordinating role in the UK, along with the provision of learning platforms and pedagogic design.

Figure 1

Partner Organizational Relationships



[1]www.wolearn.org

Learner support for this course was provided by both academics and non-academics. Local teachers in the classroom provided first-line support and online forums were also available for learners to discuss issues. Course administrators from WoLearn provided non-academic support; these tasks included seminar coordination along with overall course implementation.

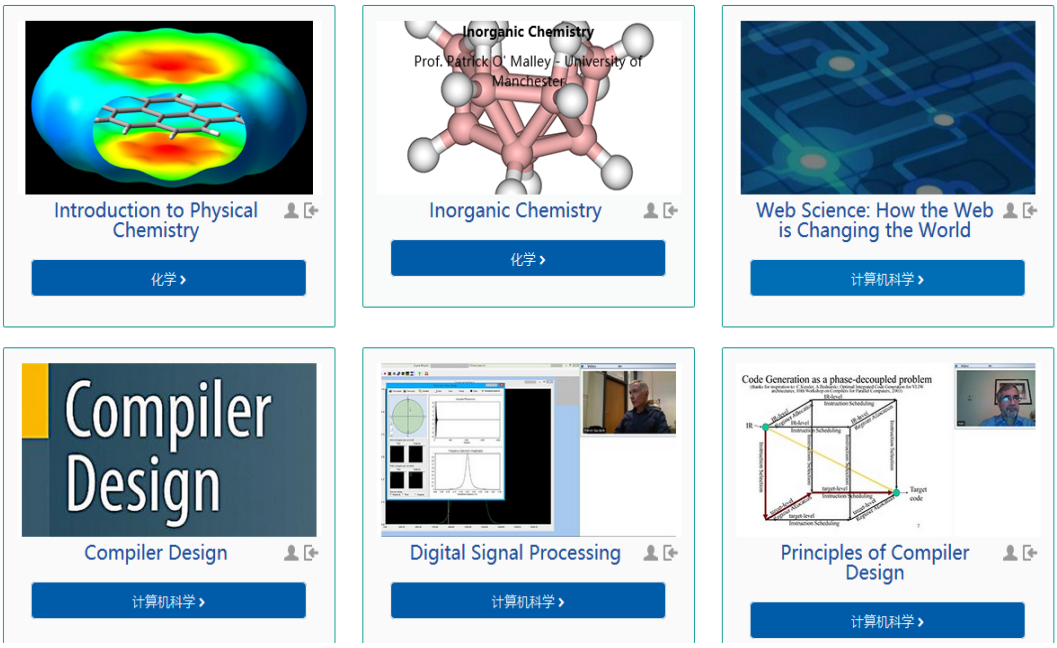
To be successful, the partnership model must address problems of a technical, pedagogical, and financial nature, all of which can arise when running blended courses internationally. It is recognized that a certain level of financial investment is required. This can be kept at a sustainable level in reference to the cost-savings and benefits. The advantage for UK universities was in gaining fee-paying students and the benefit for Chinese universities was in offering their students an international education experience with a modest financial investment.

The Open Course Platform

To enable non-UK-based universities and academics to upload online courses and directly manage online teaching and learning with registered students, a China-based bilingual (English and Chinese) Moodle platform was built. This third-party platform also provided advice on how to access the Chinese alternatives to Western social media sites, e.g., Google, YouTube, Twitter, and Facebook.

Figure 2

A China-Based Bilingual (English and Chinese) Learning Platform



Since 2015, and prior to the COVID-19 pandemic, more than 20 courses in a variety of subjects, including educational technology, computer science, and physical science, have been successfully implemented through partnerships. To deliver these online courses, collaborations were forged between Chinese universities and academics from the University of Edinburgh, the University of Glasgow, the University of Manchester, and the University of Southampton. More than 10,000 students from three Chinese Universities: Hua Zhong University of Science and Technology, Beijing Normal University, and Central China Normal University were able to enroll in these courses, supported online by UK academics. The Chinese learners benefitted greatly from

this international collaboration through access to the open courses (or MOOCs) developed by UK academics on the WoLearn platform.

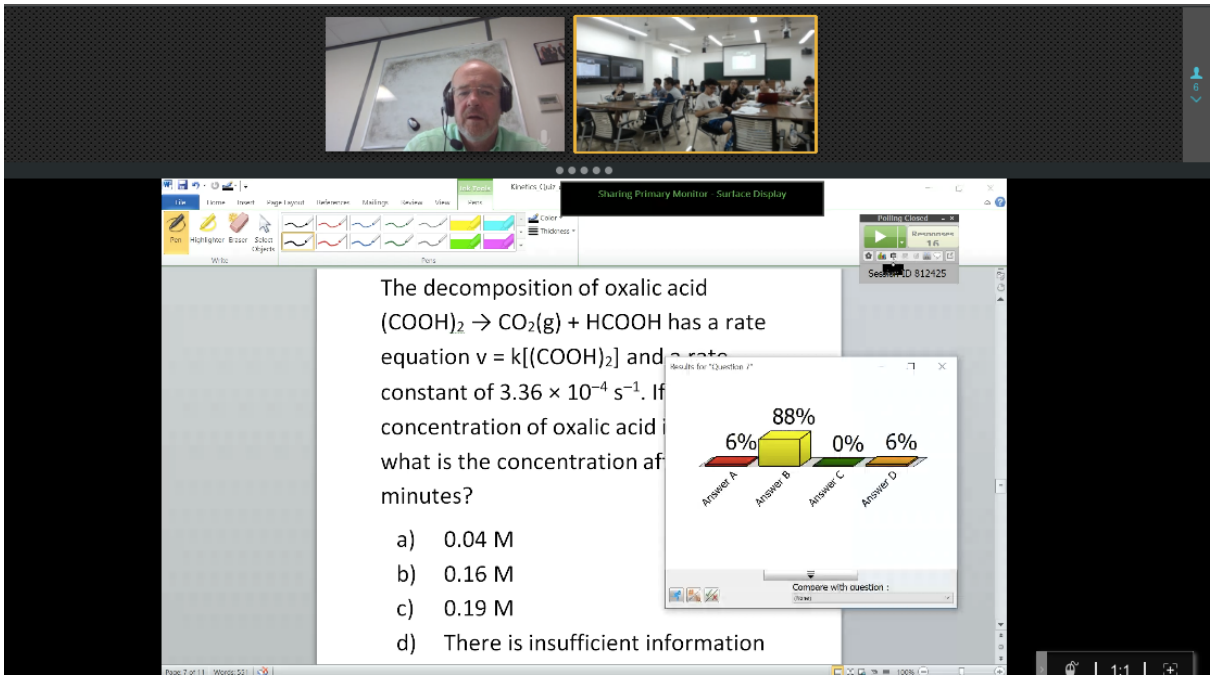
The Collaborative Teaching and Blended Learning Approach

The cooperative teaching and blended learning approach was developed to support academics in China and the UK to work collaboratively on course design and delivery in a blended learning course. In practice, online content, such as OERs/MOOCs, is created and uploaded by academics from UK universities and integrated in face-to-face teaching by Chinese teachers. The academics in the Chinese and UK universities co-deliver the courses via online and face-to-face engagement. Here the UK teacher is responsible for online activities and the Chinese teacher organizes students' offline learning. In the blended learning courses, students' learning includes: (1) online resources provided by the UK academics on the Wolearn platform; (2) online seminars hosted by the UK academics on online conference systems; and (3) face-to-face teaching delivered by Chinese teachers.

In this cooperative teaching and blended learning approach, Chinese teachers can incorporate high-quality online courses from UK universities and online interactive sessions with UK academics into their face-to-face teaching, which can improve and enrich the blended learning content and context. During the course, students are guided by their teachers to study online content at their own pace anytime, anywhere, and to work in groups to prepare questions and presentations for the online interactive sessions with UK academics. In the online sessions, UK academics are advised to adopt a flipped learning approach and provide an opportunity for students to ask questions and discuss ideas with teachers and peers.

Figure 3

Blended Learning with Overseas Teachers at Beijing Normal University



Note. Students in a classroom engage with teachers online.

During the pandemic, the collaborative blended learning courses ran during campus closures and both academics and students became very familiar with the blended learning approach, technologies, and online engagement through various social media and tools.

Virtual Education Innovations in Iran: A Successful Experience of Medical Education

As mentioned previously, COVID-19 forced universities around the world to find solutions for the sudden closure of campuses. Many countries banned international travelers to prevent the spread of the coronavirus. According to UNESCO, at the beginning of April 2020 the higher education system was shut down in more than 194 countries and students dropped out of school and universities and were quarantined in their homes (UNESCO, 2020). The arrival of COVID-19 and the closure of universities became a turning point in the development of e-learning in the world. Universities had to use online and distance learning to continue their educational activities. Before the pandemic, institutions of higher education in Iran delivered face-to-face instruction in teaching and learning; online learning was not widely available. The developmental policies of the Ministry of Health in Iran provided a way for the improvement of virtual medical education, thus virtual education grew significantly. In this section, we will briefly describe the valuable experiences of Torbat Heydariyeh University of Medical Sciences in line with innovative virtual activities through cooperation with the national ARMAN MOOC. ARMAN is a Farsi abbreviation for New and Massive National Computerized Education.

ARMAN[2] is the only national MOOC in Iran in the field of medical sciences. The ARMAN MOOCs include a variety of different subjects in the field of medical sciences such as statistics and research methods and epidemiology, medical education, clinical medicine, nutrition, nursing and midwifery, paramedical, dentistry, rehabilitation, pharmacology, psychology, basic medical sciences, and management sciences (Virtual University of Medical Sciences, 2018, 2019).

Torbat Heydariyeh University of Medical Sciences

Torbat Heydariyeh University of Medical Sciences is located in the Khorasan Razavi province in Northeast Iran. It is a public university with several specialized hospitals and health centres and offers degrees at undergraduate, graduate, and doctoral levels in areas of medical sciences, as well as various academic study programs related to medical sciences. The University's history of providing health services dates back 50 years and began its first activities in the fight against malaria disease in the form of health centres. Its academic formation as a college/university began back in the early 1990s. Gradually, the university progressed and is currently training students in various fields of medical sciences with more than 100 faculty members and more than 1,000 students.

History of e-Learning in the Ministry of Health of Iran

In 2015, the Ministry of Health of Iran presented a reformation plan for medical education systems. This package included programs that cover all aspects of medical education. Every plan had specific policies, strategies, and plans. The program was compiled of 11 development packages and a monitoring program that included a total of 46 different axes for designing, implementing,

[2] https://arman.smums.ac.ir/

and monitoring the transformation program in medical science education (Secretariat of the Headquarters for Transformation in Education, n.d).

One of the macro policies within the packages of the transformation plan was the development of virtual education in universities of medical sciences. The goals of this package were:

- Upgrade of information technology substructure.
- Application of information technology in educational processes.
- Use new educational technologies and equipment such as simulators.
- Utilization of distance education in the field of higher health education.

Following the implementation of this plan in 2015, the development of virtual education in medical sciences has been run by Iranian universities of medical sciences. In Iran a paradigm shift resulted in medical education where e-learning is one of the most important parts (Keshavarz & Karimi, 2021).

Another fundamental outcome of this paradigm shift was the establishment of the Virtual University of Medical Sciences (VUMS)[3] at The Ministry of Health and Medical Education of Iran. In 2017, according to policies of the development and strengthening of virtual education and the necessity of planning and directing virtual colleges and universities of medical sciences, the VUMS was established and was directly under the supervision of the Deputy of Education of the Ministry of Health (Virtual University of Medical Sciences, 2017).

In March 2020, with the arrival of COVID, the Ministry of Health of Iran announced the closure of universities, higher educational institutions, and schools in several cities and provinces. The Deputy of Education, Ministry of Health ordered academic organizations to launch learning management systems (LMS). All universities of medical sciences in Iran held their courses online through the national LMS named Navid, which was designed by the VUMS (Keshavarz & Ghoneim, 2021).

The history of e-learning activities at Torbat Heydariyeh University of Medical Sciences goes back to 2014 when the LMS was launched to implement blended courses. At that time, university professors offered very few blended courses through this system. With the creation of a transformation plan in education and e-learning development programs in the Ministry of Health, and the arrival of COVID, the growth of e-learning activities in this university expanded.

Planning to Create a Virtual Education Centre

The University's distance learning designers and planners developed virtual education as traditional teaching methods had to change and new teaching patterns replaced traditional ones. As students of today are digital-centric, professors sought teaching patterns to meet student learning styles. The need to change the structure of medical education and to familiarize professors with new educational technologies, such as MOOCs and the electronic content, were among the most important priorities for the University. The establishment of the VUMS and the creation of online educational hubs in the Ministry of Health marked another turning point leading to the

[3] Later renamed to Smart University of Medical Sciences (SMUMS). https://smums.ac.ir

establishment of a virtual education centre in the University under national and international standards. The Virtual Education Centre (VEC) of Torbat Heydariyeh University of Medical Sciences was launched in 2016 to deliver medical education curriculum using existing infrastructure and equipment and was equipped with different facilities including an audio/video recording studio, online testing centre, webinar room, and a department of educational new technology. The VEC is an acoustic room with modern audio and video equipment that fully complies with the desired standards (see Figures 4, 5, & 6) (Virtual Education Center, 2018).

Figure 4

The Voice and Image Recording Studio

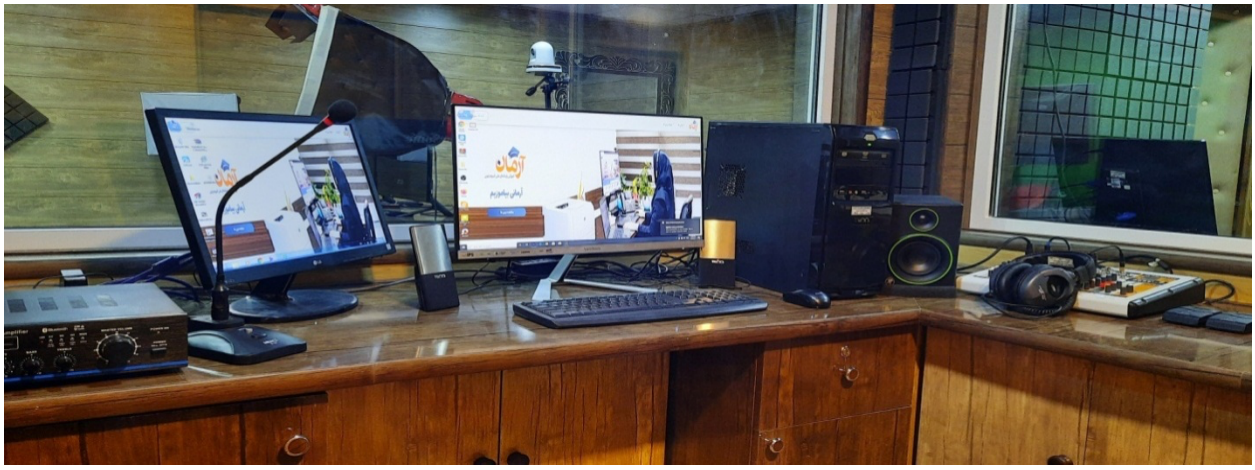


Figure 5

The Voice and Image Recording Studio

Figure 6

The Voice and Image Recording Studio

In general, three main VEC strategies were adopted to develop e-learning activities:

- Develop physical infrastructure and equipment necessary for the allocation of a standard virtual education centre.
- Attract faculty members and specialists in the area of virtual education.
- Strengthen university professors and departments to develop online learning skills.
- Empower faculty members.

In line with the goals of developing virtual education programs, participation in national MOOCs, and producing electronic content, the VEC planned an empowerment program to acquaint university professors with the concept of MOOCs and encourage the production of electronic content. The program included holding several specialized workshops and providing specific advice in the field of virtual education and e-learning with new educational technologies. One of the guidelines used by the VEC was the *Teaching in the Digital Age: Guidelines for Designing Teaching and Learning* by Dr. Tony Bates (2019), a well-known book in the field of educational technology and one of the top books in the world in the field of online teaching and learning. In the presentation of scientific workshops, Chapter 5 was selected to acquaint the faculty members with the phenomenon of MOOCs (Keshavarz & Ghoneim, 2021). In this chapter, Bates explains the concept of MOOCs, their features, and their components. The authors distinguish between two types of MOOCs, xMOOC and cMOOC. xMOOC, or extended MOOC, has specific and organized assignments, formal evaluation, and a certificate (Bates, 2019). Dr. Tony Bates also collaborated with the VEC in the implementation of the first workshop.

Results and Effects of Holding Workshops

Holding specialized workshops in the field of MOOCs and new educational technologies empowered the University faculty members and changed their attitudes toward virtual education. Faculty members gradually became acquainted with the concept of MOOCs and the culture of applying new educational technologies developed at the University. Of course, several workshops outside the Torbat Heydariyeh University of Medical Sciences and at the level of the Ninth region macro were held at Mashhad University of Medical Sciences. Professors from other universities also participated in the workshops. Gradually, faculty members became acquainted with and

interested in the concept of virtual education and the production of electronic content. In addition to holding specialized workshops, VEC provided specialized advice to faculty members. Holding workshops and counseling sessions encouraged university professors to produce electronic content and use blended methods such as the flipped classroom. The specialized team at VEC started producing electronic content and were able to produce 42 electronic content deliverables according to the technical standards of the VUMS after two years of continuous work (Virtual University of Medical Sciences, 2018). Currenty, the University, in partnership with ARMAN MOOCs, is planning to produce more electronic content.

Lessons Learned

Torbat Heydariyeh University of Medical Sciences has become an e-learning hub in Eastern Iran and strives to be a distinguished representative in the field of online learning at home and abroad with a set of predetermined goals. During COVID-19 and through establishing a VEC, an example of an educational hub, Torbat Heydariyeh University of Medical Sciences held its theory classes via an LMS and followed its training in the field of medical sciences without any problems. Now outside of Iran, especially in Canada and Austria, many outstanding distance education researchers such as Dr. Tony Bates and Dr. Stephen Downes are familiar with the research activities and faculty members of the VEC (Bates, 2021; Downes, 2022; Keshavarz & Ghoneim, 2021). Recently, the VEC gave an interview to the Institute of the Leaders and Legends of Online Learning, managed by Mark Nicholas, and described the activities of the VEC in detail (Leaders and Legends of Online Learning, 2021). In the end, the important points and achievements of the VEC can be summarized as follows:

- Development of an e-learning science group in the east of the country which is currently recruiting graduate students in the field of e-learning in medical sciences.
- Establishment of the standards of a virtual education centre.
- Licensed for a Virtual Education Centre from the Ministry of Health.
- Participation in national projects including ARMAN MOOC.
- Creating a culture in the university to change teaching patterns.
- Increasing motivation of faculty members to use virtual methods.
- Establishing international connections with leading professors of online learning abroad.
- Conducting joint international research with countries such as USA, Austria, and Canada and rising on the international stage, especially at the level of publishing articles.

Conclusion

It is a priority that universities rethink their online learning methods and the structure of their international education in the post-pandemic world (Yuan & Powell, 2013). The pandemic forced educational institutions worldwide to search for innovative solutions for online learning and remote teaching in a relatively short period. Universities worldwide are starting to develop flexible

and innovative teaching and learning models to provide solutions for international students. However, the generally slow pace of change in academic institutions globally continues to drag on technology adoption with content-based approaches continuing to dominate classroom teaching and learning practices (Keshavarz & Ghoneim, 2021) – despite the proof-of-concept successes of blended learning model such as Cetis (Center Educational & Interoperability Standards) or Wolearn or VEC.

For international education to move effectively to a blended model involving both online and physical campuses and flexible learning schedules, it is not soley teaching approaches that need to be considered and met but also financial, technical, and pedagogical solutions which provide high-quality, flexible, and sustainable learning solutions. E-learning encourages and supports active learning regardless of time and place using certain principles and tools such as web-based communication, participation, knowledge transfer, and multimedia. The changes are considered key innovations in education (Mirmoghtadaie et al., 2023).

There is no question that the internationalization of education will continue, but institutions will need different approaches and models to reach and engage international students through a dramatic change of circumstances. Post-pandemic collaboration between universities is required more than ever before to provide more accessible and flexible international education. As has been described in the two examples in this paper in China and Iran, it is possible to create new partnerships between universities in different countries to share content and resources and connect classrooms and curricula in new and creative ways. In effective partnerships, institutions have the potential to achieve their international education agenda and provide better support to “global” students through online educational hubs across the country.

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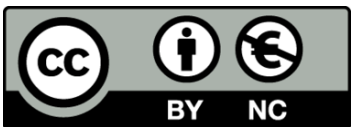

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Emergency Remote Teaching: The Challenges Associated with a Context of Second Language Instruction

Enseignement à distance d'urgence : les défis associés à un contexte d'enseignement d'une langue seconde

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Tyler MacLean, *Henan Experimental High School, China*

Abstract

The pandemic of 2020 frequently necessitated that offshore school teachers continue their instruction of Chinese children in the online format rather than face-to-face back in China; a so-called emergency remote teaching response. A required change in pedagogy accompanied a range of challenges in an effort to offer quality education to English as a Second Language (ESL) students. During the fall 2020-2021 academic year, a sample of 25 teachers and 3 principals provided feedback on those inherent challenges in a mixed method study consisting of surveys, interviews, and focus groups. Factors that impacted the delivery were identified in broad categories of teacher lifestyle, hindrances with technology, teaching practice, and pedagogical support. The findings were unique in that 1) they were nested in a response to a difficult context as opposed to a carefully planned online instruction and 2) second language students constituted a different learning cohort. This work further adds to the literature by suggesting that cognitive load, self-regulation, and attentional literacy deserve careful consideration when contexts of ESL learning with technology are implicated.

Keywords: ESL; online learning; offshore schools; COVID-19

Résumé

La pandémie de 2020 a fréquemment nécessité que les enseignants des écoles délocalisées poursuivent leur instruction des enfants chinois en ligne plutôt qu'en présentiel en Chine ; une réponse dite d'enseignement à distance d'urgence. Un changement nécessaire de pédagogie s'est accompagné d'une série de défis dans le but d'offrir une éducation de qualité aux élèves en anglais langue seconde (ALS). Au cours de l'année scolaire d'automne 2020-2021, un échantillon de 25 enseignants et de 3 directeurs d'école ont fourni des commentaires sur ces défis inhérents dans le cadre d'une étude à méthode mixte composée d'enquêtes, d'entretiens et de groupes de discussion.

Les facteurs qui ont eu un impact sur la prestation ont été identifiés dans les grandes catégories de : style de vie des enseignants, les obstacles liés à la technologie, les pratiques de enseignement et le soutien pédagogique. Les résultats étaient uniques en ce que 1) ils étaient liés à une réponse à un contexte difficile par opposition à un enseignement en ligne soigneusement planifié et 2) les élèves en langue seconde constituent une cohorte d'apprentissage différente. Ce travail contribue à la littérature en suggérant que la charge cognitive, l'autorégulation et la littératie attentionnelle méritent une attention particulière lorsque des contextes d'apprentissage de l'anglais langue seconde avec la technologie sont impliqués.

Mots-clés : ALS ; apprentissage en ligne ; écoles délocalisées; COVID-19

Introduction

The Pandemic Creates a Unique Situation

Since its onset in March 2020, the coronavirus has had considerable influence on public education around the world. Many of the first order impacts included closure of schools and reduction of curriculum covered, but most prominently, the movement to online instruction. This has led to a phenomenon referred to in the literature (Hodges et al., 2020) as Emergency Remote Teaching (ERT).

North American teachers are often employed teaching North American curriculum in Chinese schools. The rapid spread of COVID-19 created a unique situation when so-called offshore school teachers returned to their home countries in the vicinity of the Chinese Spring Festival. Coupled with the implementation of stringent travel restrictions, their respective Chinese school administrators insisted that teachers be prepared to teach core subjects in English to Chinese children in their schools. Essentially teachers were asked in an *emergency mode* to entrust technology to continue teaching via an online environment. This study, conducted during the academic year beginning September 2021, sought to investigate the factors of consideration as teachers transitioned to teaching core subjects to second-language students in English over the Internet. While the transition from face-to-face teaching to online learning during the COVID-19 pandemic has been well characterized in the literature, there is a paucity of research describing the unique setting of ESL learning.

This paper adds to the literature by suggesting ways that teachers can best navigate and mitigate the effects of a rapid transition from classroom teaching of second language students to online learning with limited tools or inherent pedagogies.

Literature Review

Benefits and Challenges of Online Learning

There are many perceived positive impacts of online learning. Flexibility and convenience are routinely mentioned in the literature. Xia et al., (2013) allude to the ability to study anywhere at any time while Famularsih (2020) notes that students can support their learning using social media connections regardless of time zone differences.

Further benefits noted in the literature include being able to give personal support and advice through online messaging as well as the ability to repeatedly refer to support materials including videos, diagrams, pictures, and graphic organizers (Gao & Zhang, 2020). It has been argued that students have extended time for thinking and response, a benefit that fosters more independent learning thus instilling more confidence and efficacy as a learner (Krishnan et al., 2020).

Bailey and Lee (2020) suggest that there are a variety of benefits for teachers who teach online. For instance, they posit that the skills teachers learn from teaching online have the potential to improve their overall pedagogy, instructional methods, and curriculum design for face-to-face teaching.

Broadly Purported Challenges

Voogt and Knezek (2021) aptly framed challenges of online learning using a micro/meso/ macro framework. At the micro level, cited literature supports challenges that include: (a) teaching from home, (b) attitudes towards online learning, and (c) readiness to teach online. At the mesa level worldwide literature supports (a) lack of in-person curriculum alignment with online learning, (b) difficulties with formative assessment, and (c) poor Internet connections. Further, at the macro level their meta-analysis included support for challenges including: (a) availability of resources, (b) cyber security, and (c) quality of online teaching.

These challenges and corresponding solutions have been the subject of recent research (Coomey & Stephenson, 2018; Gillet-Swan, 2017; Kebritchi et al., 2017).

Challenges Associated with Language Teaching and Learning

While there are many issues associated with language teaching and learning, it is worth mentioning a few here. Internet connection problems are the most noted drawback of online language learning across continents (Atmojo & Nugroho, 2020; Krishnan et al., 2020; Levy, 2009; Sari, 2021). While Famularsih (2020) reported that slow speed Internet is common across Indonesia with over 70% of participants causing access issues. Fu and Zhou (2020) claim that hardware facilities and Wi-Fi conditions are uneven across schools in China. Atmojo and Nugroho (2020) have suggested that unevenly distributed income across a nation creates barriers for effective online language learning. The relationship between the digital divide and language learning has been well established (Lozano & Izquierdo, 2019).

Teachers' preparedness for online teaching is a concern especially with regard to English language learning. Several studies suggest that teachers are not trained in the necessary technical and effective online support platforms (Fu & Zhou, 2020; MacIntyre et al., 2020). Atmojo and Nugroho (2020) have argued that teachers are lacking in professional development as they are not engaging students with the latest technologies such as artificial intelligence, gaming, augmented reality, and virtual reality.

It is important to note that teachers in this pandemic context, did not have the opportunity to systematically design their online learning; instead they were responding to an emergency situation, the process of which would inherently and predictably affect the quality of the instruction (Hodges et al., 2020). Some kinds of activities that are designed for in-person classes can be less effective in the online learning setting. In language learning, conversations tend to suffer while writing activities seem to thrive due to its asynchronous nature (Bailey & Lee, 2020). Gao and Zhang

(2020) note that timely student and teacher interactions are very difficult. Famularsih (2020) recommends that not all material is ideal for online learning and there is often a lack of meaningful interaction between student and instructor. Pazilah et al. (2019) compiled a variety of potential impediments to productive online language learning, including student's difficulty in understanding instruction, difficulty giving feedback in real time, language proficiency, and eagerness to participate.

Managing the online classroom can prove problematic. Gao and Zhang (2020) suggest a variety of reasons for this including: lack of non-verbal cues, punctuality of students both for class and submitting assignments, not being able to see all the students and finally, the perception that some students equate online learning to a holiday (Atmojo & Nugroho, 2020).

Given the inherent nature of online learning, Fu and Zhou (2020) suggest individualized learning is difficult. This is corroborated by Atmojo and Nugroho (2020) who cite the difficulty in teaching students with low cognition and various learning styles. They further allude to the additional time it takes for a teacher to attend properly and completely to those with learning challenges.

The Rapid Onset of COVID-19

The prospect of moving from a traditional classroom to one of online learning has been daunting for many teachers. Two of the most intimidating factors noted in the literature are a teacher's lack of technological competence and further, a dearth of personal strategies for online pedagogy (Dashtestani, 2014). While teachers desperately wanted and needed training in these areas, the quick transition time was difficult to overcome logistically for most education systems (Atmojo & Nugroho, 2020; Bailey & Lee, 2020).

Context of the Study

Provincial governments and private educational institutes in Canada have created partnerships with schools in China such that Chinese children can study provincially-endorsed curriculum, and upon successful examination receive graduating diplomas. This has obvious advantages for families who want their children to seamlessly apply to North American universities. One such example is the Nova Scotia government that operates and supports approximately 15 schools in China[1]. These schools typically offer Grades 10-12 Nova Scotia curriculum to class sizes of 15-30 Chinese teenagers. The Nova Scotia schools are normally housed within larger Chinese educational institutions but are segregated from the general student body. The operation of the school is closely monitored by local school officials in terms of the space but operationally, the Nova Scotia government employs its own monitoring system, policies, and matriculation protocols. With two collaborating administrations, this poses unique challenges (MacKinnon & MacLean, 2021).

Core subjects are taught in English and principals (often retired educators from North America) are charged with some responsibility for filtering student applicants based on English

[1] https://www.ednet.ns.ca/internationalprograms/international-school-programs

fluency (MacKinnon & MacLean, 2021). In this study, which included 26 teachers from a variety of North American offshore schools, 54% taught grade 10 which arguably would be the level facing the biggest challenge around English comprehension and fluency. Teachers in the sample saw student demographics distributed, specifically: 38% (3-5 years), 31 % (6-10 years), and 31% (over 10 years). Of the sample, 69% reported that the pandemic-induced online teaching task was their first exposure to this pedagogy. This sample of teachers taught from home countries: 46% Canada, 31% USA, 15% African nations, and the remainder distributed across other nations. Teachers were largely charged with using technologies at their disposal with little direction or support from their institutions.

At the beginning of the pandemic, most cities in China were forced into strict lockdowns (Ilmmer et al., 2021) which necessitated students working from their private homes to learn on a personal device. In this case, each student would log into a class meeting at assigned times to learn. As the incidence of the COVID-19 virus receded, students were expected to return to the schools. This often created a situation where all students were in a classroom and the online teacher was streamed from their home country and viewed on a large screen.

Most teachers were expected to deliver their typical schedule; this required remaining in front of their computer screen for their daily schedule. Because teachers were now living abroad, this could have them in a time zone twelve hours removed from Chinese time, that is, a typical day would entail teaching from 9 pm to 3 am.

Research and Methodology

The researchers have a distinctive lens from which to interpret this teaching and learning environment; a North American teacher with nearly 10 years' experience teaching in Chinese offshore schools and a university professor with 20 years' experience working with teacher interns placed in Chinese schools. Both have extensive experience and certified preparation to teach ESL. The study clearly has limitations and delimitations in that it takes place in a convenience sample of schools with associated teachers and principals. The regional context necessarily invokes certain educational values and political constraints. The study is unique in that it refers to both second language learners and ESL teachers from across the world. Arguably, this highlights a particular group of factors that go beyond standard online learning challenges (Voogt & Knezek, 2021).

The goal of the research was to examine an emergency-induced phenomenon of transitioning from face-to-face teaching in a unique ESL context to online learning. As such, the study was intended to identify important factors to consider whilst moving forward quickly to an online format with little time to investigate effective online learning tenets. Within an action research methodology aimed at improving future instruction (Beaulieu, 2013; Stringer & Aragon, 2021), the approach accessed both qualitative and quantitative indicators to establish said factors for improving teaching and learning in these unique circumstances.

About the Study

The investigation explored the lived experience of 26 teachers and 3 principals who adapted to online teaching of ESL learners. A question-focusing session was undertaken by the researchers with due consideration of the literature in order to create a general survey defining the scope of the

system to be studied. The survey culminated in questions in large categories of lifestyle, technology, teaching practices, and support. The survey also retrieved demographic information including teacher location, grade level taught, professional experience, and extent of experience with online teaching. Furthermore, the survey included a series of context statements about their experience that participants were asked to rate agreement on a five-point Likert scale with a range from strongly agree to strongly disagree (Appendix 1). Finally, the survey posed ranking questions to highlight the relative importance of predictable challenges with this teaching scenario (Appendix 2). The survey was field tested (with three readers unconnected to the research) to remove ambiguity in statements. The survey was administered electronically to 26 teacher participants. The problem of a careless responder was addressed by the inclusion of reverse-keyed questions (Kam & Meyer, 2015). If three of the reverse keyed questions were inconsistent the survey was removed from the sample. One such survey result was removed from the empirical data set.

Interviews and Focus Group

Means were calculated for each of the Likert responses in the survey serving only to identify trends as opposed to implying a statistical study. After analyzing the survey trends, the researchers developed a standardized open ended interview schedule (Patton, 2002). Participants for the interview were purposefully chosen for diversity in the location from which they were teaching and to ensure a variance of schools and programs to mitigate a biased response. Seven participants were chosen to be interviewed using Zoom® software. Interview questions were posed over a typical duration of 45 – 70 minutes, audio recorded then transcribed into a textual account. Transcripts of the interviews were independently coded by the two researchers in an iterative process (Huberman & Miles, 2002). Axial coding was applied wherein categories were constantly enlarged and collapsed; a reorganization to adequately cover a range of subcategories (Gasson, 2004).

In order to understand the expectations of principals and their leadership contexts as they tasked teachers with online teaching, we also chose to interview (by Zoom®) a convenience sample of three principals in Chinese offshore schools. These interviews were transcribed and analyzed using a constant comparative coding approach as we attempted to ground all empirical materials in previously gathered evidence.

The culmination of survey and interviews led to a series of conclusions regarding the phenomena. These cumulative findings were subjected to peer debriefing (Guba, 1981) accessing a research colleague unassociated with the current study. In an effort to corroborate and extend these empirical findings, a focus group (Kreuger & Casey, 2014) was conducted as a form of member check (Guba, 1981). Five participants were invited from the initial sample (n=26) for the focus group. Text accounts from interviews with principals were also used as evidential artefacts to corroborate the findings.

Results

There were a variety of challenges that presented themselves. In the survey, participants were asked to rank a list of challenges from least to most challenging. The highest rated challenges were poor Internet connection, teaching schedule, platform issues, and lack of support from the schools that they worked in. The lowest rated challenges were financial issues and classroom management.

The interviews and focus group sessions served to illuminate the rationale behind survey trends; the aggregated data served to identify themes which will be addressed below.

Note that participants who have been quoted within this report are hereafter designated (after the quote) with *I* for interviewee, *F* for focus group participant and *P* for principal. The number following the letter indicates an anonymous identifier for each individual respondent to label different speakers.

Professional Demands on Personal Lifestyle

Especially at the onset of the shift to online learning, a work/life balance was difficult to achieve for many, with 58% of the sample claiming in surveys that they had struggled in this area. They suggested in subsequent interviews that having to learn how to teach in an online format was akin to relearning your entire profession with little to no training in how to do so. This added considerable pressure to become adequate as a teacher using online teaching strategies, navigating the technology, and negotiating platforms themselves. This was especially challenging for those who were not current with instructional technology, much less favourable in their predispositions to technology in teaching. This phenomenon of reduced efficacy has been aptly identified in the literature by Bailey and Lee (2020). Focus group sessions confirmed that this dedication of additional professional time infringed on their lifestyle considerably. As stated by one interviewee, "The unfamiliarity was a cause of a lot of undue stress. Everything was different now and that can be terrifying" (I2).

Teachers who were conducting their classes from outside of Asia had to contend with up to 12 hours of time difference by comparison to a typical teaching day onsite. This meant that teachers began their teaching day in the late evening and continued through the night until the early morning hours. Readjusting to such a schedule proved challenging. Interviewees in this situation were unanimous in stating that teaching quality, as well as their personal quality of life was negatively impacted. In an interview it was shared, "In a normal school atmosphere, you have your evenings and weekends but now it seemed endless. You need to be available 24/7" (F2).

In general, the benefits of electronic communication are abundantly apparent in the online context, however, granting the students constant access to the teachers via text messaging apps (e.g., Ding Talk, WeChat) was an adjustment for most interviewees. Students would often message at all hours of the night and day seeking assistance. Teachers tried their best to return messages as soon as possible. Interviews made it clear that this 24/7 access had the potential to be overwhelming unless firm time boundaries were set.

> You are asking teachers to do the impossible. To readjust their whole schedule and maintain some sense or normality in their daily lives while you are continuously communicating to students on Ding Talk. There is no end and there is no privacy. (I3)

Over 80% of survey participants found it difficult to maintain a healthy lifestyle. Interviewees cited the schedule change with the lack of sleep and loss of structure in their daily lives as the key challenges. It was also noted that the sedentary lifestyle that accompanied teaching from a laptop was in stark contrast to the more active classroom teaching they normally undertook.

Half of the survey sample communicated undue stress as a direct result of the health issues associated with the current pandemic. Coupled with the teaching uncertainty, these factors were

identified as the biggest stressors. Some participants were forced to find a new place to live or even reconsider what country they could afford to live in. Not knowing whether a return to China was imminent also contributed to teacher stress. This consideration was intensified given the dangers of travel during a pandemic. Often information relayed to teachers from their employers was delayed or unclear. One interviewee suggested this had something to do with the Chinese culture of communication in which one does not want to disappoint or lose face. This propensity for nebulous communication has been observed in similar Chinese school systems (MacKinnon & Shields, 2020; MacKinnon & MacLean, 2021).

MacIntyre et al. (2020) found that teachers had various ways to cope with the extra stress brought about by this uncertain situation. The most frequently used methods consisted of accepting the situation and dealing with it through activity or reframing and seeking emotional support. Advanced planning was also a frequently used coping strategy, yet this was much more difficult due to the uncertainty that accompanied the unique situation of a pandemic. The fact that most teachers were given less than a week to transition from face-to-face to online learning made coping a particularly difficult response.

Financial problems were also reported by half of the participants in the survey. While working in offshore schools in China, a suitable place to stay is often provided by the employer. No longer able to reside permanently in China, many of the interviewees had to find accommodation in their home country. While some had family that could house them, many had to rent a home which was an expense not previously accounted for in their budgeting. The cost of living in China is relatively inexpensive compared to many of the participants' home countries. This added significant financial pressure on teachers. For some, it was difficult to access money that was earned and deposited in a Chinese bank. According to the laws of the People's Republic of China, there are limits to how much money can be withdrawn abroad per year. Sometimes employers were not helpful in finding solutions to this problem. As stated in an interview with one principal,

> There was stress because of the pay issue, some teachers were struggling financially and unable to access their pay. They wanted to be paid in their country. They were told this was possible, but it took several pays before it was done. (P1)

Technology

Half of the survey respondents reported problems with both Internet connection and the platform that was used to conduct classes. When students were online at home, if one student was having a problem with the teaching platform, it became a problem for the entire class as the teacher was often focused on troubleshooting and communicating with that student. When students moved back to the school, it remained an issue because the larger school had their own Internet needs that competed for bandwidth. A principal recounted, "The Internet connection at the school is a real problem" (P1). This was corroborated in a teacher interview, "the biggest problem right now is, I think, Internet speed, the students sometimes complain that they have trouble connecting because of Internet speed" (I5).

There was often significant Internet lag. When conducting conversations in class, this led to teachers repeatedly asking students to repeat themselves. This often caused embarrassment for students and led to an unwillingness to participate in class discussions. Problems with audio were noted as being more difficult when the students were moved to the classroom while the teacher was

on the main screen. Microphones were often unavailable or of poor quality, making it harder to hear what the students had to say. As relayed by two participants in the focus group, “There was not one microphone in the class even though I asked repeatedly” (F1) and “I could rarely hear the students because of poor audio. They never got to speak in my class, and I have no idea if they understood my directions or not” (F5).

Many applications that would be ideal for teaching in North America were not supported in China and blocked by a firewall. This included Google Classroom®, Pear Deck® and DropBox®. Although Zoom® was used by some for a means of teaching, one interviewee claimed it was much slower than familiar domestic use. Characteristic feedback follows,

> From what I am only now learning about it, it would have been a dream to use Google Classroom but that is just not possible in China. I used Padlet, but sometimes students have problems logging in and accessing it. (F3)

From teacher interviews, it seemed that teachers were grasping at whatever was available with very little support. One interviewee said, “I didn't have one centralized platform like Google Classroom to rely on and that is what a lot of online teachers have, and this is one thing that has really bothered me” (I7). The lack of availability of these applications often forced teachers to use Chinese versions of familiar technology such as the communication applications Ding Talk® or WeChat®. One persistent complaint from participants was that these platforms did not provide a drop box for assignments. This caused confusion when collecting student assignments. Participants reported problems with files not being uniform in format or corrupted or in certain applications expired in their accessibility. One teacher in the sample was accepting assignments by email and his storage space was completely exhausted. Almost two-thirds of teachers found collecting and marking assignments problematic. They also cited assessment issues such as: greater time spent marking, difficulty finding the assessments to grade, and more time was required to follow-up with students. Those with a detailed plan such as moving assignments to folders right away or those who were set up with a platform such as Moodle® or Schoology® (with the assistance of their North American governing body), fared much better in this organizational task.

Resiliency in Chaos

Regardless of the challenges, over time teachers found ways to improve the experience from a technological standpoint. Those who were using Zoom® found that using breakout rooms was highly effective to get more personal connection with a small group of students. This however was not often feasible when students had returned to the classroom as they were often without laptops or unable to respond due to issues of audio-feedback when the class was using a projected screen of the teacher.

Those teachers who recorded their lectures using technology offered students another learning tool. With the inherent language barrier, it was a definite advantage to provide a video that students could watch repeatedly (asynchronously). Said one teacher, “I recorded videos and they watched them on their own time. While we were in the designated class hours I could help them more with their questions” (F5).

Teachers also found text-message, while time consuming, was an effective technology for scaffolding instruction and establishing improved relationships. Students were comfortable with this

technology so, as alluded to previously, boundaries had to be set regarding communication with the teacher; especially given 12-hour time zone differences. In the focus group, one respondent suggested, “Actually I found I could sometimes make the feedback more personal in this manner, as you are having a text message conversation with them about it a lot of the time” (F1).

Based on the feedback from our cohort of teachers and principals, technologies that seemed to be most often relied upon in Asian contexts include: https://kahoot.com/, https://quizlet.com/, https://padlet.com/, https://new.edmodo.com/, https://nearpod.com, and https://www.classmarker.com/.

Teaching Practices

Across all the empirical feedback, teachers expressed disappointment that they were not serving their students well because COVID-19 had forced a very rapid pedagogical transition. The face-to-face setting traditionally offered not only important conversational language development, but personal connection with students and other faculty that enhanced and supported the learning environment. Teachers were unanimous in admitting that the technology, while possessing intrinsic potential, was not able to bridge the pedagogical gap brought on by their inexperience and the systemic hurdles. In an interview one teacher shared, “I think generally teachers want to do a good job and get frustrated when there are obstacles preventing them from giving good quality instruction” (I3). The frustration was evident in comments such as, “There was no training. It was like ‘alright go ahead we expect you to do your best and be successful even though you have no idea what you are doing’!” (I1). The lack of social construction of knowledge was captured in this expression,

> I think there was a lot of informal learning in class when you were on site, you know a lot of learning happened. Those conversations in the hallway and the basketball pitch aren’t happening now and it really hurts, a big loss. (I2)

Teaching practices were forced to change because of the new mode of delivery. According to teachers in this sample, conducting classroom conversation was no longer an effective way of teaching due to the technological and logistical challenges, a finding already aptly noted in the literature (Famularsih, 2020; Gao & Zhang, 2020). Valid testing of students was difficult as it was not feasible to monitor students’ computers. Teachers suggested teaching assistants be present during testing but this wasn’t always possible. Some interviewees suggested that cheating on tests was definitely occurring. According to one interviewee, “They were cheating more, copying more and the lower achieving students… I didn’t hear from them at all. We completely lost them” (F1).

The exchange of assessment materials was problematic and, in a context where typically Chinese parents can be pre-occupied with grades, this was exacerbated. As recounted by one interviewee,

> It was hard for me to keep track of assignments. I got my co-teacher to take pictures and I was receiving 200 plus documents on my phone. I didn’t open them in time and some expired, so I had to ask them to send some again. It was not efficient in terms of organization. (I7)

Differentiation of instruction, in order to respond to the continuum of learning abilities and styles, was deemed more difficult by the majority of the survey respondents. Participants mentioned that not being present to see student’s progress firsthand posed a problem. Students could have

easily collaborated on some assessments that were meant to be done individually. Previously, teachers in this cohort would have taught these students in person when they had started in the Grade 10 level of the school. Because of the shift to online learning, that particular mode of interaction was compromised. This is not to say the teachers did not make an effort to determine student backgrounds; it was just a new way for them to connect with students and they were admittedly lacking appropriate effective approaches in the online environment. Without a knowledge of students' personal interests and preferred learning styles, it was difficult to meet the needs of individual students. Whether the students already knew the teacher or not, participants were unanimous in saying that a level of personal connection was missing when classes moved online. The frustration due to the lack of communication is evident in these two focus group excerpts, "Some students I didn't even hear from or receive anything from the entire duration" (F3). "It hurts me to say it, but it was a write off. I wasn't able to challenge the more academic students and I wasn't able to help the less academic students" (F2).

Language Teaching Issues

Participant teachers claimed that, although all aspects of learning were compromised, it was specifically the students' skills in the English language that suffered most. The switch to online learning in most cases got rid of any informal opportunity to speak while technological and audio problems made speaking in the class difficult as well. By all accounts, any teacher assistant that was physically in the classroom spoke in the Chinese language and rarely encouraged an English-speaking environment. Although all grade levels were impacted negatively from the change, Grade 10 students just entering the program seemed to be hit the hardest. The participants suspected this was mostly due to it being their first time in a fully English language program but not being exposed to an immersive environment. As predicted by one principal,

> Now the Grade 10s, on the other hand, are struggling this year and it's certainly, it's because they are new to the program, their English skills are going to be, you know, less developed and it's going to be - it's going to be - an issue for them. (P1)

Options to Mitigate Negative Impacts

Some teachers found ways to do their best to recreate the personal connection that was diminished in the online classroom. One participant hosted daily morning meetings where students could communicate with the teacher and fellow students freely about random topics of interest and concern. This 20-minute session allowed for enhanced personal connections and gave extra opportunity for the students to practice their English-speaking skills. As proffered by one teacher, "We had a morning meeting with the students. It wasn't always just class meetings. Sometimes we logged in just to chat. This helped a lot and led to better relationships" (F4).

With the challenges that traditional assessment presented, many teachers (with support from administration), found that authentic assessment worked well in the online format. Teachers suggested they capitalized in part on the established benefits of project-based learning (Aldabbus, 2018; Astuti et al., 2021). In the focus group one participant suggested, "Project-based learning is a more authentic learning experience for the students. It could be planned with outcomes in mind and in accordance to student ability." (F1).

Support

The Chinese schools remained supportive as the learning shifted to the online domain. In the period February -April 2020 students were learning online yet were in the home environment. When students transitioned from home back to the classroom for online learning (May-June 2020), often Chinese support teachers were present for technological troubleshooting, supervising, and assisting students as needed. In most cases, curriculum support classes led by Chinese teachers continued with little disruption. While this was a reactive solution to an enormous transition, teachers were unanimous in suggesting that students were not receiving effective English learning even as they learned the core subjects. For instance, one teacher in the focus group said, “An English teacher is not in the room. This makes it hard to ensure English is being spoken” (F2).

Despite this level of support, the majority of teachers felt that the Chinese schools could have done a much better job supporting the distant teachers in a variety of areas. Sometimes much-needed resources were not purchased - a simple example was the resistance to improving the audio-visual equipment in classrooms; many teachers alluded to poor audio for both students and teacher which was clearly detrimental to language learning. Although one school mandated 45-minute classes and used Zoom® as their choice technology for teaching, the school then reduced class time to 40 minutes to avoid paying for the premium version of Zoom®. The reduction of class duration for an already precarious teaching mode impacted learning. Nonetheless, teachers were sensitive to the decision-making that accompanied the pedagogical shift. “In all honesty I can’t really fault them because just as I was unprepared, they were also unprepared” (I1).

The focus group suggested that, at times, the administration of the Chinese school was demanding better performance from the teachers with few suggestions to assist them. Teachers communicated discontent with this attitude given they were under so much pressure to perform their duties in an ever-changing pedagogical landscape with an overwhelming workload. For some, there was pressure from Chinese schools to return to China to be present for live classes; this was despite the fact it may be unsafe, not economically feasible, or perhaps not even lawfully possible to return. This was deemed incredibly unsupportive by those who were affected. It was uncovered in interviews of teachers and principals that Chinese parents/administration often had the opinion that teachers did not want to return to China. One principal recounted being accused of telling his staff not to return. Conversely, foreign teachers found it odd that the Chinese administration were not doing enough to help them get back to their teaching posts in China (i.e., assisting with travel documents, work visas, vaccines, etc.).

The North American governing bodies were far more supportive of the teachers’ safety and interests in this situation, but according to some teachers, fell short in other areas of concern. Teachers in the focus group made these comments of their principals (as representatives of the North American body), “My principal just gave students and parents what they wanted. They also put a lot of pressure on us to get back to China. This was uncalled for and added a lot of extra stress” (F3). “We taught from 9 PM at night to 3 AM in the morning. I think she could have fought for us a little more to change this" (F5).

It was evident from interviews, that some principals set up platforms for sharing resources or even the establishment of online professional learning communities. In some cases, they created a Moodle® for a program where assignments could be more easily shared and submitted. In

interviews, the principals had a more positive attitude towards the helpfulness of the North American governing bodies than the teachers. They cited several supports which included: a compilation of online learning resources, a summer learning academy with online learning workshops, and a question-feedback resource for principals. The range, quality, and usefulness of the resources were questioned by teachers in interviews and the focus group. For example, one respondent said, "We needed more help with adaptation of resources that can work in China. Perhaps the North American Organization should have tested programs first before recommending we use them in China. Some of them didn't work" (F2). Teachers felt they needed far more training as stated by one teacher in the focus group, "We should have had a lot of training sessions on how to use the technology. Especially for the more traditional teachers. Some older folks I know were completely drowned and it wasn't fair" (F1).

What Did Principals Notice About the Process?

In order to corroborate teacher observations and better understand the challenges of a unique pedagogical situation, it was deemed useful to get a system perspective from educational administrators in the offshore schools. Three principals were interviewed separately using Zoom®. These 60-minute interviews were audio recorded, transcribed, and coded for emergent trends (Huberman & Miles, 2002).

The following are common challenges these experienced educators noted.

With Respect to Technology

When students began online learning from home, principals reported that teachers made effective use of breakout rooms and allowed children to use their phones to support learning (i.e., teacher questions, interaction with other students). Teachers often asked students to leave their video on so that they might see their interaction and observe facial expression in terms of English pronunciation; this had varying success.

Principals all agreed that the transition of children from home computers (at the onset of COVID-19) back to the classroom (with the teacher still communicating from abroad) was problematic. The biggest hurdle was poor communication. The microphone systems in classrooms as well as the projected teacher audio were poor. Students were not always visible online to the teacher. There were Chinese chaperones in some of the classrooms, but they were entrusted more with management than translation and the children were well-aware these adults had no power to enforce classroom conduct. Given that teachers needed to give instructions and students needed to respond to discussion prompts, not being able to hear was a big problem. From a teacher's perspective, not being able to coach children or hear their pronunciation seriously compromised the English language learning not just the subject learning. Further, in an effort to maintain lower costs, by subscribing to shorter duration communication tools (Zoom for 40 minutes), class times were reduced. Coupled with intermittent Internet dropouts, the classroom approach was not considered seamless.

Adapting to Pressures

Principals frequently heard that teachers were fatigued because of the time-zone difference. Many teachers were teaching from 9 pm to 3 am their local time and spent that time entirely in front

of a screen. Into the evening, Chinese-time, they were receiving texts and social media questions from their students. Teachers often expressed financial pressures as they needed accommodation with living expenses in their home countries. First and foremost, with the rapid onset of online learning, teachers were in need of professional development support from their principals especially those that had little aptitude for instructional technology. This is not a surprising finding as the literature documents the instructional leadership responsibility as paramount during the pandemic (Westberry et al., 2021). Further, Westberry et al. (2021) suggested themes of concern for virtual principals during the pandemic, such as, "increased presence and communication, projecting calm during uncertainty, displaying flexibility, empathy and patience, knowledge of technological capability and a systems approach to sustained instructional leadership" (p1). From a cultural perspective, teachers and principals shared the concern that Chinese parents expected teachers to return to their teaching post in China. As parents, they had sensed a lack of language learning in the online environment. This of course was beyond the control of teachers due to international travel constraints, yet parents often thought it was a laziness or lack of professionalism on the part of the teacher. This public attitude invoked another pressure that teachers frequently felt.

Discussion

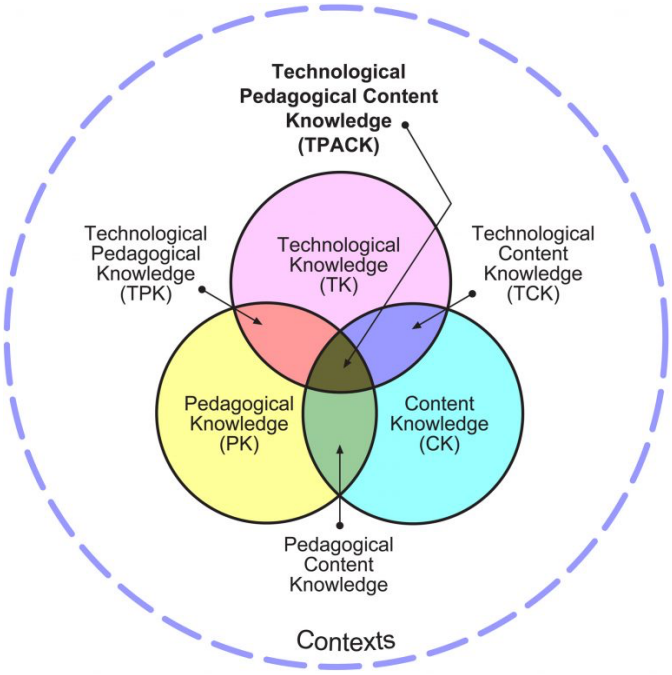
While the impact of the pandemic on public school learning has been well documented in the literature, an account of the emergency remote teaching that has occurred in ESL classrooms is rare.

The Technological, Pedagogical, Content Knowledge (TPACK) model (Figure 1) reminds us that while teachers may possess content and pedagogical knowledge, their confidence and ability to empower both domains with technology cannot be presumed. This model (Mishra & Koehler, 2006) aptly prompts us to think about how our content knowledge is best taught and further how technology can empower that teaching through unique pedagogies. In the pandemic context, the teachers were tasked, rather suddenly, with leveraging technology to teach core subjects. This was not a trivial undertaking as many teachers would have already adopted signature classroom pedagogies (Gurung et al., 2009; Ham & Schueller, 2012) and best ways of teaching their subject unrelated to technological interventions.

The aforementioned research identifies some of the challenges faced by teachers as they negotiated the rapid change to online learning. Our sample was a dedicated group of professionals who sincerely wanted to offer quality education in a difficult circumstance. Figure 2 depicts a summary of the hurdles to effective instruction in this context.

Figure 1

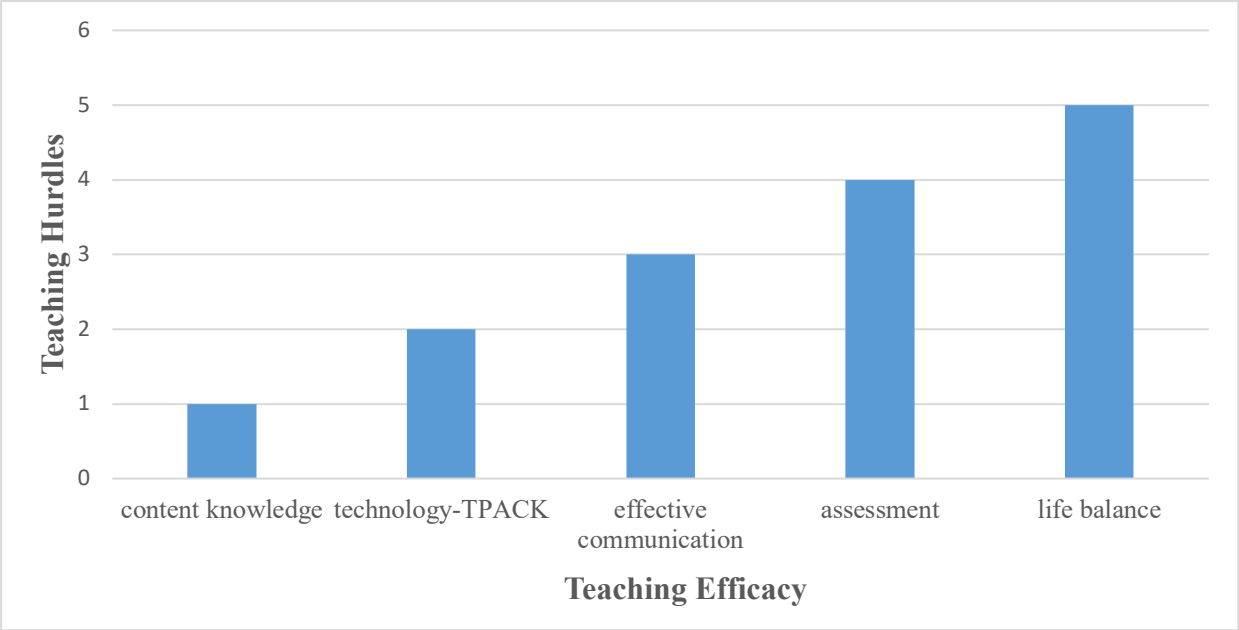
A Model For Considering How Technology and Pedagogy Intersect: TPACK



Note. Used with permission from source: http://tpack.org

Figure 2

What Did Teachers Need to Overcome?



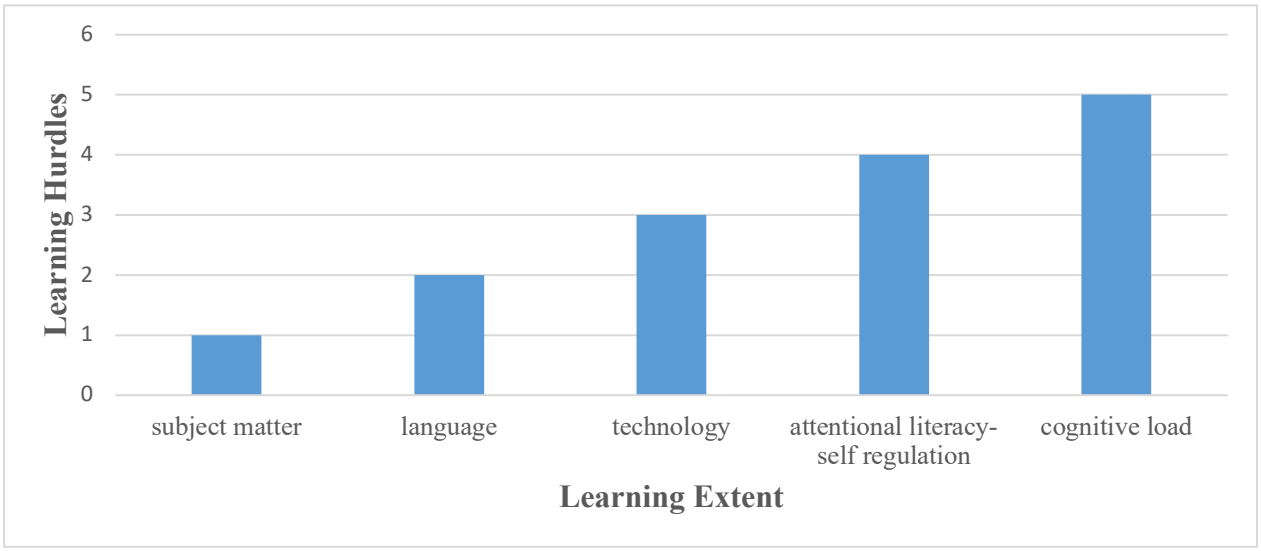
From the students' perspective, one must consider the predictable challenge of not only using technology, not only learning the core subject, but doing so in a different language other than their native tongue. While the literature has documented (Voogt & Knezek, 2021) significant challenges with a single-layer learning hurdle (i.e., learning in the online format), one might predict a significant cognitive load (Sweller, 2019) placed on a student trying to learn in this setting in an unfamiliar language. Based on the work of Atkinson and Shiffrin (1968), Sweller's cognitive load

theory is built upon the premise that incoming information is first dealt with in sensory memory, then working memory, and finally long-term memory. It further suggests that working memory is limited in its capacity and that learning can be affected detrimentally if multiple activities are happening in the learning space. Sweller has deconstructed the working memory process to consider concepts of split attention and dual modalities as they relate to mixing auditory and visual information. Suffice to say, multiple streams of knowledge via different modalities reduces working memory and therefore by association, long-term memory (i.e., retention and learning).

In many cases this may be complicated with the implied nature and culture of learning at home. When language and culture are real barriers, it requires a tremendous discipline to avoid distraction on the student's behalf. Pegrum and Palalas (2021) draw our attention to the notion of attentional literacy. In their discussion, they suggest, "When students learn online, they do so within a wider context of digital disarray, marked by distraction, disorder and disconnection, which research shows to be far from conducive to effective learning" (p 1). This is firmly entrenched in literature (Bandura, 1991; Ackerman, 2021) concerning students' ability to self-regulate a disciplined approached in the absence of a structured and monitored classroom. When Chinese children were working from home with their distant teachers, the extent of learning was clearly dependent on their ability to attend classes in front of a computer. In order to avoid distractions and maintain concentration, students would have to regulate their behaviour in disciplined ways. Teachers in interviews were not convinced that students were parent-monitored much less present (physically and cognitively) during their classes. Figure 3 offers a simplistic summary of what our research suggests students were likely to have experienced in trying to learn in these contexts.

Figure 3

What Did Students Need to Overcome?



Moving Forward

How Can Teachers Feel Better Prepared?

In preparing for a similar context, the culmination of the empirical feedback from teachers and principals highlights certain areas of suggested improvement in this system of teaching core

subjects online in English to non-native speakers:

- a readily available centralized online learning platform
- effective communication/feedback tools with clearly defined parameters for student use
- better-equipped classrooms where communication with individual students is not only feasible but clearly audible and visible
- use of technology-appointed classrooms rather than home-based instruction; this promotes more social construction of knowledge between students and avoids the inevitable issues associated with attentional literacy, digital disarray, and lack of self-regulation. While many at-home situations provided clearer teacher-student communication through personal computer systems, the benefits of face-to-face social constructivism were lost
- a revamped assessment system to diminish testing in favor of project-based learning
- an onsite translator and teaching assistant as part of the teaching and learning process
- culturally responsive curriculum materials best suited for online learning
- professional development around teaching and learning strategies associated with the online learning environment
- professional development around available instructional technologies related to second language learning
- provision of home government resources and digital repositories to support curriculum

While the researchers believe these findings and recommendations are representative of similar settings, the study is clearly limited by the convenience sample. The categories of challenges go beyond a typical well-planned online course and highlight instead the intuitive response of teachers put in an emergency situation where reactive pedagogical decisions were made.

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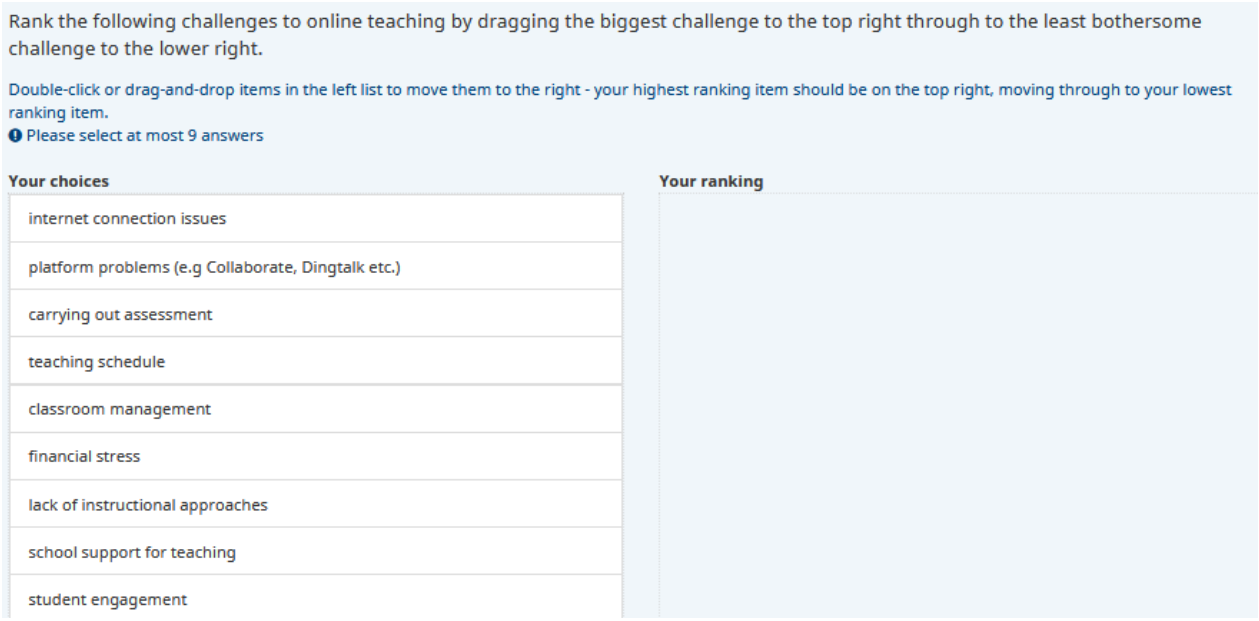
Appendix 1

Survey Items With 5 Point Likert Scale

1. I had extensive experience in online teaching before the onset of the Covid virus.
2. Adjusting my pedagogy to the online teaching environment has been seamless.
3. The software I used for conducting online classes performed without issue.
4. The Internet connection I had access to was adequate for communicating online.
5. Students complain about not being able to see graphics I share in the online environment.
6. Collecting assignment work in the online environment is tedious.
7. I feel confident that students get timely feedback on assignments in the online system I use.
8. Assessment of students' work is problematic in the online environment.
9. I am confident that students understand my assignment instructions.
10. Testing is particularly difficult in the online environment.
11. I am concerned that students may collaborate during testing.
12. I have sensed indications that students are not engaged in their learning.
13. Differentiation of instruction is more difficult in the online environment.
14. Students with learning challenges are at a disadvantage when I teach exclusively in the online environment.
15. Students are well behaved in my online classes.
16. Overall, academic performance has suffered because of the switch to online learning.
17. I feel I can assist students to their satisfaction when they have questions.
18. I believe I am a better teacher as a direct result of having to modify my pedagogy to the online environment.
19. I am able to maintain a healthy work-life balance.
20. Correcting assignments online takes longer than in the face-to-face classroom context.
21. I believe students' proficiency in spoken English is better promoted in the online learning environment.
22. I think that students' learning of core subject knowledge has suffered because of my change in pedagogy.
23. I am satisfied with my schedule with regard to the time of day I must teach classes.
24. My living arrangement since leaving China is ideal.
25. I am not able to give students feedback online as often as I would like.
26. I feel well-supported by the Chinese administration at my school.
27. The North American governing body (Department of Education, School Board etc.) offers sufficient support for those of us teaching online.
28. The North American governing body's supports are easily accessible.
29. Maintaining a healthy lifestyle while in this situation has been challenging.
30. My finances have suffered as a result of the current situation.
31. This online experience has caused me undue stress.
32. This online experience has distracted me from becoming a better teacher.
33. Despite the change in pedagogy, I found the online teaching to have positive attributes.

Appendix 2

Ranking Question in Survey



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University Student Satisfaction and Behavioural Engagement During Emergency Remote Teaching

Satisfaction des étudiants universitaires et engagement comportemental pendant l'enseignement à distance d'urgence

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Abstract

This study aimed to examine students' online learning satisfaction in the context of emergency remote teaching. The research was carried out using a concurrent triangulation design with mixed methods. The quantitative data were collected from 2,663 students studying at different faculties/ schools of a state university in Türkiye in the fall semester of the 2020–2021 academic year. Qualitative data were collected from 494 students who expressed their opinions through open-ended questions or free text. Participants consisted of students who participated voluntarily according to the convenient sampling method. An e-satisfaction scale was used to determine students' online learning satisfaction. The number of logins to the learning management system (LMS), logins to live courses, and recorded course views of students were considered to be behavioural engagement indicators. According to the findings, the students had a moderate level of satisfaction. There was a significant difference between both academic achievement and behavioural engagement of students with satisfaction levels. Students frequently mentioned these themes: longing for face-to-face education, the usefulness of the LMS, inadequate assessment, the inefficiency of online learning, technical problems, challenges of the process, and insufficient instructors. This study recommends that instructors, educational authorities, and policymakers consider online student satisfaction for a successful digital transformation in higher education.

Keywords: Online learning satisfaction; Emergency remote teaching; Behavioural engagement; Academic achievement

Résumé

Cette étude visait à examiner la satisfaction des étudiants en matière d'apprentissage en ligne dans le contexte de l'enseignement à distance d'urgence. La recherche a été menée dans un plan de triangulation simultanée à partir de la méthode mixte. Les données quantitatives de l'étude ont été collectées auprès de 2,663 étudiants étudiant dans différentes facultés/écoles d'une université d'État en Turquie au cours du semestre d'automne de l'année universitaire 2020-2021. Des données qualitatives ont été collectées auprès de 494 étudiants qui ont exprimé leur opinion à travers des réponses en texte libre. Les participants sont des étudiants qui ont participé volontairement selon la méthode d'échantillonnage pratique. L'échelle de satisfaction électronique a été utilisée pour déterminer la satisfaction des étudiants en matière d'apprentissage en ligne. Le nombre de connexions au système de gestion de l'apprentissage (LMS), de connexions aux cours en direct et de vues de cours enregistrées des étudiants sont des indicateurs d'engagement comportemental. Selon les résultats, les étudiants ont un niveau de satisfaction modéré. Il existe une différence significative entre les réalisations académiques et l'engagement comportemental des étudiants avec les niveaux de satisfaction. Les étudiants ont fréquemment mentionné ces thèmes: désir de retourner à l'éducation en face à face, l'utilité du LMS, l'évaluation inadéquate, l'inefficacité de l'apprentissage en ligne, les problèmes techniques, les défis du processus et les instructeurs insuffisants. Cette étude recommande aux enseignants, aux autorités éducatives et aux décideurs politiques de prendre en compte la satisfaction des étudiants en ligne pour une transformation numérique réussie dans l'enseignement supérieur.

Mots clés: Satisfaction d'apprentissage en ligne ; Enseignement à distance d'urgence ; Engagement comportemental ; Réussite académique

Introduction

The convenience and flexibility of online learning have made it a part of contemporary education (Shawai & Almaiah, 2018). Online learning provides opportunities for students to access teaching content anywhere and anytime. These opportunities have increased the use of online learning in higher education (Park & Kim, 2020). After the World Health Organization declared COVID-19 a global pandemic, education was suspended in many universities. This situation forced universities to rapidly transition to online learning.

The COVID-19 pandemic forced instructors to integrate new materials and methods into their courses in a very short time (Giray, 2021). Universities were given little time to prepare their instructors and students for digital technologies (Salas-Pilco et al., 2022). While course design normally takes months, during this crisis, it was necessary to find rapid solutions (Hodges et al., 2020). This period, called *emergency remote teaching* (ERT), brought concerns about the effectiveness of education (Ali, 2020; Cutri et al., 2020). Student satisfaction emerged as a new concern during this period (Baber, 2020).

Student satisfaction is an important part of educational activities. To carry out online learning in higher education, great attention should be paid to student satisfaction (Pangarso & Setyorini, 2023). In order not to compromise quality, the educational process should be constantly monitored (Crawford et al., 2020). Feedback from students is an important part of determining the quality of education (Giray, 2021). This feedback enables the evaluation of the process by comparing the expectations of the students with the current situation. To determine the current situation and make improvements, the satisfaction of students should be checked periodically (Gülbahar, 2012). Evaluating student satisfaction allows educational institutions to improve online learning (Kuo et al., 2014). Increasing student satisfaction also increases the brand image of universities (Shehzadi et al., 2021). Unfortunately, during the ERT period, students remained in the background as the focus was on the transition to online learning.

Educational activities have not been the same since COVID-19. The pandemic caused important changes in educational activities (Daniel, 2020). This period accelerated the transition to online learning and became a turning point for universities (Affouneh et al., 2020). Many universities are working to make online learning a permanent part of their educational activities. It is always possible to return to ERT during hurricanes, floods, earthquakes, wars, and other new situations that may occur in the future. For example, the 7.7 and 7.6 magnitude earthquakes that took place in Türkiye in February 2023 caused great destruction in 10 provinces. Because of the earthquakes in Türkiye, the Council of Higher Education (2023) decided to complete the spring term of the 2022–2023 academic year through online learning. Therefore, online learning should be a part of universities (Hodges et al., 2020), and for sustainability, online learning should be continued after crisis periods (Ye et al., 2023).

Higher education institutions are investigating how they can improve students' online performance and satisfaction. For this, it is necessary to determine firstly the qualities that affect students' online learning satisfaction (Agyeiwaah et al., 2022), engagement, and academic achievement (Butt et al., 2023). ERT has offered all stakeholders in education the opportunity to experience online learning. The experiences during this period provide important opportunities to increase the quality of online learning.

Literature Review

We reviewed literature in these three areas: emergency remote teaching; online learning satisfaction; and engagement and academic achievement.

Emergency Remote Teaching

Online learning conducted during the pandemic was a temporary solution called emergency remote teaching (ERT; Bozkurt & Sharma, 2020). Emergency remote teaching is a rapid transition from face-to-face learning to online distance learning in unplanned situations (Affouneh et al., 2020), which aims to meet the needs of students easily and reliably (Hodges et al., 2020). Although ERT and online learning are different concepts, online distance learning experiences are used in ERT and offers

all students and instructors the opportunity to experience online learning (Toquero, 2020). ERT is a great chance to evaluate and develop online learning in higher education.

Advances in computer technologies have a great impact on the popularity of online learning (Cidral et al., 2018). However, it should not be forgotten that technology is a tool, not a goal. Although they are central during a crisis period, technological solutions need reconsidering for long-term use. It should be noted that the purpose of education is learning, and teaching alone does not guarantee learning (Schlesselman, 2020). For this reason, online solutions should go beyond delivering the teaching content and focus on the quality of education (Affouneh et al., 2020). Students and their satisfaction should be the focus of online learning (Bozkurt & Sharma, 2020).

Online Learning Satisfaction

Student satisfaction is defined as students' perceptions of online learning and their experience in the learning process (Kuo et al., 2014). Satisfaction is an important factor that determines the success and quality of online learning (Moore & Kearsley, 2012). Online satisfaction is related to many sub-factors including communication and usability, teaching process, teaching content, interaction and evaluation (Gülbahar, 2012).

Daultani et al. (2021) stated that system features are an important predictor of satisfaction. The quality of the system has a positive and significant effect on students' satisfaction (Al Mulhem, 2020). Well-structured and easy-to-navigate system design increases user satisfaction (Pham et al., 2019). The ease of use of the system increases students' satisfaction and their continuous intention to use online learning (Ye et al., 2023).

The quality of the instructor and the course structure is another factor affecting satisfaction (Daultani et al., 2021; Wei & Chou, 2020). Instructor performance is an important variable that has an impact on students' online satisfaction (Herwin et al., 2022). Teaching style has a significant impact on satisfaction and is a determinant of the quality of teaching (Osman & Saputra, 2019). In addition, instructors have positive effects on student engagement and satisfaction (Pham et al., 2019). Barbera et al. (2013) stated that course design has an impact on both student satisfaction and learning.

One of the variables that affects both student satisfaction and achievement is teaching content (Barbera et al., 2013). The quality of teaching content has a positive impact on students' online learning satisfaction (Al Mulhem, 2020). Well-prepared teaching content may enable students to have a successful learning experience (Simonson et al., 2019). Teaching content in the online environment should be designed to attract students' attention and meet their needs (Kumar, 2021). Agyeiwaah et al. (2022) stated that engaging and motivating instructional content will increase students' online learning satisfaction.

It is stated that interaction is important to provide a better online learning experience and can increase the academic achievement of students (Kurucay & İnan, 2017). It is also seen that interaction is an important predictor of online learning satisfaction (Hamdan et al., 2021). Besides interaction, evaluation also has a significant impact on student satisfaction (Gee, 2018).

Engagement and Academic Achievement

Engagement refers to students' participation or effort in online activities (Henrie et al., 2015). In other words, it is the experience of students depending on the time they stay in the online learning environment (Lewis, 2011). Students' satisfaction depends on the time they spend on online activities (Gray & DiLoreto, 2016). Students' continuous intention to use online learning depends on their satisfaction (Ke & Kwak, 2013). Khan et al. (2023) stated that satisfaction plays a mediating role between the quality of online learning and engagement. At the same time, engagement is an important factor affecting the achievement of students (Baber, 2020).

Engagement is a multidimensional concept including behavioural, cognitive, and emotional engagement (Fredricks et al., 2004). This study focuses on behavioural engagement, which refers to observable behaviours related to students' learning. Behavioural engagement has a significant effect on students' learning performance, and it is positively corelated with learning performance (Tsay et al., 2018).

During the crisis, the focus was on technological solutions and students remained in the background. Student satisfaction is an important variable that directly affects the success and quality of online learning. At the same time, the success of online learning depends on the engagement of students in the educational process. Engagement is an important predictor of academic achievement. Ensuring satisfaction increases students' engagement in online learning and their academic achievement. Feedback from students gives important clues about interventions which can increase satisfaction. In this context, this study found that feedback is important in terms of revealing the needs and expectations of students which can provide valuable guidance to instructors, educational authorities, and policymakers who may be able to identify new strategies to improve online learning in higher education. It is very important to examine and scientifically report the experiences with ERT so that mistakes are not repeated.

Purpose of the Study

This study aimed to examine students' online satisfaction in the context of ERT. The research questions were:

1. What are the mean scores of online learning satisfaction of the students?
2. Does the academic achievement of students differ significantly according to online satisfaction levels?
3. Does the behavioural engagement of students differ significantly according to online satisfaction levels?
4. What is the opinion of students of online learning?

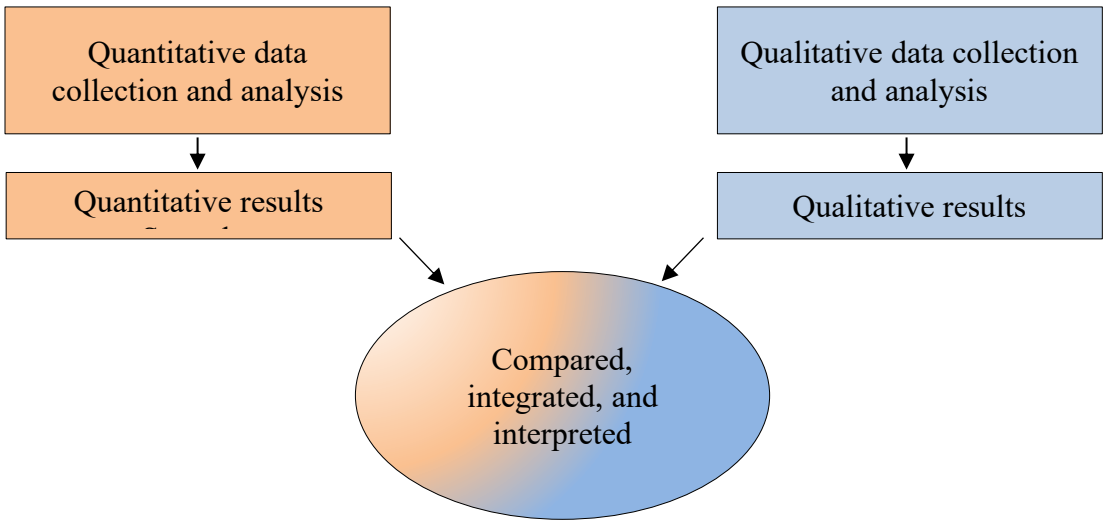
Methodology

Research Design

The research was carried out in a concurrent triangulation design using mixed methods (Creswell, 2014). Quantitative data were collected with the descriptive survey model. Qualitative data consisted of students' opinions about their experiences in online learning. Each data type was collected and analyzed separately. Statistical and thematic results were presented separately. The findings were combined and interpreted (Figure 1).

Figure 1

The Model of the Study



Sample

The quantitative data of the study were collected from 2,663 students studying at different faculties/schools in a state university in Türkiye in the fall semester of the 2020-2021 academic year. Students participated voluntarily according to the convenient sampling method. Qualitative data were collected from 494 students. All 2,663 participants responded to the e-satisfaction scale, however, 494 of these participants reported their ideas about online learning via open-ended questions or *free text*. The demographic characteristics of participants is shown in Table 1.

Table 1

Demographic Information of Participants

Variable	Group	Quantitative[a]		Qualitative[b]	
		[a]*n*	%	[b]*n*	%
Gender	Female	1,501	56.4	222	44.9
	Male	1,162	43.6	272	55.1
Grade level	First grade	1,989	74.7	229	46.4
	Second grade	354	13.3	125	25.3
	Third grade	146	5.5	69	13.9
	Fourth grade	174	6.5	71	14.4
Education level	Associate degree	1,032	61.2	145	70.6
	Licence	1,631	38.8	349	29.4
Faculty/College	Sports sciences	137	5.14	48	9.7
	Dentistry	18	0.68	5	1.0
	Education	359	13.48	83	16.8
	Marine sciences	33	1.24	5	1.0
	Arts and sciences	443	16.64	86	17.4
	Fine arts	118	4.43	24	4.9
	Theology	92	3.45	21	4.3
	Vocational schools	611	22.94	88	17.8
	Music and performing arts	23	0.86	7	1.4
	Health science	93	3.49	10	2.0
	Social sciences	202	7.59	19	3.8
	Technical sciences	219	8.22	38	7.7
	Economics and administrative sciences	203	7.62	38	7.7
	Agriculture	112	4.21	22	4.5

Note. [a] $n = 2{,}663$. [b] $n = 494$.

Implementation

The study covered a period of 17 weeks of education, with 15 weeks of lectures and 2 weeks of assessment. Education processes such as delivering teaching content, management of students, and planning of courses were carried out on the Moodle LMS. All courses were conducted live (synchronously) via the teaching platform BigBlueButton[1]. Students were able to access course recordings. Asynchronous teaching content and online activities were carried out by the instructors on the LMS. Assessments were made in the form of homework and online exams. Log records such as the number of logins to the live course, the number of recorded course views, and the number of logins to the LMS were recorded by the LMS. These log records, which showed the students' activities in online learning, were used as behavioural engagement data. At the end of the semester, students' online learning satisfaction levels were measured using the e-satisfaction scale. The scale was distributed to students online via Moodle and made available to all university students (n = 6,740) for one week. A message was sent to students asking them to respond to the scale and those who responded (39.5% of all students) were also asked to give their opinions about their online learning experiences at the end of the scale. The fall semester general grade point means were taken from the LMS.

Data Collection Tools

The e-satisfaction scale developed by Gülbahar (2012, p. 9) was used to determine students' online learning satisfaction. The Likert-type scale consists of 29 items and 4 sub-factors (Table 2).

The Cronbach's alpha reliability coefficient of the entire scale was 0.97, and sub-factors ranged from 0.91 to 0.96. A Chi-Square Goodness of Fit test revealed that the model was a good fit: $\chi 2$ (358, N = 2,699) = 3278.64, $p < .000$. Results of further testing for fitness are shown in Table 3. It is stated that the standardized coefficients of the items are between 0.26 and 0.89 and are significant at the 0.01 *p*-level. The items in the scale range from "*Never (1)*" to "*Always (5)*" according to the 5-point Likert-type grading scale.

The students' opinions regarding online learning experiences were collected through open-ended questions or free text answers. The online activities such as the number of logins to the live course, the number of recorded course views, and the number of logins to the LMS was recorded by the LMS. These log records were used as indicators to determine students' behavioural engagement in online learning. Indicators are the most common method used to determine students' behavioural engagement in online learning environments (Henrie et al., 2015).

The student's general grade point means were evaluated for academic achievement. General grade point means vary between 0.00–4.00 and reflect the students' achievement in teaching activities (Kurucay & İnan, 2017). Students' grade point means is the most important indicator of the success of academic activities, and it is used to examine the effect of instructional activities (Eom & Ashill, 2016).

[1] https://bigbluebutton.org

Table 2

E-Satisfaction Scale Sub-Factors

Sub-Factor	Items (*n*)	Definition
Communication and usability	7	Satisfaction with the usefulness and/or ease of the online learning environment
Teaching process	8	Satisfaction with instructional design and instructors
Teaching content	4	Satisfaction with the presentation of teaching content and teaching materials
Interaction and evaluation	10	Satisfaction with interactive activities and the evaluation process

Note. Items range from 1 (*never*) to 5 (*always*).

Table 3

E-Satisfaction Scale Model Fit

$\chi 2$	RMSEA	S-RMR	GFI	AGFI	CFI	NNFI	IFI
3278.64*	0.064	0.037	0.90	0.88	0.99	0.99	0.99

Note. RMSEA = root-mean-square-error of approximation; S-RMR = standardized root-mean-square residual; GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; CFI = comparative fit index; NNFI = nonnormed fit index; IFI = incremental fit index.

*$p < .000$.

Analysis of Research

Descriptive statistics were used to determine students' online satisfaction levels. The students were divided into three levels, low, moderate, and high, according to their satisfaction mean scores ranging from 1 to 5, according to a 5-point Likert-type scale. Between 1.00 and 2.33 was considered low level, between 2.34 and 3.67 moderate, and between 3.68 and 5.00 as high (Korkmaz et al., 2015). One-way analysis of variance (ANOVA) was used to determine whether there was a significant difference in academic achievement and engagement of students according to satisfaction levels (Tabachnick & Fidell, 2019).

Since the skewness and kurtosis values of the scores obtained from the independent samples to be compared were in the range of ±1.5, they showed a normal distribution (Tabachnick & Fidell, 2019). Since the variances and sample sizes were not equal, the Games-Howell test was used for post-hoc

multiplicity comparisons (Games, 1971). The skewness and kurtosis values of the variables and the variances between groups are shown in Table 4.

Table 4

Variances, Skewness, and Kurtosis Values of the Variables

Variable	Group	*n*	Skewness	Kurtosis	Levene statistic
Academic achievement	Low	345	-0.498	0.392	0.005
	Moderate	1,349	-0.532	0.224	
	High	969	-0.342	-0.016	
Login to LMS	Low	345	0.959	1.146	0.000
	Moderate	1,349	0.927	1.282	
	High	969	0.836	0.734	
Login to live course	Low	345	0.749	0.215	0.000
	Moderate	1,349	0.683	0.232	
	High	969	0.548	0.052	
Recorded course view	Low	345	0.852	-0.012	0.000
	Moderate	1,349	1.078	1.367	
	High	969	0.820	0.391	

Content analysis was used to reach concepts and relationships on students' opinions. Codes were generated from the qualitative data obtained from the students (Strauss & Corbin, 1990). Associated codes were brought together. These codes were shown with frequency and percentage distribution after editing. Themes were created according to the combined codes. The themes were evaluated separately, according to students with different satisfaction levels. MAXQDA[2] software was used in the analysis of qualitative data and SPSS statistical software was used in the analysis of quantitative data.

Results

Research Question 1

Mean scores were calculated by dividing the total score by the number of items in the satisfaction scale. Satisfaction mean scores and standard deviation values are shown in Table 5.

[2] https://www.maxqda.com

Table 5

Satisfaction Mean Scores and Standard Deviations

Sub-Factor	*M*	*SD*
Satisfaction scale	3.33	0.87
Communication & usability	3.58	0.89
Teaching process	3.30	0.95
Teaching content	3.51	1.06
Interaction & evaluation	3.12	1.02

Note. n = 2,663.

While students' satisfaction scores were 3.33, their satisfaction sub-factor scores ranged from 3.12 to 3.58. It can be said that the students had a moderate level of satisfaction. The highest sub-factor mean score was communication and usability, while the lowest mean score belonged to interaction and evaluation. The satisfaction score breakdown was as follows: 12.96% (n = 345) of the students had low-level satisfaction, 50.66% (n = 1,349) moderate level, and 36.39% (n = 969) high-level satisfaction. The satisfaction sub-factor means scores of the students according to their satisfaction levels are shown in Table 6.

Table 6

Satisfaction Sub-Factor Mean Scores According to Satisfaction Levels

Sub-Factor	Satisfaction level					
	Low[a] (1.00 to 2.33)		Moderate[b] (2.34 to 3.67)		High[c] (3.68 to 5.00)	
	M	SD	M	SD	M	SD
Satisfaction scale	1.86	0.33	3.06	0.36	4.25	0.39
Communication & usability	2.23	0.62	3.39	0.63	4.32	0.46
Teaching process	1.84	0.46	3.01	0.53	4.23	0.53
Teaching content	1.84	0.56	3.25	0.72	4.46	0.53
Interaction & evaluation	1.62	0.42	2.78	0.57	4.12	0.60

Note. [a] *n* = 345. [b] *n* = 1,349. [c] *n* = 969.

The sub-factor in which students with low and moderate satisfaction levels have the highest score is communication and usability. The sub-factor in which students with high satisfaction levels have the highest score is teaching content. It is seen that the lowest sub-factor mean score of all satisfaction levels is interaction and evaluation.

Research Question 2

The results of ANOVA, applied to test whether the academic achievement mean scores of the students showed a significant difference according to satisfaction level, are given in Table 7.

Table 7

ANOVA Results of Academic Achievement Scores

Satisfaction level	*N*	*M*	*SD*	*df*	*F*	*p*	Post Hoc
Low	345	2.62	0.56	2-2660	29.358*	0.000	3-1*
Moderate	1,349	2.78	0.50				3-2*
High	969	2.86	0.47				2-1*

Note. * significant at $p < 0.01$.

The results show that there is a significant difference between the academic achievements of the students according to their satisfaction levels. The post hoc (Games-Howell) test was conducted to find the difference in academic achievements of students reporting different levels of satisfaction. The results show that students with a high level of satisfaction have higher academic achievement scores than those of the moderate and low level. The academic achievement mean score of the students with moderate satisfaction level is also higher than the low-level students' academic achievement mean score.

Research Question 3

The students' behavioural engagement indicators scores are based on the number of logins to the LMS, the number of logins to live courses, and the number of recorded course views. This study showed a significant difference in engagement in terms of satisfaction levels. According to the results of the post hoc test, all engagement indicators of students with a high level of satisfaction are higher than those of the students with moderate and low levels. Likewise, indicator scores of students with a moderate level of satisfaction are higher than that of low level. ANOVA results of behavioural engagement indicators scores according to students' satisfaction levels are shown in Table 8. The distribution of behavioural engagement scores according to the satisfaction levels is depicted in Figure 2.

Table 8

ANOVA Results of Behavioural Engagement Scores

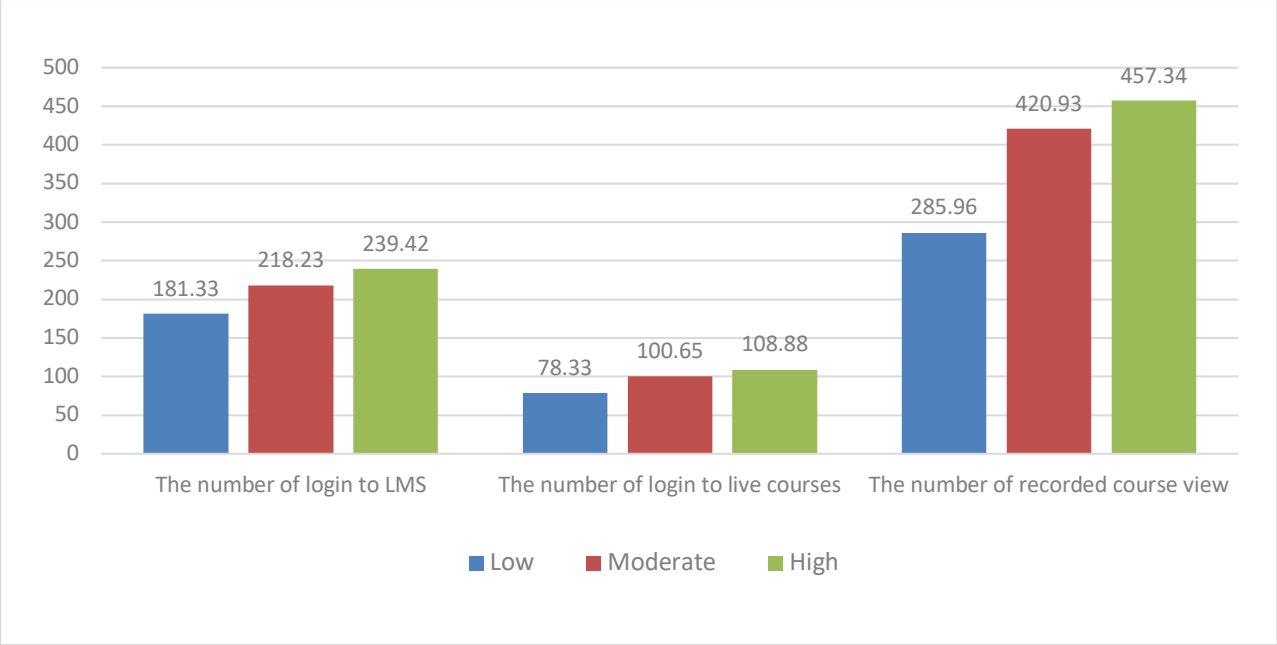
Engagement	Satisfaction level	M	SD	df	F	p	Post Hoc
Number of logins to LMS	Low[a]	181.33	89.46	2-2660	39.220*	0.000	3-1*
	Moderate[b]	218.23	104.4				3-2*
	High[c]	239.42	113.49				2-1*
Number of logins to live courses	Low[a]	78.33	54.64	2-2660	28.816*	0.000	3-1*
	Moderate[b]	100.65	65.44				3-2*
	High[c]	108.88	65.59				2-1*
Number of recorded course views	Low[a]	285.96	207.78	2-2 660	44.395*	0.000	3-1*
	Moderate[b]	420.93	299.87				3-2**
	High[c]	457.34	303.68				

Note. [a] $n = 345$. [b] $n = 1{,}349$. [c] $n = 969$.

* Significant at $p < 0.01$. ** Significant at $p < 0.05$.

Figure 2

Distribution of Behavioural Engagement Scores

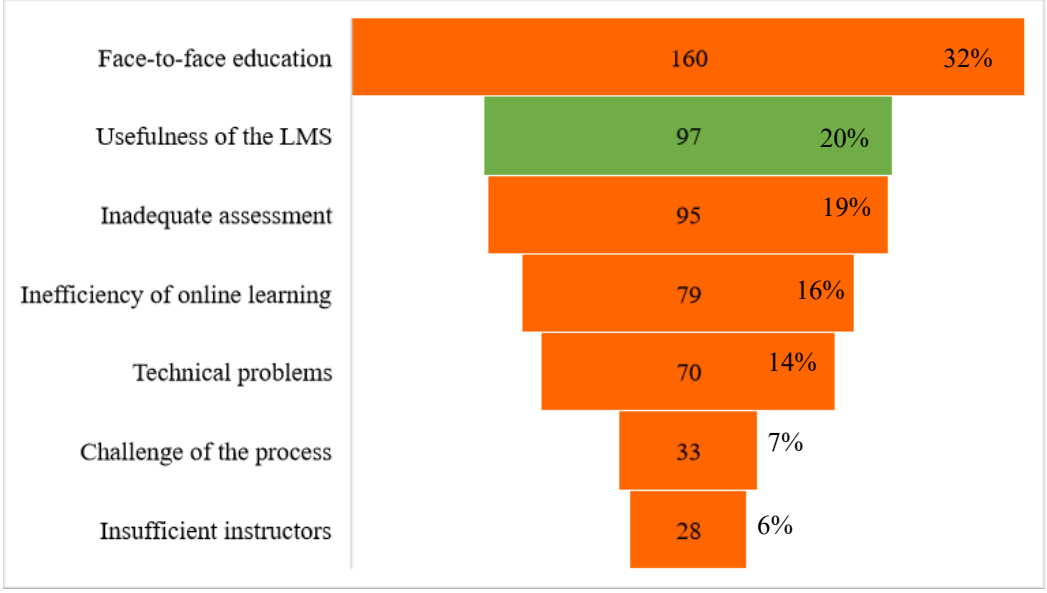


Research Question 4

The students' opinions of online learning were coded using the inductive approach, produced directly from the data. Related codes were brought together. Opinions frequently expressed by the students are shown in Figure 3. Bars with green indicate positive opinions, and orange bars indicate negative opinions.

Figure 3

Frequency and Rate of All Students' Opinions

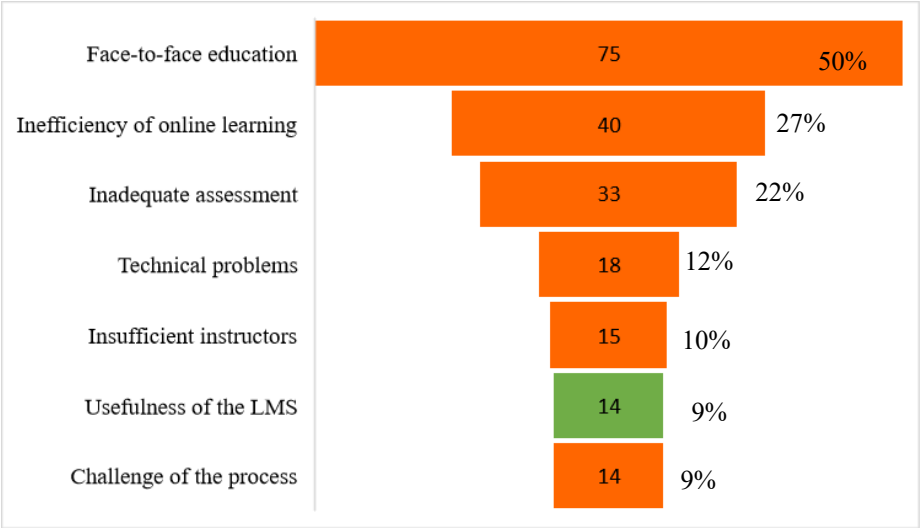


Students with low satisfaction levels generally had negative opinions. The longing for face-to-face education was most frequently mentioned, followed by problems with online learning, assessment, technical opportunities, instructors, and process. Some students gave a positive opinion about the usefulness of the LMS. The opinions most frequently expressed by students with low satisfaction levels are shown in Figure 4.

The rate of negative opinions of students at the moderate level is reduced compared to students with a low satisfaction level. The rate of positive opinion about the usefulness of the LMS increased from 9% to 15%. In addition, the issue of insufficient instructors was not mentioned. The longing for face-to-face education was the most dominant opinion (28%), followed by issues with assessment (23%), technical opportunities (17%), online learning (14%), and process (8%). The opinions most frequently expressed by students with moderate satisfaction levels are shown in Figure 5.

Figure 4

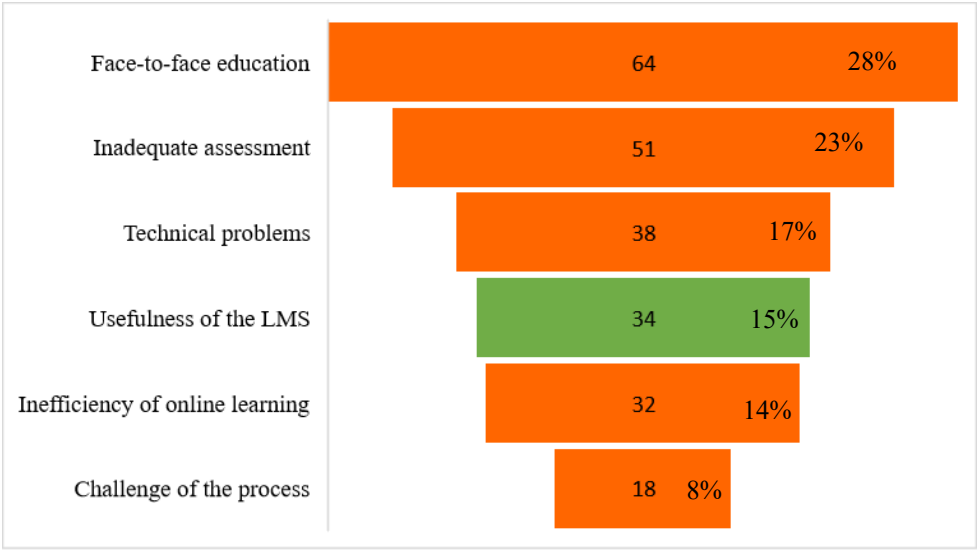
Frequency and Rate of Low Satisfaction Level Students' Opinions



Note. Green indicates a positive opinion. Orange indicates a negative opinion.

Figure 5

Frequency and Rate of Moderate Satisfaction Level Students' Opinions



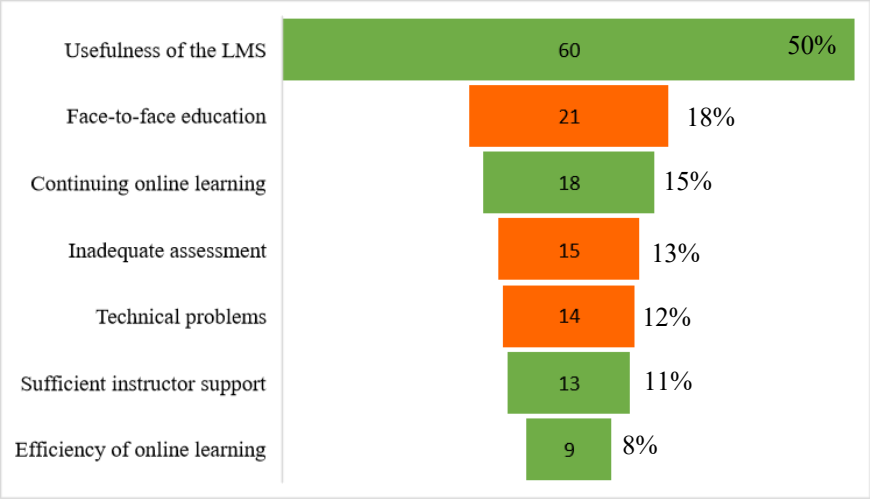
Note. Green indicates a positive opinion. Orange indicates a negative opinion.

Most of the opinions with high satisfaction levels are positive with 50% expressing a positive opinion about the LMS. Unlike the low and moderate satisfaction level students, there were students who had positive opinions about continuing online learning (15%), the support of the instructor (11%), and the efficiency of online learning (8%). Longing for face-to-face education (18%) was the most frequently mentioned negative opinion, followed by issues with assessment (13%) and technical

opportunities (12%). The opinions frequently expressed by students with high satisfaction levels are shown in Figure 6.

Figure 6

Frequency and Rate of High Satisfaction Level Students' Opinions



Note. Green indicates a positive opinion. Orange indicates a negative opinion.

Students at all satisfaction levels longed for face-to-face education. Inadequate assessment, technical problems, and the inefficiency of online learning were the negative situations mentioned by students at all three levels. The rate of negative opinions decreased as the level of satisfaction increased. While 50% of students with low satisfaction levels longed for face-to-face education, this rate was 28% for students with moderate levels and 18% for students with high levels. In contrast to the students with low and moderate satisfaction, students with high satisfaction reported more positive opinions. For these students, the LMS was useful. Similarly, students with low and moderate satisfaction levels found the process more challenging than students reporting high levels. Some of the students with high satisfaction levels wanted online learning to continue in the future. The problems expressed about the instructor by the students with low satisfaction levels turned into satisfaction at a high level.

The qualitative findings were combined with quantitative findings and interpreted within the framework of the literature in the Discussion section.

Discussion

In this study, students reported moderate satisfaction with remote learning in an emergency context. The study conducted by Giray (2021) during the pandemic period, found that the online satisfaction of students was moderate. Similarly, Agyeiwaah et al. (2022) found that students'opinions reflected moderate satisfaction. Other studies have shown that students' online satisfaction decreased

during the COVID-19 pandemic (Hamdan et al., 2021) and students were not satisfied with online learning (Hilmat et al., 2021). Giray (2021) stated that students' online learning satisfaction decreased as the courses could not be adapted to new conditions due to the rapid transition. Hilmat et al. (2021) stated that this decrease was due to the student's desire to maintain their habits in face-to-face education. The most important opinion stated by students in this study, longing for face-to-face education, also shows that students did not want to give up their previous habits. This finding shows that concerns about the difficulty providing for student satisfaction in the rapid transition from face-to-face education to online education (Baber, 2020) are not unfounded. Since most of the students in this study were introduced to online learning during the pandemic period, they were not familiar with online learning pedagogy. Therefore, students compared online learning with face-to-face education.

Communication and usability was the satisfaction sub-factor with the highest means score of students. Usefulness of the LMS was an important opinion expressed by the students. As the level of satisfaction increased, the rate of students who stated that they were satisfied with the LMS also increased. Since the quality of the LMS has a positive and significant effect on student satisfaction (Al Mulhem, 2020), increasing the usefulness of the LMS will also increase student satisfaction. Daultani et al. (2021) stated that student satisfaction will increase if the LMS is well structured in terms of content and functions. A useful and clearly designed LMS will increase students' online satisfaction. Increasing the quality of the system will increase the benefits of online learning (Al Mulhem, 2020; Pham et al., 2019). Pangarso and Setyorini (2023) recommend that universities improve the quality of their LMS to increase student satisfaction, as well as the usefulness of the LMS, and technical problems should be minimized whenever possible.

Technical problems was another factor that had an impact on students' satisfaction. Providing the necessary technical infrastructure is a basic need for online learning (Veletsianos & Houlden, 2019). Technical inadequacies emerged as an important problem that universities had to face during the pandemic period (Şenel & Şenel, 2021). Salas-Pilco et al. (2022) stated that it is necessary to improve Internet connectivity to transform higher education based on their study of the COVID-19 period. Therefore, the usefulness of the LMS as well as the ease of access to the LMS will positively affect student satisfaction.

Interaction and evaluation was the satisfaction sub-factor for which students had the lowest mean. Conrad et al. (2022) stated that the lack of student interaction negatively affects students' satisfaction. Inadequate assessment was an important opinion expressed by the students. In the literature, students stated that they worried about online assessments because online exams make cheating easier (Cabi, 2016). Assessment has a significant impact on student satisfaction (Gee, 2018). The higher the assessment score, the higher the online satisfaction of students during the pandemic period (Baber, 2020). The distrust in the assessment process and the shortness of the exam duration negatively affected their satisfaction. This situation caused students to see online learning as inefficient and their learning in the online environment as inadequate.

Students with low and moderate satisfaction levels stated that the online learning process was challenging, while students with high levels wanted online learning to continue in the future. Online

learning causes depression and anxiety disorders among university students and affects their satisfaction (Fawaz & Samaha, 2021). According to Olasina (2019), stress affects students' acceptance of online learning. As students' stress increases, their engagement (Kara, 2021) and achievement in the online learning environment decreases (Beccaria et al., 2016; Heo & Han, 2018). Pawar et al. (2022) stated that online learning satisfaction reduced students' fear and stress during the COVID-19 period. Therefore, anxiety and fear should be alleviated in order to increase satisfaction. The students' exposure to unusual situations and unusual methods put pressure on them and made it difficult to accept online learning.

The indifference of the instructor and the lack of feedback were situations that negatively affected students' satisfaction. Instructor qualification has a positive role in students' engagement and satisfaction (Daultani et al., 2021; Pham et al., 2019; Wei & Chou, 2020). Osman and Saputra (2019) stated that the teaching style of instructors has a significant effect on student satisfaction, and this is a determinant of the quality of online learning. Herwin et al. (2022) evaluated instructor performance as an important variable that has an impact on online student satisfaction. They found that the effect of the LMS on student satisfaction depends on the performance of the instructor. In this context, the attitude of the instructors and the feedback they provide have a significant effect on the satisfaction of students.

It was observed that students with high satisfaction levels also had high academic achievement. According to Schreiner and Nelson (2013), online satisfaction is related to their academic achievement. The higher the online satisfaction, the higher the assessment scores of the students during the pandemic period (Baber, 2020). In addition to the academic achievement of the students with high satisfaction, the number of logins to LMS, the number of logins to live courses, and the number of recorded course views were also high. This finding shows that satisfaction is an important factor affecting the effectiveness of online learning. Satisfaction and engagement in the online environment have a significant impact on student achievement (Cidral et al., 2018). The student's online learning satisfaction plays a key role in their decision to continue using the LMS (Ke & Kwak 2013). Engagement is a strong predictor of online learning outcomes (Baber, 2020). According to Khan et al. (2023), student satisfaction increases the impact of online learning engagement. In this context, as the online satisfaction of students increases, students engage more and their academic achievement increases. Increasing students' online satisfaction will increase the effectiveness of online learning.

Conclusion and Implications

This study offers valuable insights into the research questions of this paper. Emergency remote teaching offered all educational stakeholders the opportunity to experience online learning. This was a crucial opportunity to examine online learning in a large sample and make improvements. For this reason, instead of considering this period as a temporary measure, it is necessary to consider it as a step forward. The results obtained in this study provide important clues about what should be done to improve online learning. Student satisfaction is an important factor that determines the effectiveness of online learning. This study suggests that institutions evaluate online student satisfaction for successful

digital transformation in higher education. These results will guide instructors, educational authorities, and policymakers to improve their online learning practices in higher education.

The COVID-19 pandemic has exposed students to an environment they had not experienced before. Most of the students had to deal with online learning during the pandemic period. The combination of the obligation to stay at home and this unusual learning environment created extra stress. This stress made it difficult for students to accept online learning and created dissatisfaction. In this rapid transition, online courses could not be designed in accordance with online learning pedagogy. Courses designed for face-to-face education were transferred into an online environment. However, the course structure should be reorganized to improve student's learning outcomes and support the pedagogical structure of online learning.

Another challenge is the conversion of assessment to the online learning environment. Since the instructors could not make necessary preparations, they simply transferred the questions used in face-to-face education to the online environment. Students evaluated the online assessment according to their experiences in face-to-face education. Unproctored exams were the first choice for assessment in this rapid transition. To prevent cheating, some restrictions were made such as random question selection and reducing the exam time. This situation created dissatisfaction among students. Students' dissatisfaction can be prevented by preferring proctored exams or by using assessment methods suitable for the online learning environment.

Limitations

In this study, student satisfaction was evaluated on an e-satisfaction scale with four sub-factors. In future studies, the scope of satisfaction could be expanded to include different factors that might have an impact on online student satisfaction.

The results of this study are based on the online learning experiences of students in Türkiye. The experiences of students from different cultures and backgrounds may differ.

This study did not directly examine students' online learning experience. This study examined students' ERT experience in the context of the COVID-19 pandemic.

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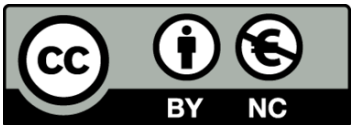

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Accessing Education: Equity, Diversity, and Inclusion in Online Learning

Accès à l'éducation : équité, diversité et inclusion dans l'apprentissage en ligne

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Abstract

As Canadian post-secondary institutions emerge from the pandemic restrictions, they are in a historically unique position to assess how online education has both facilitated and hindered learning, and how the effects might be greater for some. In this study, open-ended comments from the Canadian Digital Learning Research Association 2022 Spring National Survey were analyzed to understand how online and/or hybrid learning both supported equity, diversity, and inclusion (EDI) and presented EDI-related challenges. The findings were that: (a) online and hybrid learning presents challenges of access for students marginalized by "race," class, and location; (b) online and hybrid learning supports EDI by increasing access and flexibility; (c) pedagogy and course design are central to ensuring that online and/or hybrid learning supports EDI; and (d) student experiences and expectations around online learning indicate a need for support and flexibility. These findings highlight some of the promises of online and hybrid learning, but they also bring to light some of the challenges. This paper discusses three challenges, access, pedagogy, and technology, as well as flexibility, and recommendations that might begin to address EDI.

Keywords: equity; diversity; inclusion; online learning; hybrid learning; accessibility

Résumé

Alors que les établissements d'enseignement postsecondaire canadiens sortent des restrictions liées à la pandémie, ils sont dans une position historiquement unique pour évaluer comment l'éducation en ligne a à la fois facilité et entravé l'apprentissage et comment les effets pourraient être plus importants pour certains que pour d'autres. Dans cette étude, les commentaires ouverts du sondage national du printemps 2022 de l'Association canadienne de recherche en apprentissage numérique ont été analysés afin de comprendre comment l'apprentissage en ligne et/ou hybride soutenait l'équité, la diversité, et l'inclusion (EDI) et présentait des défis liés à l'EDI. Les conclusions étaient les suivantes : (a) l'apprentissage en ligne et hybride présente des défis d'accès pour les élèves marginalisés par la « race », la classe et l'emplacement ; (b) l'apprentissage en ligne et hybride soutient l'EDI en augmentant

l'accès et la flexibilité; (c) la pédagogie et la conception des cours sont essentielles pour s'assurer que l'apprentissage en ligne et / ou hybride soutient l'EDI; et (d) les expériences et les attentes des élèves en matière d'apprentissage en ligne indiquent un besoin de soutien et de flexibilité. Ces résultats mettent en évidence certaines des promesses de l'apprentissage en ligne et hybride, mais ils mettent également en lumière certains des défis. Ce document traite de trois défis, l'accès, la pédagogie, et la technologie, et la flexibilité, et les recommandations qui pourraient commencer à aborder l'EDI.

Mots-clés : l'équité; la diversité; l'inclusion; apprentissage en ligne; apprentissage hybride; accessibilité

Introduction

The COVID-19 pandemic profoundly impacted post-secondary education in Canada. With restrictions lifted, the impact of the pandemic continues to ripple through the education system. While the move to online learning, necessitated by the pandemic, was and is a traumatic experience for many, the lessons learned from this shift have the potential to shape educational systems in profound ways. As they emerge from the pandemic restrictions, Canadian post-secondary institutions are in a historically unique position to assess how online education has both facilitated and hindered learning and how these effects might affect some more than others.

Context

According to Johnson (2021b), while fully online course enrollments were expected to drop as restrictions were lifted, it was not expected "that fully online course enrolments [would] drop to the pre-pandemic levels" (p. 2). Further, this report showed that of the responding institutions,[1] "when comparing perceptions of student preferences for online learning compared to 2019, 75% of universities and 63% of colleges agreed that undergraduate students would be more likely to prefer online courses" (p. 5). This demand likely drives, at least in part, the likelihood that online offerings will be increased. According to the Canadian Digital Learning Research Association (CDLRA) 2022 survey data, when asked about the likelihood of courses and/or programs being offered online in the next 24 months, 53.5% of those surveyed reported that it was more likely that they would be offered fully online, 62.8% reported that it was more likely that they would be offered partially online, and 37.2% of those surveyed said that it was more likely that they would be offered in a multi-access (e.g., hyflex [2]) format.

[1] The "CDLRA roster of public post-secondary institutions in Canada consists of 234 institutions (colleges, universities, polytechnics, and CEGEPS). In 2021, 121 institutions responded to the national survey for a response rate of 52%" (Johnson, 2021a, p. 4). The CDLRA "invited a primary contact from each institution (typically the Provost/VP Academic, Vice-President Education, or Directeur général) to participate" (p. 17). While most respondents have firsthand knowledge and access to data, others may be reporting based on more limited perspectives.

[2] Johnson (2020) defined hyflex learning as where "students enrol in a course that offers them the ability to choose their mode of delivery (in-person or online) and shift modes of delivery during the course in accordance with their individual needs and preferences" (p. 9).

Understanding how online/hybrid and hyflex learning impact equity, diversity, and inclusion (EDI) is of vital importance as institutions increase their online offerings. According to *Equity and Inclusion in the Classroom*, "EDI considerations are in danger of falling by the wayside as administrators evaluate which aspects of teaching and learning are deemed 'critical' and which are not. Paradoxically, without an EDI lens, online learning, which is often assumed to make learning more accessible, can actually exacerbate pre-existing inequities" (Centre for Teaching and Technology, Equity and Inclusion Office, n.d., para. 2). This article reflects on qualitative data from the CDLRA 2022 Spring National Survey to elaborate on some of the challenges and promises of online and hybrid learning for EDI. Through a qualitative analysis, this article addresses the following two research questions:

1. How has online and/or hybrid learning presented EDI-related challenges?
2. How has online and/or hybrid learning supported EDI practices?

Literature Review

Studying post-secondary education in Canada is a complex task. Given that education is a provincial or territorial responsibility and there is no national jurisdiction over education, understanding national trends in online education is a daunting task. McGreal and Anderson (2007), for instance, concluded that understanding the Canadian situation requires an approach that focuses on specific provincial initiatives, as Canada is unable to "sustain national strategies, such as those implemented in many other countries, due to the fractious nature of federal and provincial relations" (p. 5). However, understanding the context of online learning is necessary in order to determine potential next steps. While the literature on online learning in Canada is limited, three main bodies of literature are relevant here.

The first body focuses on developments in online learning, such as massive open online courses (MOOCs) and open educational resources (OER), and how these relate to EDI. The second body focuses specifically on EDI in online learning. The third body focuses on the need for pedagogy in course development and highlights the need for more faculty training in this area. These bodies of work provide context for this project, highlight the importance of an EDI focus, and support the need for pedagogical development and training. Online learning tools and technologies are useful, but as the pandemic has taught us, how they are used has implications for EDI.

Developments in Online Learning

The two developments that are most relevant to the discussion of EDI are MOOCs and OER. The rise of MOOCs has been met with both praise and critique. While some laud this approach as being more inclusive due to the removal of spatial and temporal constraints (Veletsianos et al., 2021), others, such as Irvine et al. (2013), have pointed to the high rates of attrition and low rates of accreditation. Additionally, as Veletsianos et al. (2021) suggested, the benefits of MOOCS may be experienced

unevenly. Houlden and Veletsianos (2021) also pointed out that the shift to flexible education, including MOOCs, favours "an ideal version of the human, namely the independent, white, male, able-bodied human" (p. 144).

The second development is the movement toward OER. Open educational resources are defined as "materials designed for teaching and learning that are both openly available for use by teachers and students and that are devoid of purchasing, licensing, and/or royalty fees" (Brown et al., 2020, p. 26). These materials not only save "students money but can also provide additional affordances by way of improved inclusivity" (p. 27). Despite the advantages of OER, according to Johnson (2021a), only 49% of institutions surveyed by the CDLRA in 2021 "agreed that faculty were more likely to use open education resources" (p. 3). This may be attributable to a lack of training. Johnson (2021b) stated that "although 69% of institutions agree that they encourage faculty to use OER, a smaller proportion (58%) agree that they provide effective training on how to find and use OER" (p. 4). Morgan (2019) supported this contention, stating that in addition to a need for strong institutional leadership, professional development around OER is needed "as both an awareness and capacity building effort" (p. 376). However, it should be noted that this need for professional development must be balanced with faculty members' needs to recover from the worrying effects of the pandemic on their "mental health, workload, and research productivity" (Brennan et al., 2021, p. 880).

The Challenges and Promise of EDI in Online Learning

Literature on EDI in online learning has burgeoned in the years following the pandemic, focusing on the promise and the challenges of technology in ameliorating existing cultural, economic, and social inequalities, as well as in meeting the needs of a diverse set of learners (Simon et al., 2014). As Johnson (2020) reported, Canadian higher education administrators and faculty "remain concerned about equity: the pandemic amplified and shone a spotlight on persistent inequities in higher education" (p. 4). Thus, for online and hybrid learning to be successful, "needs like affordable widespread access to high-speed internet, affordable learning devices, and accommodations for students with disabilities must be addressed" (p. 4). These themes are supported by Farley and Burbules' (2022) meta-synthesis of current research.

Farley and Burbules (2022) argued that online and blended learning offer the potential to expand access to education, but caution that a one-size-fits-all approach does not address the diverse needs of students. There is a "substantial body of research that documents differential access and unequal educational satisfaction and outcomes in online and blended learning environments" (Introduction section, para. 5. See also Bartek et al., 2022). Their analysis uncovered both structural impediments (such as access to technology, location and environment, and academic preparation), and institutional impediments (such as design of online learning and needed support for marginalized groups and older students). Similar concerns were raised by Boys (2022), who argued that although pandemic teaching was often framed "as a massive shift from normal (face-to-face) to abnormal (virtual) delivery modes … its impact both continues and alters assumptions about what constitutes 'proper' university education, and both perpetuates and disrupts what is 'noticed', valued and supported in conventional teaching and learning processes" (p. 13). In other words, some of the

inequities that we are seeing in online learning were already evidenced in the social, spatial, and material practices of higher education.[3] In their discussion of disability, Facknitz and Lorenz (2020) have argued that while the assumption is often that online learning is "automatically more accessible for disabled learning … that is not the case" (p. 2), as accessibility "appears as an addendum or afterthought at the end of production," which often occurs without input from disabled people (p. 2). As Facknitz and Lorenz (2020) contended, "moving face-to-face learning to an online medium is not the same as teaching online; indeed, online learning uses very different pedagogies" (p. 2).

Pedagogy and Online Learning

The relationship between pedagogy and online learning is referenced in much of the work on educational technologies. For instance, Vanleeuwen et al. (2020) highlighted the importance of pedagogical training in education and set out to answer the question of how "post-secondary institutions describe faculty training and support for digital education in Canada" (p. 5). What they found was that wide variations in professional development opportunities were offered and/or mandated and concerns were raised about the fact that some "faculty are expected or asked to teach online with little or no techno-pedagogical training and support" (p. 11). Carter et al. (2014) concurred, stating that faculty "involved in e-learning must likewise integrate web-based and online delivery techniques, engagement strategies, and other activities *grounded in evidence-based pedagogical principles* [emphasis added] into their e-teaching repertoires" (p. 2). The shift to online teaching due to the COVID-19 pandemic highlighted the importance of pedagogically informed approaches to e-learning. As Barbour et al. (2020) have argued, the "design process and the careful consideration of different design decisions have an impact on the quality of the instruction" and it is "this careful design process that is absent in most cases in these emergency shifts" (p. 4). Their discussion of emergency remote teaching highlighted the fact that this type of learning should not be considered the same as carefully planned, pedagogically informed online learning. They do, however, believe it can provide new insights and solutions to "intractable problems, such as equal access to digital learning technology and broadband internet" (p. 6), a point that is discussed in the Findings section of this report.

Methodology and Data Analysis

The data analysis is based on answers to two open-ended questions from the CDLRA data set. The CDLRA tracks "the development of online and digital learning in public post-secondary institutions" (Canadian Digital Learning Research Association, n.d., "About" section, para. 1). While the survey is primarily quantitative, some open-ended questions are included. Data was collected in June and July of 2022 by the CDLRA. Identifying information was removed from the data before it was released to graduate student researchers. The CDLRA survey had 171 responses, with 32 from British Columbia, 81 from Ontario, and the remaining 58 from other provinces and territories. The respondents self-identified as senior administrators (27), teaching and learning leaders (44), other administrators (41), faculty (27), and other (33). Of the 172 survey respondents, 61 responded to at

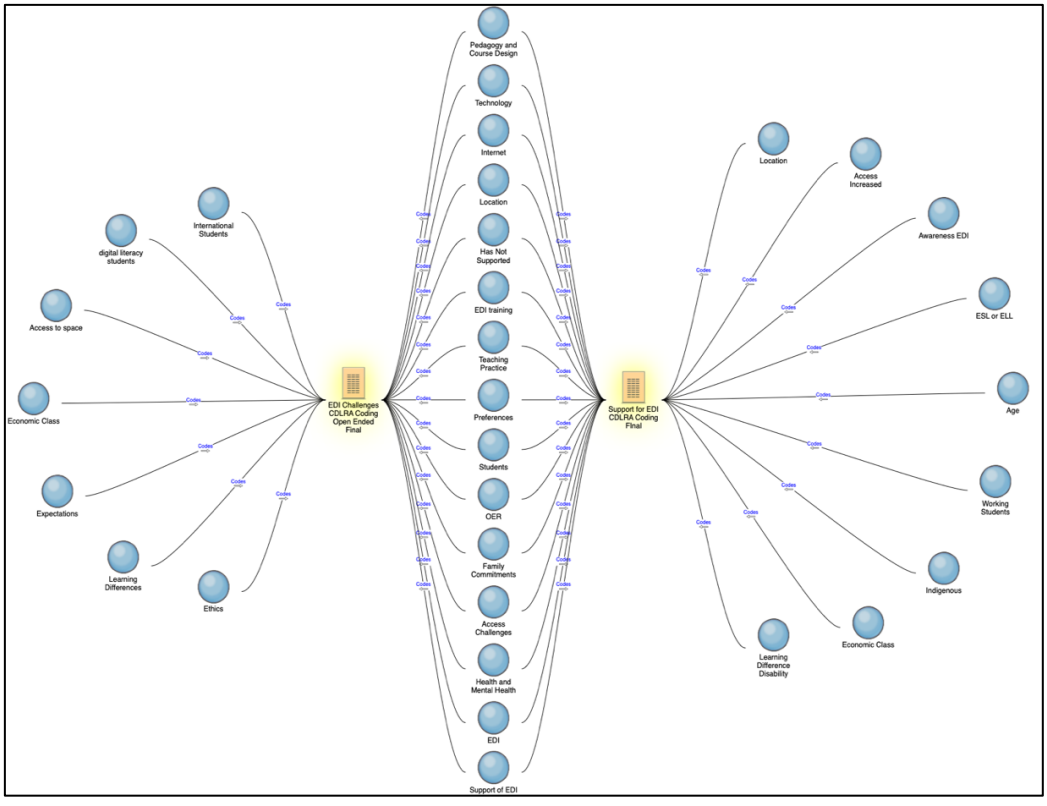
[3] For an example of how this plays out globally, see Siergiejczyk (2020).

least one of the two open-ended questions that this report addresses, with 53 responses to the first question and 56 responses to the second. The first question was: In what ways, if any, has online and/or hybrid learning presented EDI-related challenges? The second question was: In what ways, if any, has online and/or hybrid learning supported EDI practices at your institutions?

The data was imported to NVivo qualitative data analysis software (Version 12). While an inductive approach was used to determine initial codes, themes were determined using a deductive approach. To inductively identify initial codes, NVivo was used to perform a word frequency query for the qualitative data in each of the two questions. This analysis highlighted common words. The codebook was refined through the removal of words that were not relevant to the focus of the study (e.g., provost, president), common words (e.g., many, also) or words that were too broad to be analytically useful (e.g., education). During manual coding, new codes were added to the codebook. Each question was coded as a subset of the larger data set. To reduce possible bias, both inductive and deductive approaches were used, and coding was reviewed at multiple stages by another researcher to ensure trustworthiness of results. Additionally, the quantitative data was also reviewed to establish that the themes found in the qualitative data were consistent. While some of the codes used in the two questions were the same, each also had codes that were unique to that subset. Figure 1 shows a comparison of the codes used in each question. Two of the themes overlapped the two question subsets, while two themes were unique to each question.

Figure 1

Comparison of Nodes Between Data Sets



After the initial coding process was complete, unused codes were removed. Related codes were grouped under broader codes. Once all comments had been coded, a mapping strategy was used to draw connections between concepts and identify themes. Codes were then categorized within the identified themes. Codes that were not reflected within the themes and which had fewer than five references were deleted. Out of this process, four main themes emerged: challenges to EDI, support for EDI, pedagogical and course design, and student concerns. Table 1 outlines the four themes, the number of codes within each one, and the total number of references across all codes. These will be discussed in greater detail in what follows.

Table 1

Themes, Codes, and References

Theme	Codes ***n***	References ***n***
Challenges to EDI	7	71
Support for EDI	9	59
Pedagogy and course design	6	48
Student concerns	4	23

Findings

The four main findings that emerged from the data were:

1. Online and hybrid learning presents challenges of access for students marginalized by "race,"[4] class, and location.
2. Online and hybrid learning supports EDI by increasing access and flexibility.
3. Pedagogy and course design are central to ensuring that online and/or hybrid learning supports EDI.
4. Student experiences and expectations around online learning indicate a need for support and flexibility.

Although these four findings are discussed separately in what follows, it is important to note that while online and hybrid learning was seen to present challenges to EDI (Finding 1) and support EDI (Finding 2), this seeming contradiction can be explained in part by the third finding, as each can be explained, at least in part, by the strength of the relationship between course design and pedagogy.

[4] Given that the notion of biological races has been discredited, I am using "race" to refer to the socially constructed category of race and the ongoing consequences of this social construction.

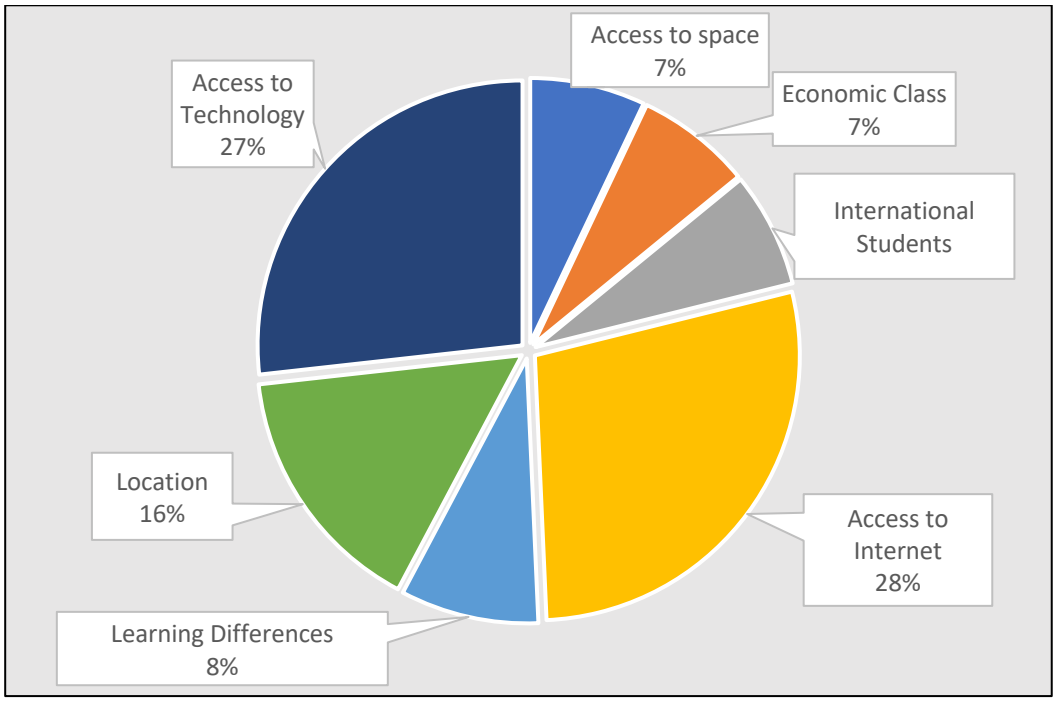
Further, pedagogy and course design are most effective when they are focused on meeting the needs of students (Finding 4).

Finding 1: Online and Hybrid Learning Presents Challenges of Access for Students Marginalized by "Race," Class, and Location

Within the data, challenges to EDI were often discussed as issues of access. As indicated in Figure 2 this included access to technology, Internet, and space. Together, these three points of access accounted for 62% of the coded references. Of the 71 references coded as challenges to EDI, 17 mentioned access to technology as being a barrier to EDI. A further 19 identified access to the Internet as a barrier. Access to study space was referenced in five of the responses. Access issues were rarely discussed individually. For instance, access to technology was discussed with access to the Internet in 12 of the 17 references. Likewise, discussion of access to study space was always paired with discussions of access to technology and/or the Internet.

Figure 2

Challenges to Equity, Diversity, and Inclusion



Note. *n* of responses = 53.

For instance, one administrator explained that "e-learning and/or hybrid learning has highlighted inequities between students: access to the Internet and the required technological tools; challenges related to the family environment and learning environment."[5] In terms of technology, lack of access was most often attributed to economic class (six responses) and location (five responses with rural/

[5] Google Translate was used to translate this comment from French to English.

remote accounting for four of the responses). Indigenous, visible minority, or marginalized students were identified in five of the cases as having less access to technology. Access to the Internet, like technology, was also attributed to economic class (4 responses), location (13 responses), and Indigenous/marginalized students (3 responses). However, class was identified in fewer of the responses with location having the most responses (13 responses). Nine of these responses identified remote or rural locations as having poorer access to the Internet or as having bandwidth issues. International locations were also identified as having access issues by four respondents.

While access issues were often linked to class, racialized groups, or location, concerns around how online learning was a challenge for students with disabilities or learning differences were more concerned with the nature of online learning. For instance, one teaching and learning leader mentioned how videos allow some students to revisit the material, which benefits students with learning differences. However, they went on to explain that the "same videos that are appreciated and desired by many, become more difficult to use for many students since reading tools do not allow benefit from these advantages (e.g., blind students)."[6] Another teaching and learning leader echoed this sentiment, championing choice as central to addressing the needs of online learners. They stated that "online learning is not ideal for all learners—choice is a much better option to allow learners to choose the mode that works best for them." Despite that online and hybrid learning were seen to pose challenges to EDI, there were also comments which praised online and hybrid learning for supporting EDI.

Finding 2: Online and Hybrid Learning Supports EDI by Increasing Access and Flexibility

The discussion of the ways that online and hybrid learning supported EDI focused largely on increased access (Figure 3). When asked to identify ways that online and/or hybrid learning supported EDI practices, the word *access* was used by 21 of the 56 respondents. While some respondents chose not to expand on how online and/or hybrid learning supported greater access, most respondents provided insights into which groups were granted greater access. Online/hybrid learning was touted as increasing access for working students, mature students, Indigenous students, students with family commitments, economically-disadvantaged students, students with disabilities or learning differences, English as a second language/English language learners, and students living in rural or remote locations.

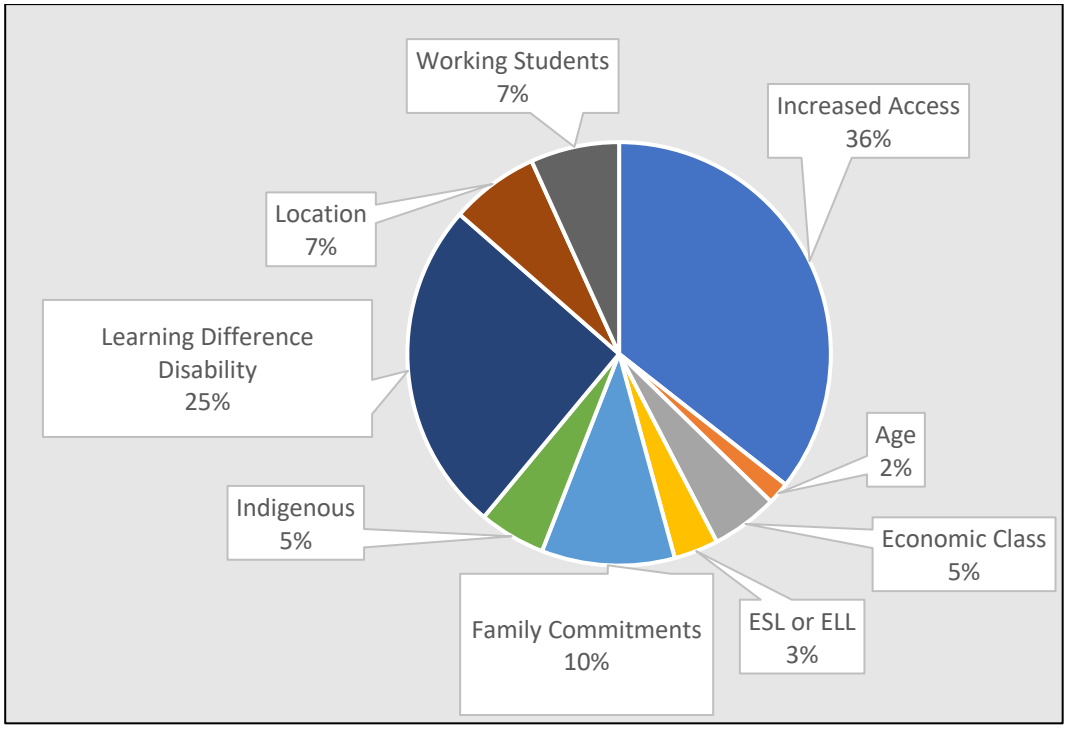
The group that was mentioned most frequently as enjoying greater access was those with disabilities or learning differences. While learning differences/learning disabilities were most often cited, a few comments also noted how physical disabilities may pose challenges for in-person attendance as well. This distinction illustrates how access was used to describe both intellectual and physical access. One faculty member, for instance, referenced how "pre-recorded lectures with captions can allow students to rewatch content multiple times (benefits those with learning differences, English as a second language students, etc.)" and a teaching and learning leader noted that "lecture recordings, open book exams with longer timelines eliminated most of the accommodations requests for our access centre." Although some discussions of access referenced how content was presented and accessed by

[6] Google Translate was used to translate this comment from French to English.

specific groups, others reflected on how the removal of spatial or temporal constraints supported EDI, specifically for those with work commitments, family commitments, or who lived in remote/rural areas.

Figure 3

Support for Equity, Diversity, and Inclusion



Note. $n = 56$.

One senior administrator who identified reliable Internet access as a challenge for those in remote areas also included learners in remote communities in their discussion of increased access:

> Our online and flexible delivery model provides access to post-secondary education to learners who would otherwise be excluded. This includes learners with health issues; learners with disabilities; learners in remote communities; learners with work and/or family commitments; marginalized learners and Indigenous learners, among others.

Likewise, while those with learning differences and/or disabilities were identified as being marginalized by online and/or hybrid learning, this group was also identified as a group that benefited from online and/or hybrid learning. In fact, while six respondents mentioned learning differences and/or disabilities as challenges for EDI, there were far more references (15) that spoke of support for EDI in this area. These seeming contradictions will be taken up in the Discussion portion of this article.

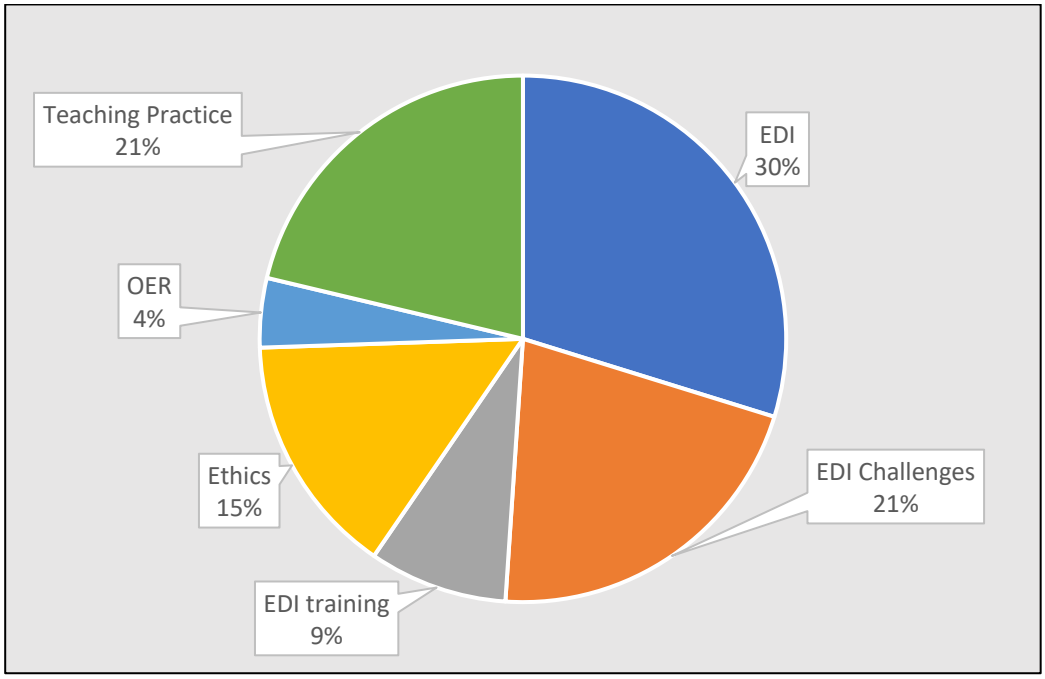
Finding 3: Pedagogy and Course Design Are Central to Ensuring That Online and/or Hybrid Learning Supports EDI

As outlined above, discussion was often framed around increased or decreased access for

students. Another topic of discussion was concerned with how courses were designed and delivered. In fact, 60% of responses that referenced EDI related to teaching and/or course design specifically. This included both barriers to EDI and support for EDI (Figure 4).

Figure 4

Pedagogy and Course Design



Note. $n = 48$.

Teaching practices were discussed in terms of teaching style, effects of burnout, and faculty use of and resistance to technology. Specific issues that were identified were instructors trying to replicate their "old ways of teaching," and inconsistencies in use of "platforms, OER and accessible (universal design for learning) technologies." Time was cited as one reason for failures to attend to EDI. One teaching and learning leader explained that teachers were "very busy with the move to online teaching and were able to devote little attention to EDI." Although there were issues raised regarding how faculty functioned in online spaces, one of the more positive themes was an increasing awareness of EDI issues in online learning. One teaching and learning leader explained that moving courses online had "sparked conversations on accessibility of course materials and inclusive design." Another stated that awareness "of the need for EDI practices has increased," but tempered that with the contention that "instructors do not know how to apply these practices." A senior administrator stated that "there is still a lot of training work to be done at the level of teachers and instructional designers for the design of online and hybrid courses that are inclusive in their content and format."[7]

Another significant issue was ethics, especially as it related to surveillance and privacy. The use of surveillance (e.g., proctoring software or mandatory use of cameras) was identified as a barrier to

[7] Google Translate was used to translate this comment from French to English.

EDI. One teaching and learning leader commented that "instructional practices, such as requiring students to leave their cameras on, or using proctoring software, can make the online/blended learning less equitable." Another linked the use of surveillance to a desire to replicate face-to-face strategies.

> Often instructors try to mimic on-campus classroom teaching in the design and delivery of their virtual courses, which has led to an over-zealousness with regards to surveillance technologies (proctoring for example) and other issues. I feel in some ways instructors trying to replicate their old ways of teaching are struggling with a lack of control, resulting in worse relationship building with students. Racialized and other marginalized groups tend to also be disproportionately impacted by these technologies.

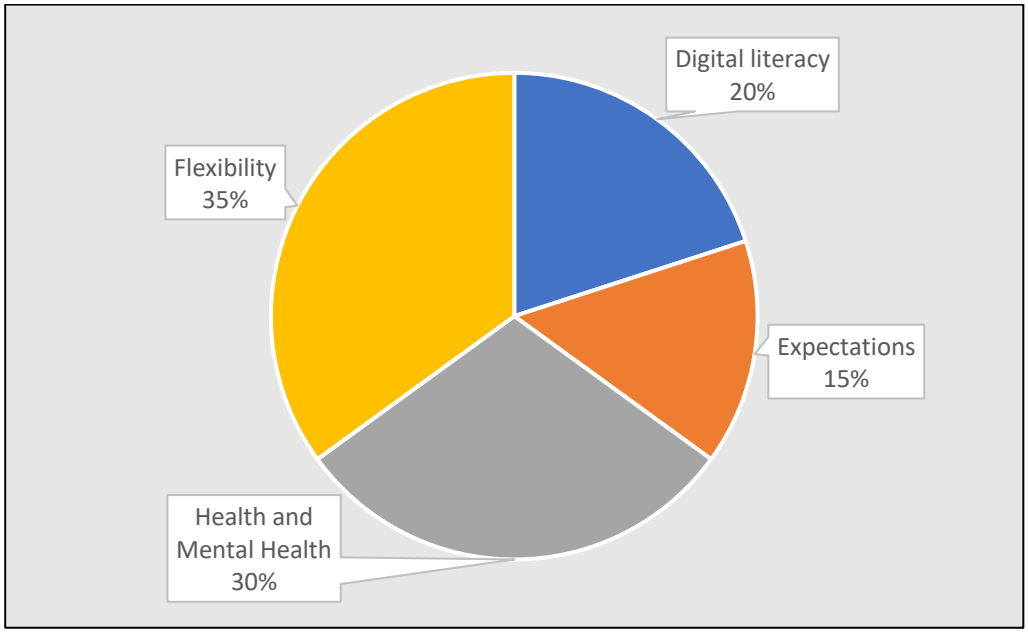
These issues were linked to teaching practices that disadvantaged specific groups or students.

Finding 4: Student Experiences and Expectations Around Online Learning Indicate a Need for Support and Flexibility

In the previous discussions of EDI, the discussion focused on how online and/or hybrid learning supported or challenged EDI. This section addresses how student experiences and expectations were framed by respondents, including discussions of their digital literacy, mental health, expectations, and needs for flexibility (Figure 5).

Figure 5

Student Concerns



Note. $n = 23$.

Although not a major theme, digital literacy was identified as a barrier to EDI by four respondents. This was always paired with discussion of inadequate access to technology. It is addressed separately here, however, because issues of access are barriers that students face. Digital literacy,

although referenced as a challenge *to* EDI, is actually a characteristic or shortcoming *of* the students themselves. This places the students themselves as barriers to their own participation. Citing "delays in digital literacy among some students" as a challenge to EDI serves to mask the real issue which is access to technology. This was an approach that was also used when discussing student expectations as barriers to EDI. One faculty member, for instance, responded to the question on how online and hybrid learning presented EDI-related challenges by commenting that "students are not self-aware enough to choose the type of learning environment that will help them be successful." A senior administrator also highlighted the following as challenges to EDI: "time management; and discipline to undertake self-directed learning." While time management, digital literacy, and self-discipline are certainly issues for some students, framing these as barriers to EDI serves to shift the focus away from pedagogical, structural, or institutional gaps.

Health and mental health were also discussed in the context of student experiences. This took the form of both positive and negative aspects of online and/or hybrid learning. For instance, while students' mental health was seen to be negatively affected by strategies such as "'force-submit' options on tests or preventing backtracking on tests," hyflex was lauded as allowing students greater control of their health and safety, and online/hybrid formats as reducing social anxiety and allowing access for students with health issues.

Students were also discussed in the context of their need for flexibility or choice. While the discussion of flexibility was often framed around access, online and/or hybrid learning was also cited as "more adapted to particular situations." One senior administrator discussed how online and flexible delivery provides increased access not only to marginalized groups, but also to those who "by choice or through life circumstances cannot attend a place-based university, and those attending place-based post-secondaries who crave increased flexibility and control." Flexibility was also cited by another senior administrator as better serving "students with work and family duties and long commutes." Flexibility, here, was tied to the diverse needs and situations of students. Flexibility holds the promise of addressing the needs of many different groups. However, the administrator went on to say that although flexibility "improves their ability to manage … it may also degrade their experience," a point that will be taken up in the next section.

Discussion and Recommendations

The findings highlight some of the promises of online and hybrid learning, but they also bring to light some of the challenges for EDI. This section will discuss the three challenges, each followed by recommendations that might begin to address them.

Challenge 1: Access

According to the Government of Canada's (2021) report on their progress toward universal access to high-speed Internet, in 2020, rural communities had a 54.4% rate of access to minimum Internet speeds of 50/10 Mbps, as compared to 99.2% of urban Canadians. Despite the government's goal to close the gap by 2030, much work needs to be done. According to their website, and despite

claims to be "on track to connecting 98% of Canadians by 2026," the status of the projects lists only 189 out of the 535 projects as operational. The remaining are either under negotiation, in the planning stage, in the detailed design and construction stage, or have an unavailable status. In the current context, educators must be prepared to work within these constraints.

While online/hybrid learning offers the promise of greater support for learners from marginalized groups such as those with learning differences and/or disabilities, or those who live in underserved, remote/rural communities (often Indigenous communities), these are often the groups that are most identified as facing challenges of access to technology, the Internet, or accessible content. Addressing issues of access is vital if institutions want education to be equitable and inclusive. Learners cannot be expected to have digital literacy skills if they do not have access to technology. Students with learning differences and/or disabilities can only benefit from online learning if they can access the content in equitable ways.

Challenge 1: Recommendations

1. Online and/or hybrid offerings need to be designed to address the needs of diverse learners with diverse needs (e.g., closed-captioning and text or audio descriptions for all visually accessed material, including images).
2. Accessibility services that support not only learners, but also assist faculty in assuring that their material is as widely accessible as possible.
3. Increased access to technology. No student should be excluded because they do not have access to the required tools of learning. Some groups, such as Pinnguaq, have started this important work through their partnership with Computers for Success Canada (Pinnguaq, 2022).
4. Given that financial constraints were often cited as reasons for reduced access to technology or the Internet, grants need to be available for students who are unable to access these important tools.
5. While the Canadian government is committed to increasing access, in the interim, flexible options need to be provided for those with inadequate Internet/broadband access. This can include access to low bandwidth options, print options, or telelearning options.

It is important to note that some of the recommendations rely on implementation by faculty. This is concerning given that the CDLRA survey indicated that 124 of the 172 respondents identified faculty fatigue and burnout as one of the most pressing teaching and learning challenges. The importance of faculty training, which is discussed below, therefore must be balanced within their need to recover from the effects of moving to emergency remote learning.

Challenge 2: Pedagogy and Technology

In "TPACK Tried and Tested: Experiences of Post-Secondary Educators During the COVID-19 Pandemic", Manokore and Kuntz (2022) discussed their study of 140 educators in Canada. They used

surveys and open-ended questions to understand how educators (n = 140) applied "technological pedagogical content knowledge (TPACK) during the pandemic" (p. 1). TPACK is a framework that includes content knowledge, pedagogical knowledge, and technological knowledge (p. 1). They found high levels of confidence in content knowledge among the educators. However, they also found that although 13% of participants indicated that they felt "the quality of their teaching practice improved; about 60% said the quality declined and about 28% said the quality remained the same" (p. 3). The authors attributed this, at least in part, to the fact that only "40% of the participants had formal teaching qualifications; meaning that they might not have had an adequate pedagogical knowledge base" (p. 3). They suggested that this is likely also because participants may not have had a broad technological knowledge. Their work underscores the importance of providing both pedagogical training and technological training, a point that was also raised in the CDLRA data.

Challenge 2: Recommendations

1. Pedagogical training for all faculty who do not have formal teaching qualifications. This training should include EDI training.
2. Technological training should be made available for all faculty who are expected to teach in online or hybrid settings. Where possible, faculty should be compensated, either through release or through financial compensation, for this training.
3. Technological-pedagogical training should be made available to faculty. Pedagogical training and technological training can provide faculty with the understanding of how to teach and how to use technology. It is also important that faculty are trained to make pedagogically-informed choices with regard to technological tools/platforms.
4. Institutional guidelines should be developed for common use. Given EDI concerns around surveillance and privacy, institutions need to provide guidance on how and when such technology can/should be used. Additionally, given that inconsistencies across faculties and in use of platforms were identified as barriers to EDI, guidelines might be drafted to ensure greater consistency.

Addressing issues of access and pedagogical training are imperative for ensuring equity, diversity, and inclusion. Increasing options for students was also identified a way to increase inclusion.

Challenge 3: Flexibility

Online and/or hybrid learning was often framed as offering students more flexibility and choice. Given that students come from diverse backgrounds and have diverse needs, flexibility is desirable. However, while flexibility has the potential to increase access for some learners, the form it takes needs to be addressed. Houlden and Veletsianos (2020) argued that learners who access flexible learning do so in ways that necessitate that they, themselves, become flexible learners. Additionally, the flexibility that is afforded by such educational approaches is not equally available to all, nor does it offer the same benefits to all. The freedom offered by anytime and anyplace education creates the responsible subject who is "autonomous, independent, and [has] the ability to self-regulate" (p. 149), which is also the type

of subject that has been identified as the most desirable or necessary for the labour force. This can result in loss of freedom and disparities in the "quality of certain forms of flexible education" for marginalized groups (p. 151). They suggest a radical approach to flexible learning which is "accountable to the purpose of education itself" (p. 152). They expand on this in a separate discussion of radical flexibility (Veletsianos & Houlden, 2020), and the shift they propose is flexible education "that is responsive to learner and societal needs" (p. 850).

Challenge 3: Recommendations

1. Flexible offerings should be designed to be responsive to learner and societal needs.
2. Flexibility should address both temporal and spatial barriers to access.
3. Flexibility should be developed through consultation with learners and instructors to ensure that learners' needs are met and that offerings are compatible with faculty workloads.
4. Institutional support for hyflex learning needs to be put in place. This includes funding for teaching assistance, technological upgrades, and pedagogical/technological training and support.

The recommendations offered here are meant to be starting points for making change or, at least, entry points into developing discussions around EDI. Many of these recommendations are institutional, and as such, it is vital that institutional leadership prioritize the implementation of policies that support equity, diversity, and inclusion.

Conclusion

The main findings that emerged from this study were that online and hybrid learning both supports and offers challenges to EDI, that pedagogy and course design must be considered as a first step in addressing some of the challenges to EDI, and that further student support is needed to facilitate equity, diversity, and inclusion in online learning. While the suggestions offered here are tentative, the goal is to highlight some of the barriers to EDI and start a dialogue that might move us forward in our pursuit of equity, diversity, and inclusion. While it is beyond the scope of this report, readers are encouraged to also engage with reconciliation, decolonization, and Indigenization as they work toward EDI goals.

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Using Google Classroom as Assistive Technology in Universally Designed Classrooms

L'Utilisation de Google Classroom comme technologie d'assistance dans des salles de classe avec conception universelles

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Abstract

This study focuses on the use of Google Classroom as assistive technology in inclusive classrooms. Findings were based on data collected through single-case study methodology in semi-structured formal and informal interviews with eight teachers and a focus group with six students at one junior high school in the province of Newfoundland and Labrador in Canada. This study is designed to better understand the benefits and challenges associated with the use of Google Classroom within the framework of universal design for learning. The findings showed that Google Classroom was perceived by both teachers and students as effective classroom technology in meeting the needs of each learner in the classroom.

*Keywords***:** Google Classroom; assistive technology; universal design for learning; inclusive education

Résumé

Cette étude se penche sur l'utilisation de Google Classroom comme technologie d'assistance dans les salles de classes inclusives. Les résultats sont basés sur des données recueillies par le biais d'une méthodologie d'étude de cas unique lors d'entrevues formelles et informelles semi-structurées avec huit enseignants et un groupe de discussion avec des élèves de premier cycle d'une école secondaire à Terre-Neuve-et-Labrador au Canada. Cette étude a été conçue pour mieux comprendre les avantages et les défis associés à l'utilisation de Google Classroom dans le cadre de la conception universelle de l'apprentissage. Google Classroom était perçu par les enseignants et les élèves comme une technologie de classe efficace pour répondre aux besoins de chaque élève dans la classe.

Mots-clés : Google Classroom ; technologie d'assistance ; conception universelle de l'apprentissage ; éducation inclusive

Introduction

Inclusive education allows each student to participate in learning activities and allows teachers to exercise new approaches to ensure that students have the means to communicate their knowledge. Google Classroom applications as a form of assistive technology (AT) can improve students' abilities and provide each student the opportunity to learn as outlined in the universal design for learning (UDL). It becomes obvious that students have learning needs, also referred to as exceptionalities, when they are the only students using AT in the classroom which may "carry stigma and/or unwanted attention" (Faucett et al., 2017, p. 14). To reduce this unwanted attention or stigma for these students, UDL provides a set of guidelines that outlines how instructional materials, methods, goals, and assessments can be used to allow *all* students to experience achievement with learning curriculum outcomes (Rose & Meyer, 2002). The goal of UDL is to recognize that every student can learn and demonstrate their acquisition using several different means addressed in the three principles that are the foundation of UDL: multiple means of representation, multiple means of expression, and multiple means of engagement (Rose & Meyer, 2002). Universal design for learning recognizes that individuals have different learning strengths and needs and invites educational institutions to offer outcomes that provide the following:

- multiple means of representation to give learners various ways of acquiring information and knowledge;
- multiple means of expression to provide learners alternatives for demonstrating what they know; and
- multiple means of engagement to tap into learners' interests, challenge them appropriately, and motivate them to learn. (CAST, 2011, p. 5)

This study is designed to better understand the benefits and challenges associated with the use of Google Classroom within the framework of UDL and focuses on Google Classroom as an assistive technology in inclusive classrooms through data collected in formal and informal interviews with teachers and a focus group with students.

Universal Design for Learning

Campbell et al. (2016) state that UDL is a blueprint that provides each individual an equal opportunity to learn. In recent years, Lohmann et al. (2018) found that the UDL engagement strategies provided students with a more connected experience to course instructors and peers. The use of technology, differentiated instruction, and UDL strategies kept students engaged and motivated in their learning (Montgomery, 2022). Duffy et al. (2022) concluded that using UDL perspective could improve learner experience, engagement, and output. It was also discovered that not only did UDL interventions help students during the learning process, but they also helped students learn independently (Wusqo et al., 2021). Given the development UDL strategies and interventions, researchers are yet to find valid tools or instruments to measure what would be deemed universal instruction (Kennedy et al., 2013), nor is there a concise teaching platform where educators can say an

intervention is universally designed. Finally, educational stakeholders have yet to figure out how principles of UDL should be implemented in curriculum outcomes.

Rappolt-Schlichtmann et al. (2013) compared a web-based science notebook aligned with the UDL framework with traditional pencil and paper notebooks, believing that the online science notebook would have a positive impact on student performance, reading and writing proficiency, and motivation to learn science. The universal design for learning science notebook (UDSN) was designed to reduce barriers to learning and followed accessibility guidelines from the *World Wide Web Consortium, Rehabilitation Act,* and *the National Center for Accessible Media,* which aligned with UDL framework (Rappolt-Schlichtmann et al., 2013). The UDSN reduced literacy-based barriers by including accessibility options such as text-to-speech technology, word-by-word English to Spanish translation, alternate text, image descriptions, and multimedia vocabulary support (Rappolt-Schlichtmann et al., 2013). Furthermore, there were built-in accessibility features for those who have "sensory or motoric limitations" (Rappolt-Schlichtmann et al., 2013, p. 1211). The book also provided students different means to communicate their knowledge, thus allowing multiple means of expression, which is one of the three principles of UDL. Rappolt-Schlichtmann and colleagues determined that students found the associated supports in the UDSN to be beneficial for enhancing their learning experience. Moreover, students were not only more motivated to learn when using the UDSN, when compared to pencil and paper learning, but excited for the opportunity. When students were using the UDSN, they felt like they were taking ownership of their learning and were competent to show what they knew (Rappolt-Schlichtmann et al., 2013). The authors indicated that there was a need for more qualitative research to explore both students' and teachers' experiences with UDL. They also suggested implementing development, testing, and refinement research in environments that use UDL (Rappolt-Schlichtmann et al., 2013).

Katz (2012) developed a three-block model of UDL that includes systems and structures, instructional practices, and social and emotional learning. Systems and structures involves an inclusive policy that sees no exceptions, an administration that has expertise in the field of UDL and a vision for the school's direction for implementation, staff that put in time and effort to collaborate and plan for inclusivity, and funding for AT and multi-levelled resources. Instructional practices involve integrating curriculum and offering choice for assessment, peer learning, differentiated instruction and assessment, integration of technology, and social and academic inclusivity of students with exceptionalities. Social and emotional learning aims to develop students' self-concepts which provides a sense of belonging, planning, and goal setting. It also values diversity which provides an awareness of strengths and challenges of others, empathy, perspective, compassion, and democratic classroom management which promotes students' rights and responsibilities, independent learning, and choice and empowerment (Katz, 2012). Sokal and Katz (2015) applied Katz's three-block model of UDL to the engagement of early and late middle school students. Participants included 183 students from 10 schools in a midsized city in central Canada. The study found that the three-block model of UDL had "a positive impact on students' perceived intellectual engagement in their learning as well as on their observed active learning and peer interaction" (Sokal & Katz, 2015, p. 78).

Assistive Technology

According to Bryant et al. (2014), AT refers to "devices and services that are intended to enhance the skills of people with disabilities in a variety of contexts" (p. 13). "AT devices, such as electronic dictionaries, audio books, reading pens, talking calculators, or word prediction software, benefit students with disabilities by improving accessibility to the general education curriculum through cognitive, social, and emotional scaffolds" (Messinger-Willman & Marino, 2010, p. 9).

Liu et al. (2013) noted a positive impact when technology was used to enhance students' academic performance. Their review suggested that "teachers and students in the field of special education expressed positive attitudes towards the use of computer-based instruction in the classroom" (p. 3625). Moreover, interviews with teachers, as well as with participating students, showed that technology was beneficial in enhancing teaching and learning, and teachers observed improvements in the performance of students (Liu et al., 2013) once technology was integrated into the classroom. Much of this motivation came from the notion that students perceived technology as fun when it was used as a learning intervention. While negative results were noted, they stemmed from teachers' limited knowledge of the device, and from having students with very high needs.

Google Classroom

Google Classroom "is a cloud-based system offering online productivity tools for classroom collaboration" (Government of Australia, 2015, p. 4). These tools include Google Docs, a word processor, Google Slides, a presentation tool, and translation software. Google Classroom is designed to support student-teacher communication and help students stay on task with course work by "assisting students in researching, organizing and collaborating for assignment, as well as turning in work through the apps' built-in sharing features" (Sweeney, 2013, p. 34). For students, Google Classroom provides a platform to read, write, present with visuals, submit work, keep track of assignments, and communicate with the instructors and peers. Parents can also join the Google Classroom as another means to communicate with the subject teacher. Google Classroom provides teachers with an organized platform for creating, organizing, and receiving students' work and it also allows teachers to post "class resources, assignments, announcements and due dates" (Government of Australia, 2015, p. 5). Google Classroom stores the teacher's class resources in Google Drive*,* which allows teachers to "automatically create and manage folders for each of their classes" (Government of Australia, 2015, p. 5), and allows students to access assignments from anywhere with an Internet connection.

Bryant et al. (2014) researched the function of AT for students with specific learning disabilities in a UDL framework in reading, mathematics, and writing. Google Classroom has AT built-in tools to meet the needs of students who have specific learning disorders. For example, *Docs* provides a speech-to-text option, where after text is typed, it can be read aloud by the computer. As the words are being read, a visual highlights the words being read, which can be useful for students' word recognition skills. A Google Classroom interface can therefore be used as an AT in the inclusive classroom and help students to complete curriculum outcomes.

Methodology

This exploratory study employed a qualitative, case study methodology to examine how teachers and students used and were impacted by Google Classroom at one school, and how it functioned as a form of AT in an inclusive classroom that was universally designed. The current study was chosen as qualitative design is "interested in whether the findings of a study support or modify existing ideas and practices advanced in the literature" (Creswell, 2012, p. 81), rather than making predictions with regards to findings. A case study is a thorough investigation of a limited system and is used to provide an informative and comprehensive depiction for research (Creswell, 2012). A single case study from a single school can often lead to skepticism, however as Yin (1981) explains, a single case study "could never provide a compelling rationale for establishing the importance of a single factor or variable" (p. 62).

The study addresses the benefits and challenges experienced by teachers when implementing Google Classroom, whether teachers found Google Classroom met the needs of students in an inclusive environment, and students' perception of Google Classroom and how it was used in learning contexts. This study draws from a junior high school in the province of Newfoundland and Labrador in Canada with over 800 students, where the experiences of several different students, from different countries, cultures, abilities, and socio-economic status were explored. Many teachers at the school embraced technology and the implementation of new technologies that can make the school curriculum more exciting for students. The Newfoundland and Labrador English School District provided programming for both English and French languages in every school. Certain schools were equipped to support the learning needs of international students through specialized programs such as ESL (English as a Second Language) and LEARN (Literacy Enrichment and Academic Readiness for Newcomers). The school district met the international students' learning needs by providing space and resources in the form of teachers and technology to assist students who encounter language barriers.

Research Context

This study examines the use of Google Classroom in Grades 7, 8, and 9 in a junior high school in St. John's, Newfoundland and Labrador. In 2019, this study took place in the Newfoundland and Labrador English School District where there were approximately 65,000 students, in 252 schools, with over 8,000 employees (Newfoundland and Labrador English School District, 2017a). According to the school's annual report from 2017, this high school had a large student body with varying needs, including students who were visually and hearing impaired. Students also had language barriers that stemmed from learning difficulties to difficulties with language acquisition for international students for whom neither English nor French was a household primary language. In recent years, the school saw technological upgrades to match the increased enrollment of the school. Increased immigration and reconfiguration of school zones based on proximity to the school had resulted in an increased number of students in the school (Newfoundland and Labrador English School District, 2017b). This school was selected because it was a larger junior high school in the province with a relatively high number of international students. There were many classroom teachers, specialist teachers, instructional resource

teachers, a LEARN teacher, and an ESL itinerant teacher. Also, this school was chosen as more than three quarters of the staff used Google Classroom to communicate content in the classroom. As well, teachers allowed students to meet learning outcomes through Google Classroom and were familiar with the many functions Google Classroom offered.

The School District encouraged schools in their district to use classroom technology to support teaching and learning. Their 2017 annual report stated that a "province-wide implementation of Google Apps for education (GAFE) came into effect for the 2016-17 school year" (Newfoundland and Labrador English School District, 2017b, p. 9). Furthermore, the report explained that the technology was to be used for collaborative teaching and learning, included several applications that assisted students in accessing information, and that information could be stored in the cloud and accessed by any device, at any time, wherever there was an Internet connection.

Participants

Participants were selected through purposeful sampling, which was used for the "identification and selection of information-rich cases related to the phenomenon of interest" (Palinkas et al., 2015, p. 533). Male and female teachers came from a junior high school, had between 5- and 25-years teaching experience, and were selected based on their use of Google Classroom to support student learning. Teachers who openly discussed the use of technology and Google Classroom in their teaching practice and attended Google Classroom tutorial sessions conducted by teachers or staff who were district-trained Google Classroom experts were contacted. This amounted to approximately half of the teaching staff. Of the 18 that were nominated, 8 chose to participate in the study, which made up roughly 20% of the sample size. Classroom teachers, the instructional resource teachers, the LEARN teacher, and the ESL teacher were interviewed, and six students participated in the focus group.

Data Collection Methods

Teacher participants contributed through semi-structured, open-ended interviews. The participants were asked 13 open-ended questions. The questions answer how teachers use Google Classroom and how it functions as a form of assistive technology in an inclusive classroom. This was supplemented by follow-up questions. Interviews were audio-recorded and later played in Google's Speech-to-Text technology and edited.

Conversations were had with teachers on an informal basis during unstructured time. Informal conversations provide raw data that can be analyzed and used to create themes (Creswell, 2012). Informal discussions provided further clarification on information gathered from the semi-structured interviews about teachers' use of Google Classroom as a form of AT. Teachers were asked what brought them to use Google Classroom and AT's impact on their classroom learning experiences. Responses to these questions were recorded in handwritten field notes and later transcribed.

The focus group with students was organized to gain information on their experiences with and perceptions of Google Classroom as a form of AT and how it aligned with UDL. Focus groups are most useful in groups of four to six and when interviewees are comparable to and supportive of each

other (Creswell, 2012). The six students who participated in the audio-recorded focus group gave their assent and had parental consent.

Data Analysis

The interview results were populated on a transcript through the voice-to-text application on Google Docs. These documents were fairly accurate but were edited to create verbatim transcripts of the interviews. Interviewees were then provided a copy of their interview and asked if they had anything to add or wanted to elaborate on from the transcript. Member checking "is a process in which the researcher asks one or more participants in the study to check the accuracy of the account" (Creswell, 2012, p. 259). This process allowed participants to review the questions and responses and to add to or omit their responses. These transcripts were examined using a content analysis approach. After transcribing data from teachers' responses and organizing the data by question, similar responses, keywords, and/or ideas, were given a colour code. These colour codes were used to identify the main ideas in each question. The following themes presented themselves:

1. How teachers present information.
2. How students demonstrate their knowledge.
3. The benefits and challenges associated with Google Classroom.
4. Students' perception of Google Classroom.

Focus groups with students were audio-recorded and those recordings were played through Google's Speech-to-Text technology and edited verbatim. Similar to the interviews with teacher participants, transcripts were examined using a content analysis approach, which included coding statements into key concepts and organizing those concepts into themes. To minimize bias, a second reader authenticated the themes from the teacher interviews and the student focus group (Creswell, 2012). After the interviews were recorded, played through speech-to-text software, and edited verbatim, three major themes emerged, as follows:

1. Students enjoyed having direct access to teachers for prompt feedback on schoolwork.
2. Students benefitted from teachers using Google Classroom to communicate information important to the course by posting class notes, deadlines, and study materials.
3. Students enjoyed interacting with technology to complete assignments.

Results

Students' Use of Google Classroom

Student participants unanimously recommended the use of Google Classroom as a teaching intervention to supplement their learning. According to the interviewed teachers, students were supported in their learning using Google Classroom as it provided the ability to complete projects, assignments, and class work using computer technology, and access content at any time, including communication and feedback from their teachers and peer support on group-based activities. It also

provided the ability to review classroom activities and materials at home, even if the students misplaced some of their own classroom materials.

Students had ample opportunities to access, interpret, and communicate their knowledge. Additionally, they had online access to notes, assignments, quizzes, and anything that may have been forgotten in the classroom. When considering classroom activities that required practice and revision, most teachers looked to Google Classroom to post classroom materials, so students could access them at home, practice, repeat, and perfect. One teacher found it useful to have all the materials online for student revision at home:

> They use it [Google Classroom] to have copies of their work. Assignments that they have, study guides, and things that we watched in class, I put those links back on there so they can watch them again because they often need more repetition. (Teacher Participant)

One participating teacher mentioned that most written pieces could be done using Google Docs, and they were always available when students had online access. As well, they could access supplementary materials to help complete student work to meet outcomes. Similarly, when students had to do a presentation that included visuals, Google Slides, which has many of the same components of PowerPoint but is offered through Google, has many more support options to help with communication, collaboration, and feedback. Using both Docs and Slides, students could work together on the same project and document or slide show from different computers, allowing for peer editing and therefore learning from each other. Another teacher stated, "Google Slides and the peer editing is really great—they can edit each other's work, and not just me giving them feedback, they suggest edits for each other." The teacher added that teachers that assign a Google Docs or Google Slides project can access the same document and quickly give feedback and suggest edits for students.

Teacher Interviews

Eight junior high teachers (four female, four male) consented to be interviewed. Three teachers had less 10 years teaching experience, four teachers had 11-20 years, and one teacher had more than 20 years teaching experience. Moreover, the school was well known to be a pioneer in the use of technology in teaching practices through classroom activities and science labs as well as extracurricular activities such as coding and learning to operate remote vehicles, among other educational technology initiatives. Google Classroom was used by more than half the teachers at this school from a novice to expert capacity.

Teachers' Use of Google Classroom

Teacher participants used Google Classroom to support learning by enhancing organization, communication, and assessments, and by supplementing material they already present. Teachers commented that all course materials were readily found on their Google Classroom site. One teacher discussed how he used Google Classroom as a means for students to access "notes, or assignments, or relevant information." Another teacher noted that she used Google Classroom "mostly as an organization tool. I have all my materials on my Google Classroom sites for all my classes." Another teacher participant explained that students could access this information at any time.

Google Classroom was also used as a communication tool. While many teachers had their own websites and the school had their own homework site, many teachers discussed how Google Classroom allowed communication between teachers, students, and parents. "It's supplementing the teacher website quite well—having your own website and then putting all your assignments in Google Classroom." One teacher added that "you can allow parents to see what's in there, so I can have another view of the upcoming material." This allows parents to be involved in their child's learning and helping them to stay on task at home. Furthermore, another teacher said, "Parents are invited so I'll usually post what we did that week, so they get in a weekly summary." Teachers could provide feedback to students as well as edit the documents they created. Another teacher participant explained that she is "able to provide students with descriptive feedback in *Français* and because they do a lot of writing, a lot of essays, I use the editing tool so that sends messages to them right away, tells them how to improve and at home wherever they are."

One teacher explained that she could post video links and Quizlet activities to her Google Classroom, which students could review or work on at home. Students could communicate with the teacher through Google Classroom, or through a forum. However, another teacher restricted the forum from usage with junior high students: "I disable any communication with students on the Google Classroom itself, because I find they tend to fool around."

Students could complete assignments online. Using Google Slides or Google Docs, a teacher could create an assignment, post it to Google Classroom, and students could complete their assignment with their phone, laptop, desktop, Chromebook, or tablet anywhere there was an Internet connection. One teacher said he used Google Classroom for certain projects, especially group projects, because students could often work and learn together while completing projects. Another teacher explained the benefits for the language classroom:

> I try to use Google Classroom frequently for any type of projects or assignments that would require students to use second language. Having the assistive technology there to help them translate is very advantageous to me, and my classroom, with up to 35 students in one room. (Teacher participant)

Benefits of Using Google Classroom

All but one teacher addressed the benefits of using Google Classroom. The one that was skeptical acknowledged its potential but preferred the use of pencil and paper assessments. One teacher noted that students benefitted by using Google Classroom through the teacher's access to student work:

> Google Classroom makes it really easy to see where a student is, and how I can help them. I can see their work being developed from start to finish—it's a lot more beneficial than just seeing a blank page and then the finished product. I'm able to check in on him and see how they're arriving at what they're doing. (Teacher participant)

One teacher reiterated that students no longer had the excuse that they left their notes at school or that they were out of ink as everything was available online. Another teacher suggested that students who completed assignments through Google Classroom stayed on task:

> When we're using Google Classroom, students that are often very unfocused, it helps them to really focus. I'm thinking about a few students in particular, that when we're doing activities in Google Classroom, they produce a lot better. (Teacher participant)

Moreover, one teacher explained that the built-in software supports, such as word prediction and autocorrect, helped students who had writing difficulties produce better than if they were solely provided with a pencil and paper. Another teacher explained that there was less stigma attached to students who needed support, as students were all using the same intervention and the same device to meet their individual needs.

> I was able to give everybody the same project, except for two students who needed it modified. They can get a different project, without having everyone blatantly see that they were working on a different project. (Teacher participant)

Challenges with Using Google Classroom

The lack of access to technology that enabled the use of Google Classroom was a common theme noted amongst teachers when discussing challenges associated with using Google Classroom. Because technology has a cost, a school can only afford a limited number of Chromebooks per year, and even if they had the ability to give every student a device, the Internet upgrade required to support the connection of several hundreds of devices at the same time would be costly. One teacher explained the challenge:

> We're often challenged with the amount of network that we have available ... mobile devices will swamp the Wi-Fi that we have within the school and then some will not be able to connect, or they'll be intermittent, or spotty. (Teacher Participant)

Another challenge with Google Classroom was support. While this intervention often assisted students who had learning difficulties, a student with more severe learning needs may have required support to access technology. Students with specific learning disorders could use Google word predict, spell check, speech-to-text, text-to-speech, and have text read to them to promote text accessibility. Students with cognitive delays may require help logging onto their computer, remembering their passwords, or creating documents or slides, and may also need an alternative language to help explain assignments or projects. "The needs of students are ranging. I have some students that are very technology literate and I've got others who need a bit more help, not just with the curriculum, but how to actually access this technology" explained a teacher participant. Another teacher explained that the current students, for the most part, were capable with handheld technology. They knew how to use a phone, take a video, send a text, and download and navigate an app. With that said, their keyboarding skills were weaker.

> Due to the fact that they are growing up with tablets and smartphones, they don't know how to type. All they can do is swipe or they can type with their thumbs if they're texting. So, getting keyboarding skills back into the hands of the kids is something that's becoming more pressing. (Teacher participant)

Students' Perceptions of Google Classroom

Every teacher but one expressed that students' attitudes towards Google Classroom were very positive. One of the teacher participants, however, suggested that while "the students who are engaged like that convenience and like the way in which we supplement what happens in the class with material," students who were not generally enthusiastic about school were not enthusiastic about Google Classroom.

One teacher commented on the students' enthusiasm: "They rejoice if I booked out the computer lab or get the Chromebooks. They're happy to get on Google." Another teacher explained that students knew their course content was accessible anywhere a device could be used, and it took the pressure off them to remember to take everything home. Another teacher at one point asked her students their opinions on the Google Classroom:

> They love being able to complete work electronically, being able to collaborate, and not having to print anything. They love the organization piece; that they can access it anywhere. They love the creativity. They love that it automatically saves. (Teacher participant)

The school's LEARN teacher and the teacher responsible for filling in the educational gaps that may have been missed during a student's schooling career, explained that her students had a positive attitude towards Google Classroom because it kept all their subjects in the same place. Further, she said, "The kids they can come in, sit down with me, pull up Google Classroom from science, from social studies, from technology, and then their work assignments are there."

Focus Group with Students

The focus group was approximately 30 minutes in duration and consisted of two boys and four girls from Grades 7, 8, and 9. Three of the students started French immersion in kindergarten (early French immersion), and three started French immersion in Grade 7 (late French immersion). The students were volunteer participants. None of the students in the focus group were diagnosed with an exceptionality or were on an individual education plan. Upon analyzing the data, the previously mentioned themes emerged.

The six students in the focus group indicated that their teachers presented information through class comments on web boards and wrote it on the board, as well as used Google Docs, Google Slides, and PowerPoint. Students agreed that most information could be found on Google Classroom where the teachers provided information, review materials, deadlines, and links to supplementary materials. One student noted that Google Classroom offered "links to Google Slides, and Quizlet, and Docs" (Participant 2). Another student added that teachers put deadlines and rubrics in their Google Classroom, which helped students know how to complete assignments and the expectations of the assignment. Students also could demonstrate what they had learned by creating their own presentations through Google Slides and Docs. This was supplementary to quizzes, tests, and other assessments. Students participants noted they preferred using a keyboard instead of using the traditional pencil and paper approach to assignments unanimously recommended the use of Google Classroom as a teaching intervention to supplement their learning.

Discussion

The results of the literature review suggest that many schools are shifting to inclusive education models using UDL, assistive technology, and training in inclusive education. The goal is to meet the needs of every student. The current study suggests that Google Classroom applications as a form of AT has had success in engaging students and meeting learning needs of students through a UDL framework. Focus group data revealed that students generally had positive feelings towards the use of technology in the classroom. This feedback supports previous research by Bryant et al. (2014), who discovered that students with and without exceptionalities showed significant engagement with AT interventions. Further, they used case study methodology, with observations and interviews with teachers, who used a web-based book builder, digital graphic organizer, and an interactive whiteboard app. They found that students who interacted with technology to type, speak, or organize their school materials were more engaged and even excited to complete and show coursework. This increased engagement, as noted by Kortering et al. (2008), could potentially lead to academic success. Kortering and colleagues found that nearly 90% of students found their classroom activities enjoyable or that they worked hard when in a classroom using UDL interventions. Students engaged in their learning have academic success, which leads to the eventual completion of school (Appleton et al., 2006). The current study noted that while both students and teachers are currently using this technology, it needs to be further evaluated to examine its effectiveness as AT.

Student participants stated that teachers presented information, materials, deadlines, and links to supplementary materials through web boards (homework website), Google Docs, Google Slides, and Google Classroom. No students discussed confusion about how to access or use the applications or the inability to access technology inside or outside of school. Students noted that they enjoyed having access to rubrics, so assignment expectations were clear, preferred using a keyboard instead of pencil and paper, and really enjoyed when teachers were able to access their assignments so they could be provided with prompt feedback during the completion of their assignments. Parents were also invited to be a member of their child's Google Classroom subjects. This allowed for an open line of communication between teachers, students, and parents when dealing with curriculum content, upcoming events, and assessment data. Not all parents will be active on Google Classroom and not all students are motivated to participate in classroom activities. Students who are less eager to complete curriculum outcomes may find motivation in collaborating and sharing (MacArthur, 2009), and can collaborate with both teachers and students when completing an assignment.

Students who are eager, but have limited writing ability, can avail of Google Docs, as it can help students who struggle with writing output (Martin & Lambert, 2015). Students who are digital drivers, or comfortable with digital writing technology, use collaboration with instructors, peers, and digital Internet tools to competently complete a written assignment (Martin & Lambert, 2015). There are, however, barriers to entry. If the school was to equip each student with a device, the school's Wi-Fi network would need to be upgraded as it would be unable to support that many devices at the same time; a budgetary constraint and major barrier to technology implementation (Anstead, 2016). While students in the focus group discussed being able to access school material outside of school hours, one

teacher did not support this notion, stating that, "not every student will have access to Google Classroom at home" (Teacher participant), which creates a lack of equity between students. Another barrier is the decline in students' keyboarding skills. One teacher participant noted that most students could use handheld technology, quickly send text messages, and Interact with phone apps, but when it came to actual keyboarding on a computer, their skills were very weak.

Conclusion

Messinger-Willman and Marino (2010) discuss how assistive technology, such as electronic dictionaries, audio books, and word prediction software, benefit students with exceptionalities. While there is limited research on Google Classroom as a form of AT, it does provide multiple interventions found in the realm of AT. The applications in Google Classroom provide students who have writing difficulties the ability to speak their thoughts and have those thoughts written down on paper. It also allows for text to be read to a student who has difficulty reading, and for students to collaborate while using this software alongside other applications. Responses from teachers in the current study support the notion that Google Classroom can be useful for students who require AT.

While most teachers in the study agreed that Google Classroom supported students in the inclusive classroom, some felt that it depended on the student, expressing that students who are engaged will really enjoy Google Classroom's functions, and how information can be found and communicated, and students who are generally disengaged will likely remain disengaged even after being provided with technological interventions. Teachers discussed the stigma attached to students with exceptionalities using AT. One teacher explained that through Google Classroom, she could assign student projects, modified and based on the students' individual education plans, without anyone else knowing there were modifications to certain assignments. The stigma associated with students who use AT was removed since every student in the class was using a Chromebook or computer to complete an assignment, but they were all using them slightly differently.

Google Classroom is currently recommended for use to meet the needs of students in inclusive classrooms and is a school board supported initiative as outlined in the Province-wide Implementation of Google Apps for Education (Newfoundland and Labrador English School District, 2017b, p. 9). Teachers expressed that their ability to post pertinent classroom information and content was highly beneficial. Moreover, they could create assignments that students could complete online, at school and at home, or with peers provided they have technology access. Google Classroom met the needs of students with reading or writing exceptionalities through speech-to-text, text-to-speech, word prediction, and spell-check. Being able to complete assignments using a keyboard on a computer allowed students with writing issues to be able to get what they need. Teachers could give every student an assignment and students could work on similar devices without knowing if a student in their class had an exceptionality. Educators who familiarize themselves with Google Classroom and its functions, and use it as a form of AT, are stepping away from the *one size fits all* approach of the past and are meeting UDL standards by providing the ability to create and manipulate course materials and objectives to meet the needs of every student (Lopes-Murphy, 2012).

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L'apprentissage en ligne dans le contexte de la quatrième révolution industrielle : le cas d'un module connectiviste en contexte universitaire

Online Learning in the Context of the Fourth Industrial Revolution: The Case of a Connectivist Module in a University Context

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Résumé

Cet article propose de faire le lien entre les différentes révolutions industrielles, les principales théories de l'apprentissage et la formation en ligne : à travers l'histoire, nous montrons comment l'éducation s'est toujours plus centrée sur l'apprenant, quand nos systèmes de production et d'éducation de masse ont dépossédé les consommateurs de la conception et de l'agencement des produits et les apprenants de leurs curriculums d'apprentissage. En introduisant une dimension connectiviste dans un cours à l'université, nous montrons ses effets sur les étudiants, sur leurs apprentissages et sur comment le connectivisme pourrait permettre de développer les compétences essentielles à la quatrième révolution industrielle.

Mots clés : connectivisme ; révolution industrielle ; formation en ligne ; compétences du 21e siècle

Abstract

This article proposes a link between the different industrial revolutions, major learning theories, and online learning. We show that while learning theories have become progressively more learner-centred, systems of mass production and mass education increasingly separate consumers from the design of the products they use and likewise separate learners from the design of their learning and curricula. By introducing a connectivist element into a university course, we show how students are affected by a connectivist approach to education and discuss

how such an approach could be used to develop essential skills for the fourth industrial revolution.

Keywords: connectivism; industrial revolution; online education; 21st century skills

Introduction

Après plus de 30 ans de rentabilisation et d'industrialisation des systèmes éducatifs et après plusieurs années de pandémie qui ont vu fleurir des modalités à distance auprès de l'ensemble des acteurs éducatifs, la formation en ligne a mauvaise presse et hérite d'une image plutôt mitigée : pas assez d'interactions, pas de « contact humain », trop d'écrans, etc. Pourtant, les développements de cours en ligne tout comme ceux de nos systèmes éducatifs sont indissociables de leurs contextes technologiques et sociétaux (Durkheim, 1922/2006). Notre hypothèse est que ces évolutions suivent les transformations technologiques liées aux différentes révolutions industrielles. Les cours en ligne aujourd'hui seraient sous-tendus par un modèle industriel qui domine l'ensemble des marchés; or, il en existe beaucoup d'autres, plus humains, plus inclusifs, et l'éducation en ligne peut être porteuse d'énormes possibilités. Cet article propose d'éclairer l'apprentissage en ligne à la lumière de la quatrième révolution industrielle et des nouvelles compétences qui l'accompagnent pour comprendre son évolution future. À travers l'expérience d'un cours qui s'inspire du courant connectiviste, nous avons regardé les effets sur les étudiants[1] et leurs apprentissages. Les résultats montrent que si la non-directivité d'un tel cours insécurise les étudiants, elle permet de développer des apprentissages authentiques, profonds et de développer des compétences liées à la quatrième révolution industrielle.

À l'origine était la production de masse

Pour comprendre les transformations de nos systèmes éducatifs, il faut commencer par décrire l'histoire des transformations des systèmes de production de nos sociétés industrielles, en lien avec les mutations technologiques.

Première révolution industrielle et école de masse

La première révolution industrielle a commencé en 1790 avec l'invention de la machine à vapeur qui a permis une mécanisation de la production et le développement du transport (Blinder, 2008). Cette avancée de la production et la possibilité d'un transport croissant des produits a introduit pour la première fois une rupture de la production et de la consommation : le produit est devenu quasi magique pour des consommateurs dépossédés du design et de la production.

[1] Dans le présent document, le masculin est utilisé dans le seul but d'alléger le texte.

Cette massification s'est accompagnée du transfert des emplois agricoles ruraux vers des emplois manufacturiers urbains et elle a été rendue possible grâce à la mise en place d'un système d'éducation de masse performant, notamment aux États-Unis (Galluzzo, 2020; Kayembe & Nel, 2019).

Deuxième révolution industrielle et apprentissage béhavioriste

Ensuite, la seconde révolution industrielle a débuté en 1860 avec la généralisation de l'électricité et des procédés chimiques (Yusuf et al., 2020) qui ont permis d'accélérer la production et la consommation de masse, donnant au consommateur toujours plus de produits magiques en le dépossédant de leurs conceptions et de leurs productions et en distinguant les rôles des ouvriers qui font et ceux des ingénieurs qui savent (Meier, 2017).

Les thèses tayloristes de division du travail ont inspiré les écoles publiques américaines pour former des travailleurs et ont introduit dans le système scolaire un fonctionnalisme se traduisant entre autres par les curriculums, les objectifs et les mesures de l'apprentissage, ainsi que la fragmentation des disciplines et des matières (Normand, 2005). C'est aussi durant cette deuxième révolution industrielle qu'est né le béhaviorisme, dans un souci de scientifisation du processus d'apprentissage, avec notamment la naissance des machines à apprendre (Skinner, 1965).

Si le grand apport de ce courant est de se centrer sur l'élève, la principale critique du béhaviorisme est que l'apprentissage y est défini comme un processus de mémorisation décontextualisé (Wilson & Myers, 2000). Aujourd'hui, ce paradigme aux caractéristiques proches de la production de masse des premières révolutions industrielles est toujours important dans nos systèmes éducatifs, du fait des évaluations sommatives et de la mémorisation pour les examens.

Troisième révolution industrielle et apprentissage cognitiviste

La troisième révolution industrielle est celle de l'information, avec la généralisation de l'ordinateur au début des années 1980 qui a permis l'automatisation et l'informatisation des processus de production. L'ordinateur et son pouvoir de modélisation des processus cognitifs ont donné naissance au cognitivisme en psychologie et à son pendant constructivisme en éducation (Dupuy, 1994).

Le constructivisme a permis de mettre en avant le concept de représentation dans les processus cognitifs : l'enfant ne mémorise plus une connaissance, mais il la construit à partir d'informations et de ses propres représentations passées de manière dynamique (Larochelle & Bednarz, 1994). Comme pour le béhaviorisme, la principale limite de ce courant concerne la prise en compte du contexte d'apprentissage (Wilson & Myers, 2000), contexte que plusieurs courants, comme la cognition située (Suchman, 1987) ou le socioconstructivisme (Legendre, 2008), tentent de pallier.

La quatrième révolution industrielle et ses nouvelles compétences

La quatrième révolution industrielle est très récente et les technologies qui la sous-tendent sont plus difficiles à identifier. Ces technologies semblent liées au développement des réseaux et au croisement des univers réels et virtuels : Internet des objets, impression 3D, réalité virtuelle, intelligence artificielle, informatique en nuage, analyse des données massives, nanotechnologies, etc. (Kayembe & Nel, 2019). Ces technologies s'associent en partie avec des délocalisations de plusieurs aspects de la production et avec la réintégration des processus de design et de production par le consommateur.

De ce fait, la littérature sur la quatrième révolution industrielle s'accompagne de cartographies de nouvelles compétences nécessaires aux changements de nos systèmes de production, et ces nouvelles compétences doivent s'articuler avec les savoirs disciplinaires plus traditionnels, d'où leurs noms de compétences transversales ou compétences du 21e siècle (Blinder, 2008; Kayembe & Nel, 2019; MÉO, 2015; Schwab, 2017; Yusuf et al., 2020). Il est difficile d'être exhaustif et d'établir un curriculum de ces compétences du 21e siècle, mais on peut retrouver des éléments communs dont nous présentons ici une synthèse :

- Résolution de problème et algorithmique : avec le développement de l'intelligence artificielle, il est important de se former à la pensée algorithmique et à résoudre des problèmes nouveaux toujours plus complexes en lien avec des mutations en perpétuelle accélération. Une citoyenneté éclairée passe par une meilleure compréhension des codes et programmes qui touchent nos vies.
- Créativité et multidisciplinarité : dans ce monde en transformation, il est important que le futur citoyen sache construire par lui-même des solutions innovantes et créatives, qui mobilisent non plus des savoirs spécialisés, mais des savoirs de différentes épistémologies et de différents domaines de connaissance.
- Pensée critique et capacité d'apprentissage continu : la profusion d'informations numériques et la multiplication des contenus accessibles demandent au futur citoyen de développer une pensée critique pour la sélection des sources, mais aussi des capacités d'apprentissage pour s'adapter aux nouveaux outils; il doit apprendre à apprendre.
- Habilités sociales : avec le développement des réseaux et l'accès à l'ensemble de l'humanité en ligne, le futur citoyen doit développer des habiletés sociales pour collaborer en ligne avec toujours plus de monde et de manière toujours plus numérisée et plus complexe.

Le développement de ces compétences du 21e siècle pose au moins trois problèmes (Kayembe & Nel, 2019). 1) Le premier problème vient de la transversalité de ces compétences avec les curriculums et avec les approches traditionnelles. Elles touchent tous les domaines du savoir et nécessitent des apprentissages individualisés adaptés aux profils de chaque apprenant. De ce fait, il est difficile d'établir des curriculums génériques et des évaluations standardisées,

comme c'est le cas dans nos systèmes éducatifs industriels. 2) Ces compétences créent de l'injustice entre les individus et entre les systèmes éducatifs des pays. 3) Enfin, comment former les enseignants à ces nouvelles compétences? Doivent-elles être réparties dans tous les cours ou faire l'objet de cours spécifiques? Quelles structures d'activités permettent de développer ces compétences chez les enseignants, puis chez les élèves? Notre hypothèse est que la reconnexion de l'apprenant avec le processus de design du cours permettra de donner des pistes pour le développement de ces compétences. En faisant de l'apprenant non plus un consommateur mais aussi un producteur de connaissances, il pourrait développer son esprit critique, ses compétences technologiques, sa créativité ou ses habiletés sociales. Mais comment le faire en ligne?

Ingénierie pédagogique des cours en ligne

Avec la massification des systèmes de production, on assiste au développement des méthodes d'ingénierie. Les définitions de l'ingénierie sont variées dans la littérature (Carré & Gaspar, 2017; Le Boterf, 2011; Paquette, 2002), mais elles mettent toutes un principe fondamental au cœur du processus de production : la séparation de la conception, ou *design*, et de la réalisation, à la différence du processus artisanal durant lequel l'artisan conçoit le produit en même temps qu'il le réalise. Ceci permet principalement deux choses : 1) des économies d'échelle, puisque la production peut être faite en chaîne de manière moins couteuse, et 2) une assurance de la qualité, puisque la conception assure le même produit en sortie. À partir des années 1980, l'éducation et en particulier la formation à distance sont devenues perméables à ces principes d'ingénierie en récupérant les principes du génie logiciel à forte inspiration cognitiviste (Paquette, 2002). C'est ce même modèle d'ingénierie cognitive que l'on retrouve dans les cours en ligne de l'ensemble des institutions éducatives aujourd'hui (Power, 2008) : identification des besoins et des connaissances à construire, conception des activités, des modules, des parcours, développement du contenu et des ressources pour une plateforme donnée, diffusion du cours et assistance du professeur ou du tuteur.

Dans ce contexte d'ingénierie des cours en ligne, plusieurs théories ou techniques tentent de modéliser l'apprentissage : la théorie des trois présences (Jézégou, 2010), l'apprentissage par l'enquête en ligne (Lee et al., 2004), l'approche *Quality Matters* (Legon, 2015) ou encore la théorie de la distance transactionnelle (Moore, 1993). Dans toutes ces approches, le processus de design du cours (conception) est toujours préalable à sa diffusion (production), respectant le principe clé de l'ingénierie propre à toute production industrielle. Comment alors permettre à l'apprenant en ligne de s'approprier le design du cours? Est-ce que cela pourrait lui permettre de développer en ligne des compétences en lien avec la quatrième révolution industrielle? En ce sens, l'approche connectiviste peut apporter des éléments de réponse.

Le connectivisme et la quatrième révolution industrielle

Le connectivisme est une approche théorique alternative de l'apprentissage en ligne qui est née avec le cours en ligne ouvert et massif (MOOC) développé par Downes et Siemens à

l'Athabasca University (Downes, 2022; Siemens, 2006). Il est d'ores et déjà intéressant de noter qu'il existe deux types de MOOC : les cMOOC, cours post-industriels basés sur des interactions humaines et une approche connectiviste et les xMOOC, cours typiquement industriels, qui sont arrivés par la suite sous la forme de systèmes automatiques, inspirés des machines à apprendre béhavioristes (Smith & Eng, 2013).

Le connectivisme met l'accent sur les connexions du processus d'apprentissage en ligne : le tuyau est plus important que le contenu qu'il transporte (Siemens, 2006), et la localisation de l'information est plus importante que l'information elle-même. La valeur de la diversité est donc une fonction de l'apprentissage, soulignant l'importance de la présence sociale à travers la création et le maintien des réseaux d'apprenants, considérant un contenu comme un acteur désynchronisé (Anderson & Shattuck, 2012). L'un des éléments dominants dans cette approche est le haut niveau de contrôle par l'utilisateur sur le contenu et sur la manière de l'appréhender (Siemens, 2006). Le méta-apprentissage devient aussi important que l'apprentissage lui-même. On passe d'un apprentissage individuel objectif à un apprentissage social fondé sur l'imitation et l'intersubjectivité.

Le connectivisme pourrait être rapproché du constructionnisme de Papert (Harel & Papert, 1991) qui est né dans les années 1980 en réaction au constructivisme. Le constructivisme et le contructionnisme ont en commun qu'ils considèrent l'apprentissage comme un processus de construction (Dumora & Boy, 2008). Cependant, pour les constructivistes, l'accent est mis sur un acteur individuel construisant sa propre réalité psychologique, alors que pour les constructionnistes, les relations sont au cœur du processus de construction (Gergen, 2001). Le constructionnisme dans le domaine scolaire a donné naissance en 2005 au mouvement *Maker* ou Bricoleur (Martin, 2015) par le biais d'activités et de processus de design en orientant le processus d'apprentissage vers l'exploration, l'expérimentation, l'itération, la collaboration et la résolution de problèmes (Dougherty, 2013; Martin, 2015). On retrouve ici nos compétences du 21e siècle, bien que ces activités *Maker* se réalisent toujours en périphérie de la salle de classe, toujours du fait de la difficulté à les industrialiser. Plus récemment, le courant du constructionnisme social s'est développé en ouvrant une perspective langagière au construit (Gergen 2009), s'approchant ainsi des approches post-modernistes en sciences humaines (Alford, 2012; Dumora & Boy, 2008).

Le connectivisme en ligne et le constructionnisme en présence semblent adaptés aux développement des compétences du 21e siècle, mais ils partagent la même problématique d'intégration dans nos systèmes éducatifs industriels : si l'apprenant réalise le design de son apprentissage, comment élaborer un curriculum et comment évaluer les apprentissages de manière standardisée?

Méthode

Un module connectiviste dans un cadre universitaire

Nous avons conçu et développé un module d'inspiration connectiviste dans un cadre académique à partir d'un cours en ligne d'intégration des technologies en formation d'enseignant dans une faculté d'éducation. Nous nous sommes inspirés de la méthode de conception fondée sur la recherche (*design-based research*) (Anderson & Shattuck, 2012). La méthode de la conception fondée sur la recherche permet de développer un artéfact et de l'évaluer. Cette méthode comporte quatre étapes : la collecte d'informations, la conception de l'artéfact, la mise à l'essai de l'artéfact sur un groupe restreint et, enfin, l'évaluation à grande échelle. Nous n'avons pas fait une évaluation à grande échelle, mais les données disponibles pour l'évaluation du cours ont été utilisées à cette fin. Nous avons développé un module connectiviste spécifique à partir d'un cours existant, puis nous avons analysé les données produites par l'évaluation du professeur et par l'évaluation des étudiants. Aussi, nous avons pu comparer certaines évaluations avec les évaluations du même cours et du même professeur, sans module connectiviste.

Participants et éthique

Les participants au cours étaient les 31 étudiants de la formation en ligne d'enseignants de l'Université d'Ottawa de la session d'hiver 2021. Nous avons aussi pu comparer certaines données quantitatives avec le même cours donné à l'hiver 2017, qui comportait 18 étudiants. Les données utilisées étaient l'évaluation des travaux par les étudiants, les types de projets et l'ensemble des données publiques et anonymes d'évaluation du cours, quantitatives et qualitatives.

Le module connectiviste

À l'aide de la littérature, en 2021, nous avons transformé le module central d'un cours existant qui avait été donné en 2017. Le premier module était, dans les deux versions, organisé autour de la production d'une page Web pour développer les littératies numériques des futurs enseignants. Le dernier module, dans les deux cours, portait sur un projet individuel de mise en place d'activité pédagogique en intégrant une ressource, développée ou existante. C'est dans le cœur du cours de 2021 que le module connectiviste a remplacé deux modules plus classiques du cours de 2017. Comme le montre le tableau 1, dans les modules 2 et 3 du cours initial en 2017, les étudiants devaient réaliser des lectures théoriques et proposer un premier scénario final. Ensuite, ils devaient développer une ressource éducative à l'aide d'un outil d'édition. Pratiquement, ils devaient donc réaliser des lectures, concevoir un scénario d'activité éducative et développer un contenu numérique destiné à des élèves sur l'ensemble des modules 2 et 3. Dans la version de 2021, nous avons remplacé ces modules 2 et 3 par un module connectiviste nommé « Projet bricoleur ».

Tableau 1

Transformations des modules 2 et 3 en module connectiviste

Version 2017		Version 2021	
Module 1 2 semaines	Identité professionnelle numérique (20 %) - Lectures - Fils Twitter - **Développement d'un site Web de présentation de soi**	Module 1 3 semaines	Évaluation de ressource (30 %) - Sélection et évaluation d'une ressource - **Développement d'un site Web pour présenter les résultats**
Module 2 2 semaines	Connaissances de base à l'ère numérique (20 %) - Lectures - Développement d'un premier brouillon du projet final	Module 2 4 semaines	Projet Bricoleur (30 %) - Définition d'un sujet de recherche et investigation - Développement d'une vidéo de présentation des résultats
Module 3 3 semaines	Littératies numériques (30 %) - Développement d'une ressource éducative		
Module 4 3 semaines	Projet technopédagogique (30 %) - **Développement complet d'une activité** intégrant la ressource précédente	Module 3 3 semaines	Projet technopédagogique (30 %) - **Développement complet d'une activité** intégrant des ressources

Dans une approche connectiviste, le professeur est plus un guide qu'un fournisseur de contenu pour les étudiants, en partageant des méthodes et outils, en agrégeant les meilleures pratiques pour les diffuser à l'ensemble de la classe, en accompagnant la collaboration des membres d'équipes et en rassurant les étudiants quant aux directions qu'ils choisissent. Nous avons donc proposé une situation initiale et une situation finale au réseau d'étudiants, puis suivi l'apprentissage des groupes en autonomie, favorisant ainsi la créativité, la pensée critique, la curiosité, la débrouillardise, la collaboration et la mise en pratique d'une pensée design. Le principe du module connectiviste était d'associer l'apprentissage par enquête (Lee et al., 2004) et l'approche Bricoleur (Martin, 2015) dans une activité de recherche en ligne. Dans un premier temps, il s'agissait de définir une question de recherche d'équipe. À partir de cette question, les étudiants faisaient leurs propres recherches sur Internet pour réaliser une vidéo de 10 minutes qui présentait leur travail à l'ensemble de la classe. Afin d'être sûrs que les étudiants étaient motivés par leurs curiosités et non par la direction stricte du professeur qui évalue, nous avons proposé une évaluation collective : chaque étudiant évaluait le travail de sa propre équipe, ainsi

que les travaux des autres équipes. Les vidéos finales étaient présentées lors d'une séance synchrone, à la fin du module, afin de favoriser l'évaluation par les pairs. Nous rencontrions et échangions des courriels avec chaque groupe au moins une fois par semaine, et nous diffusions les commentaires de chaque groupe à l'ensemble de la classe par courriel, après les rencontres. Toute latitude était laissée aux étudiants pour l'organisation de ces étapes, guidés par la curiosité et la découverte.

Instruments de collectes et analyse de données

Afin d'évaluer la portée du cours, nous avons eu recours à plusieurs types de données. Les premières données sont celles de l'évaluation des travaux du module par les étudiants. Nous avons utilisé des échelles de Likert de cinq items pour les sous-critères d'évaluation formative : pertinence du projet, qualité ergonomique, qualité pédagogique, réflexion sur le processus, originalité et évaluation générale.

L'autre outil utilisé est celui de l'évaluation du cours par les étudiants. Cette évaluation formelle est composée de 13 questions, et nous avons ainsi pu comparer les réponses de ces questions entre la version du cours de 2017, sans module connectiviste, et la version de 2021, avec module connectiviste. Les questions portent sur la préparation du professeur, sa capacité à communiquer la matière, la qualité générale du professeur, l'aspect stimulant de l'enseignement, l'organisation du cours, la clarté des attentes, la pertinence des commentaires du professeur, etc. Enfin, le dernier type de données est composé des commentaires anonymes des étudiants dans cette évaluation du cours.

Analyse des données

Pour analyser les données de l'évaluation des projets par les étudiants, nous avons réalisé les moyennes d'autoévaluation et d'évaluation par les pairs, par projet, puis nous avons réalisé des corrélations entre les différents sous-critères en utilisant le coefficient de Pearson. Pour les autres données en lien avec l'évaluation du cours, nous n'avons utilisé que les statistiques descriptives pour comparer les deux cours, car il n'était malheureusement pas possible de faire des analyses de comparaison de moyenne, n'ayant pas les données par répondant. C'est donc une analyse qualitative de ces données que nous proposons. Enfin, nous avons analysé les commentaires de l'évaluation du cours en les regroupant en catégorie : l'aspect transformationnel du cours, les travaux, les compétences du 21^{e} siècle, les compétences du professeur et, enfin, les commentaires négatifs du cours.

Résultats

Les données issues du cours proviennent des étudiants. Elles sont de trois sortes : les évaluations de travaux du cours de 2021 par les étudiants, les comparaisons d'évaluations des cours de 2017 et 2021 et les commentaires sur le cours.

Les travaux des étudiants

Les travaux du module connectiviste ont porté sur plusieurs sujets en lien avec la quatrième révolution industrielle. Chaque étudiant a évalué son projet (autoévaluation) et les projets de ces pairs (évaluation par les pairs). Nous n'avons trouvé aucune corrélation entre les données d'autoévaluation et les données d'évaluation par les pairs, pour l'ensemble des critères. Pour les données d'autoévaluation, nous avons relevé deux corrélations : entre la pertinence du sujet et la qualité pédagogique de la présentation ($r = 0,899$; $p < 0,01$), et entre l'autoévaluation générale du projet et l'originalité du projet ($r = 0,698$; $p < 0,05$).

Pour toutes les données de l'évaluation par les pairs, l'ensemble des critères est corrélé aux autres critères, comme le montre le tableau 2.

Tableau 2

Corrélations entre les critères de l'évaluation des travaux par les pairs (n = 10)

Critères d'évaluation	Général	Pertinence	Ergonomie	Pédagogie	Réflexion	Originalité
Général	—					
Pertinence	0,886**	—				
Ergonomie	0,942**	0,888**	—			
Pédagogie	0,895**	0,877**	0,887**	—		
Réflexion	0,899**	0,757*	0,820*	0,785**	—	
Originalité	0,895**	0,723*	0,882**	0,826**	0,816**	—

Note. * $p < 0,05$; ** $p < 0,01$

Évaluations du cours

Comme mentionné, nous avons pu récupérer l'ensemble des évaluations des cours donnés en 2017 et 2021 afin de les comparer, la différence principale étant l'adaptation connectiviste en 2021. L'ensemble des variables sont sensiblement les mêmes, cependant plusieurs variables ont varié avec l'ajout du module connectivite : l'aspect stimulant de l'enseignement (Figure 1), la capacité du professeur à communiquer la matière (Figure 2), et la qualité des commentaires sur les travaux (Figure 3). Pour ces trois variables, l'évaluation « très positif » a gagné des pourcentages, alors que l'évaluation « positif » a diminué considérablement. De plus, pour le cours de 2021, il y a systématiquement 3,85 % d'étudiants, donc deux étudiants, qui évaluent chaque question négativement ou de manière neutre.

Figure 1

Évaluation en pourcentage d'étudiants de l'aspect stimulant de l'enseignement des cours de 2017 (n = 13) et de 2021 (n = 25)

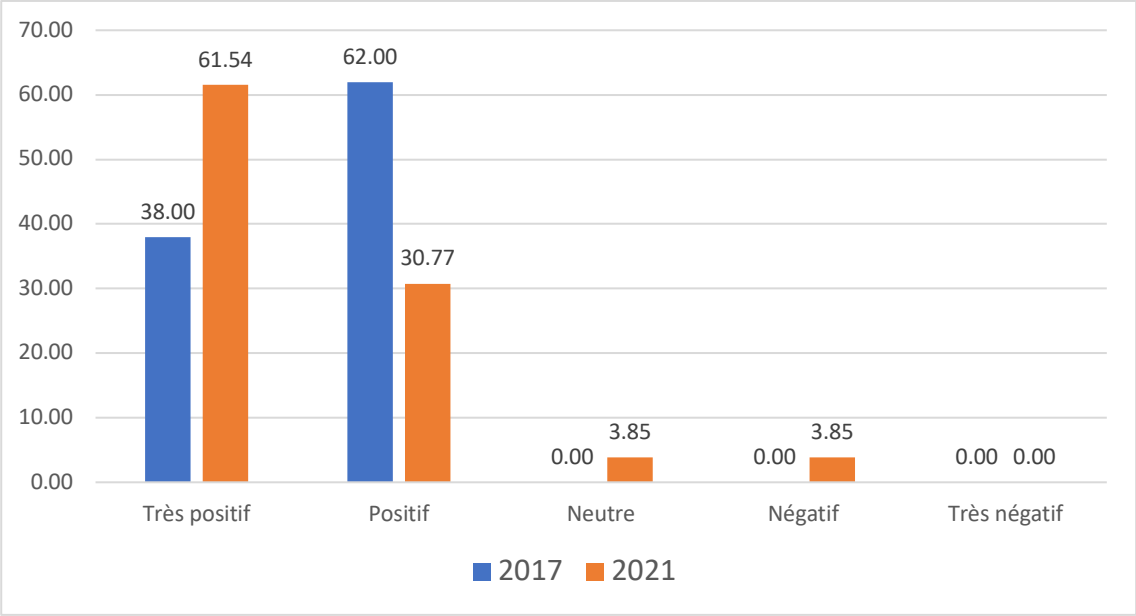


Figure 2

Évaluation en pourcentage d'étudiants de la qualité de la communication de la matière par le professeur des cours de 2017 (n = 13) et de 2021 (n = 25)

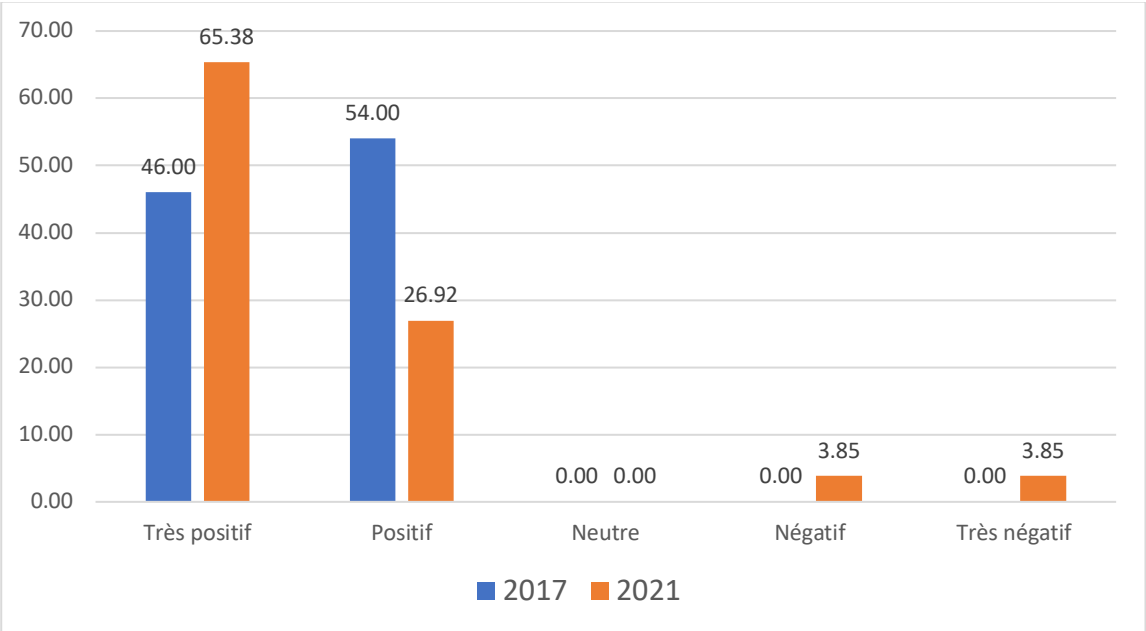
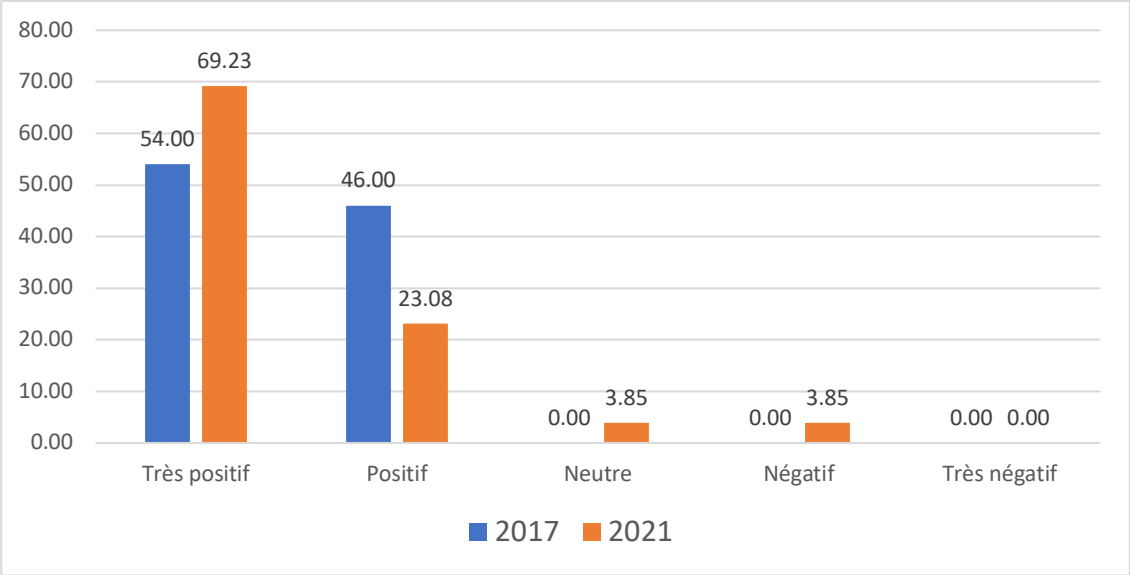


Figure 3

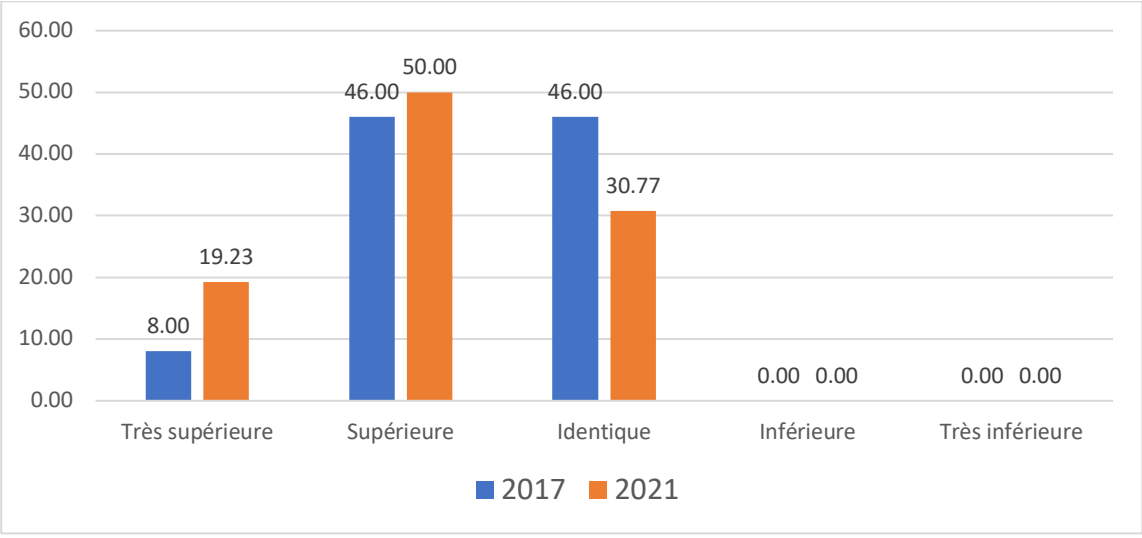
Évaluation en pourcentage d'étudiants de la qualité des commentaires sur les travaux des cours de 2017 (n = 13) et de 2021 (n = 25)



Une autre dimension qui varie entre les deux cours est l'importance de la charge de travail (Figure 4). Elle est considérée plus importante en 2021 qu'en 2017. Ces statistiques descriptives ne donnent pas d'effet significatif, car nous n'avons pas chaque réponse d'un même étudiant, les échantillons sont de tailles différentes et ils sont dispersés, en particulier avec les deux étudiants plutôt défavorables au cours.

Figure 4

Évaluation en pourcentage d'étudiants de la charge de travail du cours par rapport aux autres cours de la session pour les cours de 2017 (n = 13) et de 2021 (n = 25)



Commentaires sur le cours

Nous avons reçu 22 commentaires, parmi lesquels 20 positifs et 2 négatifs ou neutres. Nous les avons triés en trois catégories : les commentaires sur l'aspect transformationnel du cours (qui ont motivé l'écriture de cet article), les commentaires sur les travaux et, enfin, les commentaires en lien avec les compétences du 21e siècle.

Les commentaires sur l'aspect transformationnel du cours mentionnent à deux reprises le fait que le cours a poussé les participants hors de leurs zones de confort : « Ce cours n'était pas du tout ce à quoi je m'attendais, et je n'ai pas été déçu. En fait, j'ai appris beaucoup plus que ce à [quoi] je m'attendais et j'ai l'impression d'avoir été poussé hors de ma zone de confort et que je suis plus que jamais disposé à explorer et à essayer de nouvelles technologies, idées et méthodes d'enseignement. » Un autre étudiant fait aussi mention de cet aspect : « Le cours est stimulant et me sort de ma zone de confort :). » Enfin, un dernier commentaire exprime différemment cette transformation : « Où je me suis embarqué? Quel est ce cours? Mais, à force d'avancer dans le cours et d'abandonner la vieille méthode traditionnelle, j'ai découvert au cours […] un autre côté pédagogique que j'avais en moi et une autre façon de voir l'enseignement. »

Plusieurs commentaires portent sur l'importance des travaux : « [J'ai] aimé la liberté donnée pour les travaux » ou encore « la manière dont le contenu a été présenté est stimulante. J'ai bien aimé le caractère "open-ended" des productions à accomplir. J'ai beaucoup appris ». Enfin, un commentaire fait le lien entre les travaux et l'aspect transformationnel du cours : « Approche avant-gardiste des travaux : le site Web, le projet de recherche, la mise en commun de connaissances, c'était extrêmement stimulant et a mené à plein de profondes réflexions et remises en question. »

Plusieurs commentaires portent sur les compétences acquises : « [Le cours m'a] énormément apporté sur le plan académique et il sera d'un très grand apport sur le plan professionnel! » ou encore : « Le contenu du cours a été extrêmement pertinent à la réalité que nous vivons en salle de classe. » Aussi, un commentaire insiste sur l'aspect continu de l'apprentissage avec les technologies : « J'ai aimé le cours qui nous permet de s'autoformer et apprendre à apprendre. J'emporte avec moi de merveilleux acquis! » Un commentaire détaille la pédagogie connectiviste du cours, son lien avec la pensée critique et sa différence avec l'enseignement béhavioriste : « Dans mes autres cours, j'ai été assujetti, pendant des heures, aux monologues de mes professeurs et à la remise continuelle d'une série de planifications détaillées ou de réponses à des questions nécessitant rien d'autre que la réécriture des informations qui nous ont été présentées. La livraison de ce cours et les activités auxquelles nous avons participé ont été stimulantes et, pour la première fois, m'ont fait penser et réfléchir. » L'aspect collaboration est moins mentionné, cependant un commentaire l'évoque : « J'aimerais cependant avoir une plus grande partie de nos cours à distance en travail d'équipe. Les cours à distance sont plus stimulants et plus riches en apprentissage s'ils incluent plus de collaboration et de travail en équipe. »

Deux commentaires retranscrits en intégralité ici sont plutôt négatifs et éclairent fortement sur les travaux et l'esprit connectiviste du cours : « Des difficultés à réaliser les travaux pour ce cours. Les consignes des travaux peuvent être plus claires. Les commentaires pourraient avoir plus de détails »; « Ce cours était une perte de temps, le professeur parlait comme si l'on était des experts en informatique. Les instructions pour les travaux étaient confuses et les explications du professeur l'étaient encore plus, il nous demandait de faire ce qu'on veut pour les travaux, il n'y avait pas d'attente, en général, je n'ai rien appris dans ce cours, les documents qu'on avait à lire n'étaient pas pertinents, donc inutiles ».

Enfin, de nombreux commentaires renseignent sur les compétences du professeur pour mener à bien ce cours d'inspiration connectiviste. Trois commentaires mentionnent l'ouverture du professeur : « sa disponibilité et son ouverture », « très patient mais aussi compréhensible et très ouvert » et « grande ouverture d'esprit de l'enseignant ». D'autres commentaires mentionnent qu' « il a un réel recul sur ses connaissances et sait les remettre en perspective pour développer notre esprit critique » et que le suivi était important : « J'aime ce cours qui au début m'a poussé à abandonner le programme. Sa façon de s'y prendre et de son encouragement m'a donné l'espoir et l'intérêt pour moi et pour les élèves. »

Pour finir, nous mentionnons le ressenti du professeur pendant le cours. Le principal aspect pendant le module 2 était de constamment rassurer les étudiants sur leurs directions, tout en les orientant parfois vers des pistes prometteuses du fait de son expertise (par exemple le traitement de la langue en intelligence artificielle). Il devait aussi leur rappeler constamment qu'il n'évaluait pas, que leurs pairs les évaluaient, et donc qu'ils ne devaient plus se centrer sur les attentes du professeur, chose qu'ils ont eu beaucoup de mal à intégrer. Enfin, il était intéressant de gérer la différence des profils étudiants en termes pédagogiques : les étudiants immigrants d'Afrique et d'Europe semblent avoir une tradition très béhavioriste et leur arrivée en Amérique du Nord semble consister en une appropriation du constructivisme et du socioconstructivisme. Le passage au connectivisme demandait pour eux un suivi particulier, quand les étudiants canadiens d'origine, baignés dans le constructivisme depuis leurs propres scolarités, voyaient plus facilement le pourquoi de la transformation visée.

Discussion

Ce cours d'influence connectiviste et son module 2 semblent avoir contribué à développer des compétences du 21e siècle en lien avec la quatrième révolution industrielle. Les étudiants ont abordé pour la première fois les problématiques de l'algorithmique, de l'intelligence artificielle et de l'importance du design pour leurs élèves. La liberté de direction des étudiants a permis une appropriation et une contextualisation très personnelles et pratiques de ces phénomènes de transformation de la société. Le contrôle de l'activité par les étudiants a permis de rester proche de leurs contextes : les étudiants ont ainsi eu un cours proche de la « réalité que nous vivons en salle de classe », puisqu'ils ont défini eux-mêmes les contours des problèmes et les solutions. La formulation des problèmes a permis de mobiliser des

connaissances transdisciplinaires et l'évaluation partagée, d'être guidé par la curiosité de manière authentique. Le connectivisme semble donc apporter une forte contextualisation de l'apprentissage, en inscrivant la connaissance dans un contexte réel, dépassant ainsi la principale limite du béhaviorisme et du cognitivisme (Wilson & Myers, 2000).

Les étudiants ont développé leurs métacompétences, leur « apprendre à apprendre », en développant la localisation et le jugement de l'information propre au connectivisme (Siemens, 2006). En matière de pensée critique, le cours a été aussi très important puisqu'il a particulièrement amené à « penser et réfléchir » les étudiants. L'aspect social est moins mentionné, mais le seul commentaire demande plus de collaboration, ce qui est assez rare de la part d'étudiants dans des programmes professionnels en ligne qui préfèrent généralement travailler seuls. Le connectivisme du cours semble avoir permis aux étudiants de s'approprier les processus de production et de design, de développer leurs propres agencements, en rupture avec la production de masse.

Nous avons tenté de développer un module connectiviste dans un cours créditeur en université en tentant de contourner deux aspects : l'évaluation standardisée du professeur et le développement d'activités homogènes qui suivent un même curriculum. Afin de contourner l'aspect béhavioriste de l'évaluation du professeur, nous avons utilisé une autoévaluation et une évaluation par les pairs. Ces deux types d'évaluation ne sont pas corrélés entre eux, et pour ce qui est de l'évaluation par les pairs, tous les critères sont corrélés deux à deux, ce qui laisse à penser que chaque étudiant produit une évaluation générale d'ensemble de chaque projet, sans réellement distinguer les critères. Cependant, la faible taille de l'échantillon et la mansuétude des étudiants entre eux peuvent expliquer cet écrasement des données conduisant à cet ensemble de corrélation. Il est cependant intéressant de noter que pour les autoévaluations deux corrélations apparaissent : entre le critère de la pertinence du sujet et la qualité pédagogique d'une part, ce qui semble associer le fond et la forme des projets; d'autre part, nous avons une corrélation entre l'évaluation générale et le critère d'originalité. Ce dernier point nous conduit à considérer l'originalité d'un projet comme principal critère de qualité pour la personne qui s'autoévalue. Or, être original pour soi-même, c'est aller hors de sa zone de confort, guidé par sa curiosité. Ceci est appuyé par les commentaires qualitatifs pour ce qui concerne l'aspect transformationnel du cours et les zones de confort dépassées. Pour cet aspect, il semble donc que des recherches supplémentaires spécifiques sur ces formes d'évaluation pourraient éclairer les méthodes connectivistes.

Pour ce qui est de la liberté du curriculum dans le module, on note que les étudiants sont poussés hors de leurs zones de confort, et cela correspond à l'abandon progressif de la « vieille méthode traditionnelle » et, parfois, à la découverte d'un « autre côté pédagogique [que l'on a en nous] et une autre façon de voir l'enseignement ». Cette dernière citation est importante, car elle laisse entendre que cet apprentissage par la curiosité est déjà en nous, et qu'il a peut-être été affecté par les logiques descendantes des approches industrielles. Le connectivisme propose donc une approche post-industrielle, dans le même sens que les transformations des systèmes de production dans la quatrième révolution industrielle : le consommateur devient producteur, de

la même manière que l'apprenant devient son propre professeur, guidé par le curriculum de sa curiosité.

En ce qui concerne l'évaluation du cours par les étudiants, les principales améliorations du module connectiviste, entre 2017 et 2021, portent sur l'aspect stimulant de l'enseignement, sur la capacité du professeur à communiquer sa matière, sur les commentaires des travaux et sur la charge de travail. Même si on ne peut pas parler d'effets du module connectiviste sans plus de développement statistique, une lecture qualitative montre que les évaluations passent de positives à très positives, mis à part pour deux étudiants. Ceci peut souligner comment un cours non directif augmente l'engagement des étudiants et la pertinence des commentaires du professeur, mais en demandant une charge de travail plus importante de la part des étudiants.

Arrêtons-nous sur les deux étudiants qui évaluent moins favorablement le cours, et à qui nous pourrions prêter les deux seuls commentaires négatifs ou neutres sur le cours. Ces deux commentaires négatifs sont intéressants, car ils corroborent le vécu du professeur. Ces commentaires mentionnent les problèmes de « clarté » des consignes, les instructions « confuses », le problème de « faire ce qu'on veut pour les travaux ». Pour le professeur, le principal défi a été de rassurer les étudiants sur ce manque de direction descendante, et la nécessité d'accompagner les étudiants dans la construction d'une direction ascendante à leurs apprentissages, avec plus de difficultés quand les étudiants avaient une culture béhavioriste de l'enseignement. Tout le monde n'est pas prêt à prendre en charge son propre apprentissage et un travail d'autonomisation préalable pourrait être important dans certains cas.

Dans tous les cas, les compétences du professeur sont importantes pour assurer une approche connectiviste : comme mentionné dans les commentaires, il doit être ouvert, engagé, passionné, à l'écoute. Son expérience doit être solide en pédagogie, pour pouvoir accompagner sans diriger. Sa connaissance doit être spécialisée, mais aussi générale pour pouvoir guider vers des chemins qu'il ne connaît pas lui-même. Cette approche peut être risquée – comme en témoignent les deux étudiants – par rapport à un enseignement traditionnel académique. Bien sûr, il faut encore explorer cette approche, dans d'autres matières par exemple, sans tenter de développer un curriculum de l'éducation connectiviste. Enfin, il faut du temps pour ces apprentissages : le temps de se tromper, le temps de ne pas réussir, le temps de se questionner.

Conclusion

En conclusion, nous avons tenté de montrer comment on pouvait tenter d'intégrer une activité connectiviste dans un cours universitaire, sans curriculum et avec une évaluation décentralisée. Ce type d'activité permet de développer les compétences du 21e siècle en lien avec les transformations de nos systèmes de production; cela permet de développer l'autonomisation des apprenants face aux systèmes d'information croissants et toujours plus complexes. Ce module connectiviste a permis aux apprenants de contextualiser leurs apprentissages, en leur laissant la direction à prendre. Il a ainsi permis de réaliser des apprentissages plus transformationnels fondés sur le développement de la curiosité et non plus

sur un programme. Selon nous, une éducation post-industrielle passe par une grande décentralisation des curriculums. Prenons comme exemple le système éducatif finnois (Sahlberg, 2021) qui, avant 1994, laissait la conception du curriculum à l'enseignant, ce qui a permis son bon classement PISA.

Notre expérimentation a deux limites. La première est qu'il faudrait adapter et expérimenter ce genre de module connectiviste dans d'autres contextes professionnels et scolaires, car la formation d'enseignants est très particulière, les étudiants sont déjà familiers des théories de l'apprentissage. La deuxième limite est aussi une perspective : il faut associer cette décentralisation connectiviste des curriculums à une ouverture de l'évaluation en multipliant les acteurs et en focalisant sur les aspects formatifs plus que sommatifs. Plusieurs recherches sont à mener sur ces nouveaux types d'évaluations permises par les technologies de la quatrième révolution industrielle. Comme le mentionne Gergen (1985), si les technologies et leurs capacités d'uniformisation peuvent réduire le développement de nos individualités, elles peuvent aussi étendre nos capacités collectives à partir des réseaux.

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