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Implementation of Virtual Learning Community and Web 2.0 Technologies under COVID-19 Pandemic in High Education: Opportunities and Challenges

Yunxiao Zhang
University of Windsor, zhang1mk@uwindsor.ca

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By

Yunxiao Zhang

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By

Yunxiao Zhang

APPROVED BY:

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C. Greig
Faculty of Education

_____

Z. Zhang, Advisor
Faculty of Education

December 17, 2021

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ABSTRACT

Educational systems worldwide are facing unprecedented challenges that have arisen due to the COVID-19 pandemic. In response to the pandemic, many higher education institutions suspended face-to-face courses and shifted to distance teaching and learning. This major paper reviews the challenges higher education institutions faced after the COVID-19 outbreak, the necessity of implementation of virtual learning communities, and the use of Web 2.0 technologies in teaching and learning. The findings indicate the implementation of virtual learning communities in higher education can reduce the sense of isolation, encourage interactions, and build a support network during the pandemic.

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CHAPTER 1

INTRODUCTION

Internet accessibility and the development of Information and Communication Technology (ICT) have led to an explosion of online education. In 2019, the Canadian Digital Learning Research Association did a survey to examine the implementation of online and digital learning among publicly-funded post-secondary institutions in Canada. Their data indicates that among 234 publicly-funded institutions, 76% of institutions provide online courses or programs. Of those institutions, 93% of universities and 85% of colleges across Canada offer online courses (Johnson, 2019). In the United States, more than 6.3 million university students are enrolled in online courses (Seaman et al., 2018).

Online education helps learners acquire knowledge in a flexible way. Unlike traditional education where all students sit in the same physical classroom, online education allows learners have greater control over their learning environment, time, content, and pace (Coman et al., 2020). The demographic composition of the student population is becoming more diverse in terms of age, ethnicity, gender, location, cultural background, employment, and enrollment status (full-time or part-time). To cope with their financial stress and prepare for the labour market, some college and university students have to combine their work and school. As a result, they have fewer or no physical connections with the campus and other students. Therefore, it is becoming increasingly important for educational institutions to move more courses online.

However, teachers and students in online and remote courses face numerous challenges. Studies show that students attrition rates in online programs are higher than in traditional face-to-face classes (Bawa, 2016; Murdock & Williams, 2011) and there is a lack of interaction in online settings (Doleck et al., 2021; Famularsih, 2020; Rotas &

Cahapay, 2020; Sarkar et al., 2021; Subedi et al., 2020). Interactions (involving learner-to-content, learner-to-learner, and learner-to-instructor) on common tasks and problems necessitate a more proactive and self-directed approach where students can use their cognitive skills to plan, implement, and reflect on their learning (Deng et al., 2019; Saiyad et al., 2020). Bawa (2016) points out that less student-teacher interaction results in a less guidance-oriented online learning environment. Diramio & Wolverton (2006) attributes the high attrition rates in online courses to the lack of course instructors and support from peers.

The growing need of online learning and the complexities of remote education requires higher education institutions to develop innovative ways to offer the best possible education to students (Dhawan, 2020; Richardson et al., 2020). In higher education, creating an active learning environment through developing supportive Virtual Learning Communities (VLCs) has been employed as a means of improving student engagement and retention rates (Chang, 2012; DiRamio & Wolverton, 2006; Laux et al., 2016; Rovai, 2001).

Web 2.0 technologies are popular for students' daily life. Web 2.0 refers to a concept that allows individuals to produce content, publish thoughts, and collaborate with others (Hew & Cheung, 2013). The emerging Web 2.0 technologies have been explored to use in formal education as a platform to offer students a ubiquitous and flexible learning experience in VLCs (Bennett, 2012). The Web 2.0 technologies can create and maintain an online social network by offering students opportunities to share content and interact with their teachers and peers (Usoro et al., 2014).

Problem Statement

Since March 2020, in response to the COVID-19 pandemic, a vast majority of institutions shut down face-to-face classes and shifted to remote teaching and learning (Ali, 2020). It challenged the current education system across the world and has forced students and instructors across all levels of education to engage in the ubiquitous use of online and remote learning. Educational administrators predict that online and blended courses will continue to be offered to a much greater extent than before (Johnson, 2020). Even though many academic units have experience with blended learning and online learning, many are stuck in traditional procedures and teaching pedagogy. To maintain continuity in teaching and learning, some academic institutions that were previously hesitant to change their traditional pedagogical approach had to shift completely to online teaching and learning (Dhawan, 2020; Lockee, 2021). Online education and distance learning has become one of the most important topics faced by scholars, practitioners and policymakers (Chan, 2020). The uncertainty of COVID-19's transmission and mutation could produce a lasting effect on education and permanently change how education is delivered (Lockee, 2021).

To better meet the need of the workforce, post-secondary education is asked to offer more "robust pathways" (Laux et al., 2016, p. 452) to degree education. The pandemic changed students' academic routines and led to negative psychological consequences (Zhai & Du, 2020a). Hamza et al. (2021) did a longitudinal study regarding the mental health impacts of COVID-19 among 733 university students in Canada. The social isolation caused increasing risks of sadness, depression, anxiety, self-harm and burdensomeness to students without pre-existing mental health concerns. Therefore, VLC

is an essential tool for universities to help students to sustain formal academic communication (Sobaih et al., 2020), maintain social connections (Goldenson, 2021), and establish autonomy by taking control of their own learning process (Clark & Mayer, 2011).

Purpose of the Study

During the COVID-19, some institutions established VLCs to support the teaching and learning of faculty members and students. It is critical to explore their experiences and use findings gleaned from them to propose the future implementation and improvement of VLCs (Zamani et al., 2021). This study aims to explore the recent implementation of VLCs and Web 2.0 technology in higher education institutions. The guiding research questions for this study are:

1. How have VLCs been implemented into higher education institutions during COVID-19?

2. What barriers and challenges may affect the implementation of VLCs?

Definition of Terms

The following are terms used through this literature review:

Blended education. Blended education, also known as hybrid education, often refers to a mix of traditional face-to-face elements combined with online learning activities (Kose, 2010). Blended learning includes 30% to 79% online training time (Matukhin & Zhitkova, 2015).

Distance learning. Distance learning is defined as an education experience using various types of technologies to reach a student in a distant place (Kose, 2010). It addresses the physical separation of students from the instructors.

Learning Communities (LCs). The term "learning community" refers to a group of people who have common interests and goals to collaborate on learning (Barth, 1991). According to Riel and Poline (2004), members in LCs learn "from their interactions with others, with objects of the effort and from their own participation" (p. 6). Riel and Poline (2004) suggested three elements in LCs: 1) provide learners with an active learning environment, 2) build community both academic and social, and 3) connect the learning of theory with practices. Speck (1999) defined a school learning community as follows:

> A school learning community promotes and values learning as an ongoing, active collaborative process with dynamic dialogue by teachers, students, staff, principal, parents, and the school community to improve the quality of learning and life within the school. (p.8)

Online education. Online education is a teaching and learning experience through the internet in an asynchronous or synchronous environment where students interact with instructors and fellow students (Singh & Thurman, 2019).

Virtual Learning Community (VLC). VLCs are information technology-based cyberspaces where individuals and groups of geographically dispersed learners may achieve their objectives through the Internet (Yang et. al., 2007). Preece (2001) explains VLCs include an online social space where individuals gather together to exchange information, to learn, or to find companionship (Wegener & Leimeister, 2012). The main goal of VLCs is to encourage organizational learning of skills, expertise and experiences through people's interaction and communication (Teo et al., 2003). Wegener and Leimeister (2012) consider that VLCs should have some degree of stability that can "last for a certain time period of at least several weeks" (p. 384). VLCs can be distinguished

between formal VLCs and informal VLCs. Formal VLCs often take place in school and university courses (Wegener & Leimeister, 2012). Informal VLCs usually are more invisible and take place in a much wider variety of settings (Eraut, 2004; Wegener & Leimeister, 2012). In this study, VLC is used to describe both formal and informal online learning.

Web 2.0. Web 2.0 is the social use of the Web, which allows individuals to collaborate, to participate actively in the creation of content, to produce knowledge, and to exchange information online (Grosseck, 2009; Murugesan, 2007). It enables individuals to have close contact with various digital tools in a virtual and immersive environment where people can search for and acquire information (Loureiro et al., 2012). Web 2.0 technology has an emerging role in the transformation of teaching and learning (Bugawa & Mirzal, 2018; Loureiro et al., 2012). The possibilities that foster creativity, encourage information sharing, build collaboration, and promote the functionality of the Web led to the evolution of Web-based communities and platforms (Abdelmalak, 2015, as cited in Laborda & Litzler, 2017). Specific Web 2.0 tools include wikis, blogs, microblogs, bookmarking, video and picture sharing, social networking sites and other social software (Grosseck, 2009). In addition, Web 2.0 platforms also include learning management system tools such as Blackboard, Moodle, and MOOCs (Wang et al., 2014, as cited in Hassan et al., 2021).

CHAPTER 2

METHODOLOGY

Literature reviews are critical as a basis for all kinds of study. A literature review can

be defined as a method of gathering and synthesizing previous research to find

gaps/inconsistencies in a topic, identifying research questions, and justify future research

(Torres-Carrion et al., 2018). It can serve as a foundation for knowledge growth, provide

guidelines for policy and practice, offer evidence of a viewpoint, and have the potential to

generate new ideas and directions for a specific area (Snyder, 2019). Baker (2016)

suggests the specific purposes of literature reviews include:

- providing a theoretical framework for the specific topic under study;

- defining relevant or key terms and important variables used for a study or

  manuscript development;

- providing a synthesized overview of current evidence for practice to gain new

  perspectives and support assumptions and opinions presented in a manuscript

  using research studies, quality improvement projects, models, case studies, and so

  forth;

- identifying the main methodology and research techniques previously used; and

- demonstrating the gap (distinguishing what has been done from what needs to be

  done) in the literature, pointing to the significance of the problem and need for the

  study or building a case for the quality improvement project to be conducted. (p.

  265)

Literature Search and Collection

Relevant literature can be found in a number of ways to conduct an overview of

previous practices related to the construction, implementation, and improvement of VLC.

The main way of literature collection was through Google Scholar. A supplemental search was conducted through the online databases at the University of Windsor library website, ERIC (Educational Resources Information Center), and ScienceDirect. A combination of search keywords included: "learning community," "virtual learning community," "online learning community," "Web 2.0," "social media," "COVID-19," and "higher education." The search results were limited to studies published since 2019. This initial search received 42 articles. The following questions were adopted in the process of final selection, and the expected answer to these questions is "yes":

1. Is this article a peer-reviewed journal article?

2. Is this study empirical research?

3. Is this study focused on higher education or post-secondary education?

4. Is this study relevant to the development, implementation, and improvement of VLC?

Nine articles were selected since they meet all of these criteria, and they were from the following peer-reviewed journals:

1. *The Cureus Journal of Medical Science*

2. *The Journal of the European Association for Computer Assisted Language Learning*

3. *Teaching and Learning in Nursing*

4. *Sustainability*

5. *Current Problems in Diagnostic Radiology*

6. *Arab World English Journal*

7. *Asian Journal of Education and Social Studies*

8. *International Journal for e-Learning Security*

9. *Journal of Education for Teaching*

CHAPTER 3

LITERATURE REVIEW

This paper aims to explore the recent implementation of VLCs and the adoption of Web 2.0 technologies in higher education institutions. This chapter includes a review of the virtual learning environment and the impact of COVID-19 on higher education. Additionally, discussion of the concept of community, benefits of VLCs and the implementation of Web 2.0 technology to education are included.

The COVID-19 Impact on Higher Education

Educational systems worldwide are facing unprecedented challenges that have arisen from the COVID-19 pandemic (Aristovnik et al., 2020). In response to the COVID-19 outbreak, governments and academic institutions worldwide launched various policy initiatives to protect students and faculty, maintain academic activities and restrict the transmission of the virus (Ali, 2020). As of April 2020, schools and universities among 194 countries suspended the face-to-face courses, and thus 91% of the global student population were affected (United Nations Educational, Scientific and Cultural Organization, 2020). In the Ontario context, the Ministry of Colleges and Universities (MCU), on March 13, 2020, announced a plan to work with Ontario's postsecondary institutions to "ensure each campus has a COVID-19 response plan for academic continuity for students and faculty that does not put their health or personal well-being at risk" (Ministry of Colleges and Universities, 2020). Soon afterward, most Ontario universities and colleges issued a suspension of on-campus classes and transferred to distance learning (EI-Masri & Sabzalieva, 2020).

The sudden closure of campuses interrupted the traditional educational practices and exposed the weakness of the current higher education system (Ali, 2020; Iglesias-

Pradas et al., 2021; Rashid & Yadav, 2020). Higher education institutions had to use existing resources to transform formal education into remote and online education in a matter of weeks or even days (Mishra et al., 2020; Strielkowski, 2020). This emergency online teaching response (e.g., instructors simply sending a digital copy of learning material to students or using a videoconferencing system to deliver lectures) is not a completed digital transformation. It cannot be conflated with well-planned, well-designed and pedagogically effective online teaching (Bonfield et al., 2020; Iglesias-Pradas et al., 2021).

This rapid educational transition exposed some deficiencies in higher education, including internet connectivity, technology accessibility, financial issues, teaching infrastructure, information gap, complex online environment, data security, and home-related factors (Ali, 2020; Gurukkal, 2020; Mishra et al., 2020; Pokhrel & Chhetri, 2021; Rashid & Yadav, 2020). According to Guangul et al. (2020), many institutions in the Middle East did not provide enough guidance and support regarding the student assessment in the COVID-19 lockdown period. Faculty members, therefore, had questions in assessment type, time arrangement, academic dishonesty, infrastructure, and students' commitment to submitting assessments. Similarly, Sharadgah and Sadi (2020) interviewed 96 faculty members from a Saudi university to investigate whether Saudi higher education institutions were prepared for online assessment during the COVID-19 pandemic. They found out institutions were not well prepared for online assessment, nor did they have clear guidance for online assessment. Researchers indicated that the lack of security assessment infrastructure was a great limitation that defeated the purpose of assessment and raised academic integrity issues and privacy concerns (Almossa, 2021;

Holden et al., 2021; Sharadgah & Sa'di, 2020). Some Canadian universities (e.g., Western University and University of British Columbia) adopted remotely proctored exams to address student academic integrity (Mahood, 2021; Yong, 2021). Students were asked to participate in exams using remotely invigilation software and webcams. To track suspicious student actions, these proctoring service providers (such as ProctorU, Proctortrack, and Proctorio) collected and stored student biometric data and personal files and monitored student actions by facial tracking during exam time (Mahood, 2021). However, these proctoring services have drawn student and faculty member concerns about cybersecurity, ethics, and privacy (Balash et al., 2021; Lupton, 2020; Mahood, 2021).

Student's Mental Health amid COVID-19

University students in Ontario have a variety of challenges in the wake of the COVID-19 outbreak (Gallagher-Mackay et al., 2021; Hari et al., 2021). Researchers indicated that students' stresses come from interruption of research projects and internships, loss of on-campus jobs, financial hardships, learning losses, as well as delayed graduation (Gallagher-Mackay et al., 2021; Mant et al., 2021). Students reported that the study-from-home made them have less physical activities and increased screen time, which results in a greater likelihood of having mental distress and adverse health outcomes (Colley et al., 2020; Rodgers et al., 2020; Rebar et al., 2014; Woodruff et al., 2021). This public health crisis also generates fear of infection and concerns for the health of family members (Hari et al., 2021; Mant et al., 2021). These hardships and challenges lead to a spectrum of psychological consequences, including depression,

anxiety, difficulty sleeping, stress eating and many other mental problems (Hamaza et al., 2021).

For students who pursue higher education outside of their home countries, they have language barriers, acculturative stress, academic pressure and financial problems (Hari, et al., 2021; Wu et al., 2015; Zhai & Du, 2020b). During the COVID-19 pandemic, the travel restrictions and isolation from family and friends intensified the mental pressure of international students (King et al., 2020). Chirikov et al. (2020) collected data from 30,725 students at nine public universities and the findings indicated that vulnerable populations, including low-income students, students of colour, women and LGBTQ students, are more likely to experience major depressive disorder and anxiety disorder. Therefore, students need access to effective and specialized mental health services as well as understanding and support from the universities (Rudenstine et al., 2021; Son et al., 2020).

Challenges of Online Education

There are challenges to provide quality online education to students. Online teaching requires the instructor to adopt the appropriate learning context in the Web-based system, give effective feedback, and monitor the student behaviours (Tobarra et al., 2014). Saiyad et al. (2020) states online learning can be demanding since the teaching quality and students' learning experience rely heavily on the virtual modes of communication. Without face-to-face contact, it is more challenging for faculty to detect the possible teaching problems and adjust teaching practices by observing the behavioral patterns of students (Tobarra et al., 2014).

Hew et al. (2010) point out the common problem of online courses is the lack of effective guidance for the discussion activities. If students' discussions are unrelated to the course objectives, their learning effectiveness decreases. It is also difficult for program managers to assess faculty efforts in providing instructions to students (Tobarra et al., 2014). Darabi and Jin (2013) point out online discussion may retain a large amount of discussion contents to overload learners with a large amount of information. Learners easily get lost in increased information load because of the large amount of discussion contents generated from others. Consequently, learners have to spend extra time and effort to filter out irrelevant contents. In addition, the absence of face-to-face feedback and prompt responses in online settings may result in a longer time for teachers and students to identify the miscommunication and misinterpretation of the discussion forums (Wang & Woo, 2007).

It is also essential to take into account the pedagogical and emotional aspects of e-learning. Many faculty members who lack the training, expertise, and experience to teach in an online environment failed to transform pedagogical approach to the online teaching process (Clinton & Kohlmeyer, 2005). Qin et al. (2014) noted that the online settings provide lesser visual stimuli, language stimuli and auditory stimuli to learners than face-to-face classes because classroom interactions highly rely on keyboard and mouse. As a consequence, e-learners may hardly feel emotional stimulation and their learning interest and learning efficiency may diminish. O'Sullivan et al. (2004) indicated that teachers and learners who "spend little time outside the lecture hall or communicate primarily via mediated communication channels may struggle to establish positive relationships that can be important for student motivation and their perceptions of instructors" (O'Sullivan

et al., 2004, p. 465). The online education facilitators should also take into account the technological and psychological aspects of e-learning. In 2016, Laux et al. designed a model to examine the factors that significantly influence students' persistence in a virtual learning environment. Their research suggests that the level of usability, collaborative learning, sense of community, organizational commitment and turnover intention directly influence student persistence. Without interpersonal trust and social cohesion, students are more reluctant to share knowledge and work as teams (Leimeister et al., 2005; Wegener & Leimeister, 2012).

Discrimination, conflicts, and bullying may occur in virtual learning environments (Nikiforos et al., 2020). The increasing use of electronic devices and the Internet service has provided a new forum for the bullying – cyberbullying (Slonje et al., 2013). Cyberbullying has become an invasive school issue in school globally (Ryan et al., 2011). Hinduja and Patchin (2010) define cyberbullying as actions that "using communication technology to harass, intimidate, threaten, or otherwise harm others" (p. 21). Cyberbullying has an increased potential for distribution in and out of the school setting due to its insidious nature and minimal cost (Slonje et al., 2013). Faucher et al. (2014) collected data from 1925 students from four Canadian universities. Their finding suggested that over 98% of respondents used the Internet for their schoolwork, and nearly 24% of participants experienced cyberbullying victimization in the last 12 months. Conaway and Bethune (2015) investigated 147 online instructors' underlying attitudes to students. They found that instructors had racial and ethnic implicit bias based on students' first names in the online instructional environment, leading to stereotyping such as lack of attention and negative evaluations. According to Faucher et al. (2015), student

and faculty members expect to engage with the university community in developing a strong anti-bullying policy and a more respectful university culture.

VLCs in Higher Education

A learning community is composed of "a group of people who have a common set of needs and interests" (Rolando et al., 2014, p. 44). VLCs can boost the social connection of students by offering asynchronous and synchronous communication via tools such as Facebook, Twitter, and E-mail (Boyd & Ellison, 2007). It facilitates a learning environment where students acquire knowledge, share resources, exchange ideas and express supports to their peers online (Gannon-Leary & Fontainha, 2007). Chen and Tsao (2021) illustrate that social interactions can promote cognitive learning and critical thinking, and ultimately, make positive contributions to students' learning. In addition, it can enhance their interests, expand individual learning horizons, deeper their understanding of academic materials, reduce the sense of isolation/loneliness, improve their knowledge management ability and comprehensive application ability (Doleck et al., 2021; Tobarra et al., 2014).

Web 2.0 Technology in Education

The emerging Web 2.0 technologies have been widely used in education to offer a ubiquitous learning experience. Its characteristics, including device portability, relatively strong computing power in small devices, and always-on connectivity (Hsu & Ching, 2012), empower users with a venue for collaboration, interaction, and personal expression within the community. There is growing popularity of using Web 2.0 applications (including blogs, wikis, video sharing tools, social networking applications, and VoiceThread) for educational purposes (Eze, 2016; Zheng 2012). Augustsson (2010)

investigated the effects of VoiceThread on collaborative social action in a university course. He found that it supported the collaboration processes, revealing individuals' personal efforts and strengthening students' identification within the team.

Web 2.0 can create a fixable, responsive, and open language learning environment (Laborda & Litzler, 2017; Peeters, 2018). The possibilities that foster creativity, encourage information sharing, build collaboration, and promote the functionality of the Web has led to the evolution of Web-based communities and platforms (Abdelmalak, 2015, as cited in Laborda & Litzler, 2017). Tzotzou (2018) indicates that incorporating Web 2.0 technologies into language learning can result in a higher engagement and confidence of language learners. These components are crucial in communicative language acquisition (Tzotzou, 2018). Irawan et al. (2020) advocate the view that Web 2.0 learning is unavoidable teaching alterative sustaining student-centred learning during COVID-19.

However, there are barriers to the utilization of Web 2.0 in education (Tzotzou, 2018). Zamani et al. (2021) investigated mobile message apps in professional VLCs. Their research results showed that the main obstacles for knowledge sharing are constant rule-breaking by some members, problematic Internet access, constantly running out of storage space on the electronic devices as well as limited technology knowledge (Zamani et al. 2021). An and Williams (2010) emphasize time may be a barrier since learning and understanding new Web 2.0 technologies requires a lot of time for some learners.

CHAPTER 4

THEORETICAL FOUNDATIONS

Abend (2008) states that theory is related to the actual production and sociological knowledge. Researchers cannot neglect theoretical inquiries since they can help us understand social phenomena. Edwards (2012) noted that educational theory affects practices and cannot be separated from practice. Lederman et al. (2015) emphasized that "all research should have a valid theoretical framework to justify the importance and significance of the work" (p. 597). To understand the implementation of VLCs and Web 2.0 technology in education, we need to review the Social Constructivism perspective of knowledge formation and acquisition, collective learning theories, and technology acceptance.

Social Constructivism of Learning

According to social constructivism theory, knowledge is socially and culturally developed and constructed through cognitive activity (Ashcraft et al., 2008; Kim, 2001). Social constructivists consider that negotiation and discussion within the communicating groups shape the knowledge and social meanings (Hirtle,1996; Prawat & Floden, 1994). An influential theory was the theory of knowledge-building community developed by Scardamalia and Bereiter (1996). This theory emphasizes the construction of knowledge is to generate contributions to the community by increasing collective knowledge. All the above theories emphasize the importance of dialogue as a condition of learning.

Many researchers viewed classroom as a community to facilitate educational practice (Goos, 2004; Rovai, 2001; McKinney et al., 2006; Young & Bruce, 2011; Summers & Svinicki, 2007). Goos (2004) considered that classroom is a learning community where "students progressively appropriate and enact the epistemological

values and communicative conventions" (p. 259). Vygotsky's (1978) Zone of Proximal Development (ZPD) theory argues that children could engage in more advanced cognitive activities with teachers' guidance and peer collaboration. Bruner (1985) related the term "scaffolding" to ZPD theory. He remarked that the students could adopt the teacher assistance and peers' collaboration as a scaffolding "to internalize the knowledge and critical thinking skills and to convert them into tools for conscious intellectual functioning" (Hagaman, 1990, p. 153). The scaffolding theory has been widely employed in ESL studies that address the development of language and cognitive abilities through classroom interaction with others (e.g., Mackiewicz & Thompson, 2014; Read, 2006; Yildiz & Celik, 2020).

Given my research questions, it is essential to gain insight into how people learn in an online community. Rovai (2002) defines a community as a group of people who are interdependent with each other in dimensions of "spirit, trust, interaction, and commonality of expectation" (p. 4). The evolution of ICT and the Internet created virtual communities where people communicate and interact through specific social media. According to Hampton (2002), a virtual community is IT mediated network that connects people without propinquity. Hampton and Wellman (2003) stated that the emerging of virtual communities freed communities from geographical limits as well as social characteristics such as gender, race, ethnicity, and socioeconomic status.

Many researchers examined learner participation by assessing the number of postings on the discussion board (e.g., Bliss & Lawrence, 2009; Davies & Graff, 2005; Nandi et al., 2011; Ramos, 2008; Xie, 2013). However, it was not sufficient to only rely on quantitative measures. Martzoukou et al. (2020) asserted that students' digital

competencies in the online learning environment are relevant to their experiences with the everyday life digital environment. Alzahrani and Woollard (2013) asserted that discussion and rehearsal with peers provide students with opportunities to reflect and refine their understanding of concepts.

Researchers addressed social relationships among community members (Alavi and Leidner 2001; Kang, 2010; Wenger 1999). Alavi and Leidner (2001) considered knowledge a process and can be created, shared and distributed among community members. Wenger (1999) suggested that online participation might involve all kinds of relationships, including conflictual, harmonious, intimate, political, competitive, and cooperative relations. Fischer (2011) therefore advocates the concept of cultures of participation in which members are supported by technical design, social capital as well as cognitive factors to frame and solve personally meaningful problems. Hrastinski (2009) defined online learner participation as follows:

> I have argued that online learner participation (1) is a complex process of taking part and maintaining relations with others, (2) is supported by physical and psychological tools, (3) is not synonymous with talking or writing, and (4) is supported by all kinds of engaging activities. The implication of the theory of online learning as online participation is straightforward: If we want to enhance online learning, we need to enhance online learner participation. (p. 81)

Community of Inquiry Theory

The Community of Inquiry framework (CoI) can guide online educational practices. Figure 1 illustrates the framework. In the past two decades, researchers have used the CoI to explain the development of online learning communities and the

processes of knowledge building in online and blended learning environments (Shea & Bidjerano, 2012; Swan & Ice, 2010).

Figure 1

Community of Inquiry Framework (Xin, 2012)
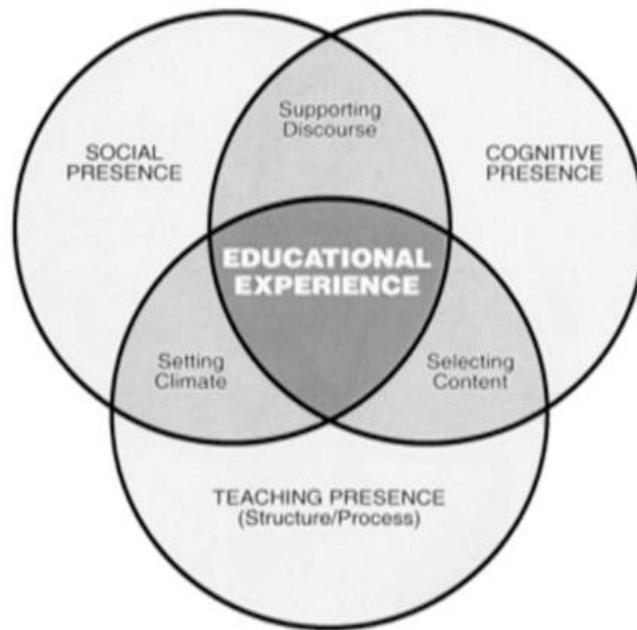
The CoI assumes successful knowledge building relies on three foundational constituent elements: teaching presence, social presence, and cognitive presence (Garrison et al., 2001). Teacher presence is the instructional orchestration, including the design and organization, facilitation discourse, and direct instruction (Shea & Bidjerano, 2010). In this way, teaching presence creates active, student-centred learning environments in which students and teachers are equal participants in the learning experience. Garrison et al. (2010) defined social presence as the ability of learners to develop interpersonal relations and establish a sense of belonging in communities. Cognitive presence is "a multivariate measure of significant learning that results from the cyclical process of practical inquiry within a community of learners" (Shea & Bidjerano,

2010, p. 1722). The CoI theorizes that online learning occurs by collaboration among participants in learning communities "characterized by instructional orchestration suitable to the online environment and a supportive mutually respectful online setting" (Shea & Bidjerano, 2012, p. 317).

The Theory of Reasoned Action

The first theory to predict acceptance of technology is the theory of reasoned action (TRA) proposed by Ajzen and Fishbein in 1975 (Echeng et al., 2013). The TRA originated from social psychology to predict the subjective likelihood that one would perform a given behaviour. TRA theory argues that an individual's behaviour is determined by the strength of that person's intention (including individual's attitude and subjective norms) to perform that behaviour (Fishbein, 2008). One's intention is influenced jointly by the individual's attitude and subjective norm. Based on the TRA, researchers developed other technology acceptance models, such as the Technology Acceptance Model (Davis et al., 1989), Theory of Planned Behaviour (Ajzen, 1985), and Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003).

Technology Acceptance Model

Fred Davis (1985) formulated the Technology Acceptance Model (TAM) based on TRA (Chuttur, 2009; Echeng et al., 2013). Davis hypothesized that the users' motivation to use a system is determined by perceived ease of use, perceived usefulness and attitude toward using the system. He considered that the system's features and capabilities could be an external stimulus to impact user motivation, and finally, explain and predict the user's actual use of the system (Chuttur, 2009). However, Lee et al. (2003) found that TAM's simplicity may have attracted many quick and replicating

studies. It also reduced people's attention to the role of technology and design (Lee et al., 2003). In addition, the theoretical relationship was questioned. Bagozzi (2007) suggested the behaviour of using a system should be treated as a fundamental goal. He argued that intention could not be representative enough of actual use because there are other factors that might influence the decision to adopt a technology.

The Unified Theory of Acceptance and Use of Technology

The unified theory of acceptance and use of technology (UTAUT) was a definitive model with strong empirical support. It was originally formulated on the basis of eight explanatory models of individual acceptance of information technology (Venkatesh et al., 2003). This original model includes four core determinants of intention and four significant moderating influences (see Figure 2). The main effects are theorized direct determinants of user acceptance, and they are performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FCs). Four moderators are gender, age, experience, and voluntariness of use. The UTAUT model attempts to understand how individual differences influence the decision on technology use. Specifically, the UTAUT explains how people's age, gender, and experience moderate their perceived usefulness, ease of use, and intention to use technology. For example, the effort expectancy is more significant for females, older workers, and those with limited experience in technology.

The UTAUT model has been extended in many other contexts to explain individuals' technology acceptance and use decisions, including the educational area (Mohammad-Salehi et al., 2021; Venkatesh et al., 2016). Many researchers have adopted the UTAUT and its extended models to understand Web 2.0 technology acceptance in

higher education settings (Gitau, 2016; Mohammad-Salehi, 2021;Tulaboev, 2013). For

example, Tulaboev (2013) extended the UTAUT model and found that barriers in using

Web 2.0 tools (e.g. the bandwidth of internet speed) inside campus would decrease the

students' use of Web 2.0 tools. Mohammad-Salehi (2021) used the UTAUT model to

predict the factors that influence Iranian EFL teachers' adoption of Web 2.0 technologies.

The results indicated that the performance expectancy and social influence positively

influence the teachers' intention to use of Web 2.0 tools in language teaching.

Figure 2

The UTAUT Model (Venkatesh et al., 2003)
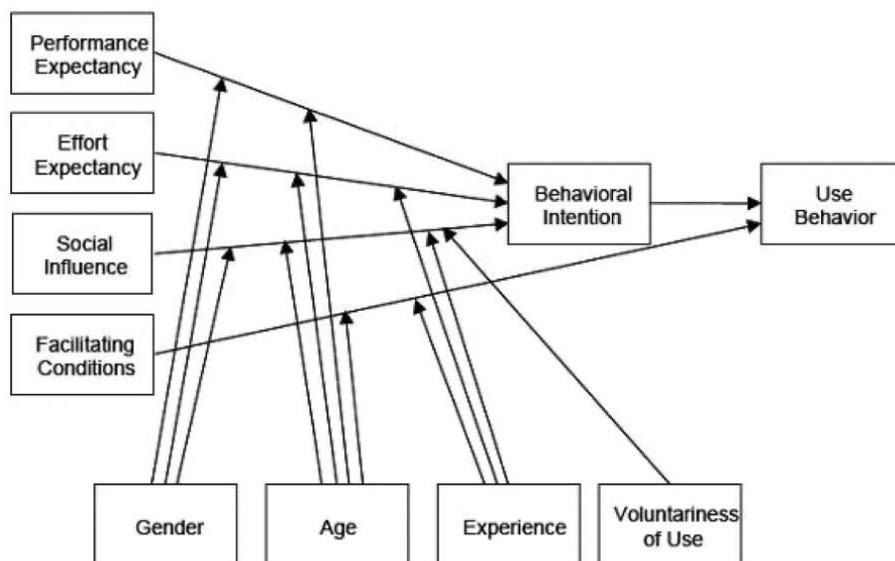
CHAPTER 5

RESEARCH ANALYSIS

Participants

Nine studies were selected for this meta-data analysis (see Table 1). There were a total of 1658 participants involved in these nine studies. They were 309 faculty members and 1349 college students who studied medicine, nursing, language and literature, ESL, tourism and hotel, and education. Five studies adopted the quantitative analysis (Basal & Eryilmaz, 2020; Goldenson et al., 2021; Mbabazi et al., 2020; Nkansah et al., 2020; Peeters & Pretorius, 2020), one used qualitative analysis (Hassan et al., 2021), and three used mixed-method analysis (Anderi et al., 2020; Cantey et al., 2021; Sobaih et al., 2020). Three studies were conducted in the United States (Anderi et al., 2020; Cantey et al., 2021; Goldenson et al., 2021). The other six studies were conducted in Belgium (Peeters & Pretorius, 2020), Cyprus (Sobaih et al., 2020), Egypt (Hassan et al., 2021), Ghana (Mbabazi et al., 2020), Uganda (Nkansah et al., 2020) and Turkey (Basal & Eryilmaz, 2020)**.**

Table 1 shows information about these nine studies including the title, author(s), research method employed, participants in the study, and the size of population represented.

Table 1

A brief Overview of the Selected Studies

Title	Authors	Research Method	Participants	Pop. Size
Learning communities engage medical students: A COVID-19 virtual conversation series	Anderi et al. (2020)	Mixed-method	Medical students	55

Table 1 (continued)

Title	Authors	Research Method	Participants	Pop. Size
Facebook or fail-book: exploring "community" in a virtual community of practice	Peeters & Pretorius (2020)	Quantitative	ESL Learners; English literature learners	157
Skills, community, and rapport: Prelicensure nursing students in the virtual learning environment	Cantey et al. (2021)	Mixed-method	Nursing students	157
Responses to COVID-19 in higher education: Social media usage for sustaining formal academic communication in developing countries	Sobaih et al. (2020)	Mixed method	Students and Faculty members	613
The virtual homeroom: Utility and benefits of small group online learning in the COVID-19 era	Goldenson et al. (2021)	Quantitative	Medical students	56
Challenges and benefits of Web 2.0-based learning among international students of English during the Covid-19 pandemic in Cyprus	Hassan et al. (2021)	Qualitative	International ESL students	15
Web 2.0 students adoption model for learning in universities: A case of Muni University, Uganda	Mbabazi et al. (2020)	Quantitative	Technoscience students	100
COVID-19 pandemic: Assessing the effectiveness of educational technology applications on improvement of tutor-student relationships in Ghanaian colleges of education	Nkansah et al. (2020)	Quantitative	Education students	370

Table 1 (continued)

Title	Authors	Research Method	Participants	Pop. Size
Engagement and affection of pre-service teachers in online learning in the context of COVID-19: Engagement-based instruction with Web 2.0 technologies vs direct transmission instruction	Basal & Eryilmaz (2020)	Quantitative	Pre-service teachers	135

Purpose

The empirical studies can be classified into three major categories based on their research purposes: (1) evaluating the effects of VLC on learning (Anderi et al., 2020; Basal & Eryilmaz, 2020; Cantey et al., 2021; Goldenson et al., 2021; Hassan et al., 2021; Nkansah et al., 2020), (2) evaluating the influence of learner characteristics on VLC learning process (Peeters & Pretorius, 2020), and (3) examining the usage of VLC tools for sustained communication (Mbabazi et al., 2020; Sobaih et al., 2020). While two studies examined the application of VLC tools among students and instructors, focusing on the different application scenarios of VLC tools. Sobaih et al. (2020) investigated the student and faculty member preferences on the usage of social media websites, and Mbabazi et al. (2020) emphasized the students' acceptance of the use of technologies for learning beyond the ordinary classroom. Four studies described their setting up of VLC and organization of learning activities (see Table 2).

Table 2

Summary of Learning Activities

Authors	VLC Activities	VLC Platform
Anderi et al. (2020)	The learning community program at Wayne State University School of Medicine offered virtual conversation series for medical students to share their pandemic challenges and connect with physicians on the COVID-19 frontlines.	Zoom
Peeters & Pretorius (2020)	Researchers set up two virtual communities of practice for participants enrolled in ESL courses to create an interactive environment and material sharing platform on Facebook.	Facebook
Cantey et al. (2021)	Researchers designed virtual clinical labs via Zoom for two cohorts of nursing students who enrolled in foundation course and Pediatrics course when the campus is closed.	Zoom
Goldenson et al. (2021)	After the COVID-19 pandemic, Harvard Medical School reinforced small group learning sessions, or "virtual homerooms," for 111 students to continue their medical education during their entirely virtual Radiology clerkship.	Zoom

Platform Selections

Studies suggest that using appropriate technology platforms can foster online teaching and learning (Nkansah et al., 2020; Sobaih et al., 2020). An analysis of their platform selection is necessary since it can be a guideline for future VLC design and implementation during and after worldwide lockdowns caused by COVID-19.

Four studies mentioned their considerations to choose one particular website as the platform to implement the formal VLC. Two studies select Zoom as their VLC platform for students (Anderi et al., 2020; Goldenson et al., 2021). According to Anderi et al. (2020), the requirement of rapid transformation to online learning is the primary

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consideration for the learning community program designer. As COVID-19 evolved and social distancing was put into place, faculty members had to adjust their lectures (both pre-clerkship and clerkship curriculum) to online delivery in a short period of time. Therefore, Zoom was selected as the platform for the virtual conversation series because students had experiences in the utilization and were familiar with the interface design (Anderi et al., 2020). Goldenson et al. (2021) explained the Zoom' features (i.e., chat boxes, break-out rooms and share screen) were practical and useful in their virtual clinical lab sessions. Basal and Eryilmaz (2020) also indicated that the features of Web 2.0 tools were their primary consideration. They used Tricider to promote brainstorming, Padlet to summarize the course content, Flipgrid to stimulate course discussion, and Google docs to encourage teamwork. Peeters and Pretorius (2020) integrated Facebook into their ESL courses. They chose Facebook due to its capability for community formation and popularity among diverse groups of students.

In addition, Mbabazi et al. (2020) examined one hundred students' preferences on Web 2.0 tools in Muni University, Ugandan. Their research confirmed the UTAUT model proposed by Venkatesh et al. (2003) in predicting the behavioural intention to use Web 2.0 for learning. The Web 2.0 tools highly used by students beyond the classroom are YouTube (55%), Facebook (51%) and Google apps (37%). Moreover, Sobaih et al. (2020) found a significant difference between students and faculty members regarding the usage of Web 2.0 tools in teaching and learning. Their research suggested that students tend to use social media to build online learning communities and support each other, whereas faculty members were exclusively focused on formal teaching. Facebook

and WhatsApp were the top two tools to support formal academic communication by students and faculty members.

Engagement

A common finding extracted from these studies is that Web 2.0 technologies positively affect student engagement in learning (Anderi et al., 2020; Basal & Eryilmaz, 2020; Cantey et al., 2021). These factors could be summarized by a safe and comfortable learning environment, the decreasing sense of isolation, enjoyment, support from others, engaged leaders, well-designed teaching materials, increasing interaction, and appropriate instruction from teachers.

Interaction and Communication

Studies point out that VLCs fostered a sense of connectedness among students (Anderi et al., 2020; Cantey et al., 2021; Peeters & Pretorius, 2020; Sobaih, et al., 2020) and the student-to-tutor interaction (Nkansah et al., 2020). Nkansah et al. (2020) noted the involvement of Web 2.0 tools promotes student-and-tutor information sharing, which allows tutors to be aware of students' needs and provide assistance in time. Peeters and Pretorius (2020) proposed the configuration of VLC based on the frequency of interaction among participants, shared learning goals, appropriate instruction, proper usage of platform, and inclusion. They shared their experience to emphasize the balanced power between learners and teachers in VLCs. In one of their research groups, the teacher led all discussions on Facebook and was the only core member in the community. Students can only passively accept tasks and materials, resulting in a lower level of participation and weak ties in VLC.

Students' Emotional Wellbeing

Three of the studies discussed students' social-emotional wellbeing during the COVID-19 pandemic, as well as the effect of VLC on reducing negative emotions (Anderi et al., 2020; Basal & Eryilmaz, 2020; Cantey et al., 2021). The psychological health of medical students has also been impacted by the ramifications of social distancing measures and the interruption in education (Anderi et al., 2020). According to Cao et al.(2020), students' anxiety came from financial hardships, changes to daily life, and academic setbacks (Anderi et al., 2020). In the study of Cantey et al. (2021), participants described their experiences in virtual lab sessions as follows:

> I really appreciated the virtual lab sessions and believe they were one of the few precious opportunities to connect with our cohort early in the semester. The ice breakers and supportive atmosphere that educator provided was SO incredible. (p. 387).

> I really appreciated the ice breakers and the educator(s) were always present and helpful. As the first few weeks of school were pretty lonely, it was nice to have smaller groups of students to interact with in breakout rooms. (p. 387)

Challenges and Barriers

Three studies examined the barriers that faculty members and students had in using Web 2.0 tools in formal academic teaching and learning (Cantey et al., 2021; Hassan et al., 2021; Sobaih et al., 2020). Details could be found in Table 3. Results of the analysis identified the challenge of technical competencies overlapped in different institutions, faculty members and students. Even though some faculty members and

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students have prior technical knowledge of Web 2.0 learning tools, training and

workshops are necessary by host institutions (Hassan et al., 2021; Sobaih et al., 2020).

Table 3

Summary of Challenges and Proposed Solutions

Challenges	Examples	Proposed solutions
knowledge of technology (Hassan et al., 2021; Sobaih et al., 2020)	Inadequate knowledge of Technology for formal academic communication (Hassan et al., 2021; Sobaih et al., 2020). Loss of login password (Hassan et al., 2021)	Provide training and orientation programs on how to effectively use Web 2.0 technology for academic communication (Hassan et al., 2021; Sobaih et al., 2020)
IT infrastructure (Hassan et al., 2021; Sobaih et al., 2020)	Poor internet connectivity Internet cost (Sobaih et al., 2020) Loss of login password (Hassan et al., 2021)	Establishing an IT support unit to offer technical support continuously Facilitate internet access for learning and teaching (Sobaih et al., 2020)
Privacy and security (Sobaih et al., 2020)	Tracking activities Personal life (Sobaih et al., 2020)	Use an official account instead of a personal one Create a closed community for each course (Sobaih et al., 2020)
Learning policy and plan (Sobaih et al., 2020)	Unclear policy and instruction for social media usage as a formal academic tool (Sobaih et al., 2020)	Establish and announce a clear policy for social media usage as a formal academic tool (Sobaih et al., 2020)

Table 3 (continued)

Challenges	Examples	Proposed solutions
New learning culture (Sobaih et al., 2020)	Lack of experience in using specific social media tools Inadequate home working environment Variation in students' needs and expectations (Sobaih et al., 2020)	Establish an inclusive learning environment to all students Acquire family support (Sobaih et al., 2020)
Time constraints (Sobaih et al., 2020)	A rapid turnover of new educational content Undetermined time for enquires and questions Time for assignment discussion (Sobaih et al., 2020)	
Ethical considerations (Sobaih et al., 2020)	Inappropriate comments or posts Slang language Lack of class observation (Sobaih et al., 2020)	Establishing an ethical code and publish it to faculty members and students Establish an appropriate management involving online class observations with regular reports (Sobaih et al., 2020)
Assessment and grading (Sobaih et al., 2020)	Inappropriate usage of social media as an tool for quizzes and exams	Employ alternative ways and tools for student assessment
Platform selection (Sobaih et al., 2020)	Unfamiliar with the features of Web 2.0 tools Inconsistent in their use of social media tools (Sobaih et al., 2020)	Selecting a primary platform for teaching and learning (Sobaih et al., 2020)
Student support (Cantey et al., 2021; Sobaih et al., 2020)	Lack of interaction with faculty members and delay in response to inquires Inadequate emotion support to vulnerable students (Sobaih et al., 2020)	Setting up regular office hours for discussion with students (Sobaih et al., 2020)

CHAPTER 6

DISCUSSION

This paper reviewed nine empirical studies conducted after the outbreak of COVID-19. The aim was to examine the effects of the integration of VLCs on the teaching and learning of higher education institution students and faculty members using Web 2.0 technologies and platforms during the COVID-19 pandemic. The literature reports different Web 2.0 tools utilized in the teaching and learning process and discussed their considerations in selecting the tool as a platform to establish VLCs. It was demonstrated that VLCs positively influence resource sharing, collaboration development, network establishment, engagement, and interaction promotion among students. The adaptation of Web 2.0 platforms improved student-instructor communication and helped students become successful in their learning during the COVID-19 pandemic era (Nkansah et al., 2020).

Findings also show that students had favourable reactions to VLCs in diminishing the sense of isolation and loneliness in the online learning environment (Anderi et al., 2020; Basal & Eryilmaz, 2020; Cantey et al., 2021). Given that the intensifying concerns surrounding the pandemic, many universities suspended part or all of in-person classes and campus services. The decreased social interactions and social isolation increased the student's feeling of loneliness, leading to a negative psychological consequence among college students (Grubic et al., 2020). Given the uncertainty and abrupt disruption of the semester, some students experienced distress, anxiety, depression, and even abuse (Zhai & Du, 2020a). Therefore, for students who enrolled in online and blended programs, participating in VLCs had a significantly positive effect on their mental wellbeing during the COVID-19 pandemic.

Literature indicates that VLCs can help students gain insight into not only theoretical learning, but practice applications on some academic topics (Anderi, 2020; Cantey, 2021; Peeters & Pretorius, 2020). Anderi et al. (2020) argued that the VLCs offered unique opportunities to medical students' exposure to the realities of COVID-19 by involving the frontliners in the community activities. VLCs can benefit language learning by creating a language communication environment to foster language development (Peeters & Pretorius, 2020). Cantey et al.(2021) described their hands-on training experiences to nursing students through virtual clinical lab sessions. Students learned theoretical knowledge by reading texts, watching videos, and participating in course discussions. Then they were asked to practice with a partner in the front of the camera using the equipment that was mailed to them. These practices could be examples to enlighten other innovative practices through VLCs.

This literature review examined the barriers and challenges that may affect the implementation of VLCs. According to understanding from the findings and theoretical foundations, technological issues, including the inadequate knowledge of technology, Internet connection stability, software features and device-related issues, are commonly mentioned. Therefore, institutions should pay adequate attention to the ICT training and IT infrastructure to students and faculty members who experience challenges in using those Web 2.0 platforms with respect to teaching and various learning activities (Hassan et al., 2021; Nkansah et al., 2020; Sobaih et al., 2020).

It is also reported in the reviewed literature that faculty members had hardships with 1) time constraints to adapt the rapid turnover to online teaching, 2) selecting suitable platforms to scaffold student online learning activities, and 3) finding appropriate

methods to evaluate student effort and performance in VLCs. Students' barriers were also discussed in the literature, including the lack of an uninterrupted home learning environment, time management issues, inappropriate posts and language, and privacy and security problems.

Limitations and Recommendations

This literature review summarized a list of barriers and solutions that educators may adopt or consider when setting up and maintaining an online learning community using Web 2.0 platforms. For higher education institutions, it is urgent to improve the IT infrastructure to better support faculty and students' online teaching and learning activities during the pandemic. IT infrastructure includes digital learning materials, internet connectivity, uninterrupted single and group study space, electronic device loans, Web 2.0 learning platform group memberships, and other services. To solve the technical problems that students and faculty members have, universities can provide regular training and workshops to develop students and faculty digital competence and literacy (Hassan et al., 2021). Moreover, an IT support team should be made readily available to provide timely service to students and faculty members in solving technical problems such as the loss of login passwords and the upload of big files (Hassan et al., 2021). VLCs might be connected with other campus services as a coping strategy to the increased pressure and depression of students in life and study. Communities may hold online lectures by inviting guest speakers from career development center, writing support desk, library resources, academic support service and counselling psychology.

With the increasing number of online and blended programs, more research should focus on online learning and virtual learning communities, even when the

pandemic is over. Institutions should provide an online learning environment where students can engage in and establish connections with peers and instructors. Given the number of searching keywords and databases this literature review examined, the collected literature is limited. Some studies in this literature review mentioned international students and female students' learning challenges using Web 2.0 learning tools, but a more in-depth examination of these topics requires inclusion of more studies to be reviewed. To better support the thriving of every student, future research could be conducted to explore the experiences and demands of learners with different backgrounds, including gender, culture, age, race, and geographic locations, in VLCs. Longitudinal studies could provide insights into the ways in which students' behaviours and interpersonal relationships on VLCs may develop over time on VLCs.

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VITA AUCTORIS

NAME: Yunxiao Zhang

PLACE OF BIRTH: China

YEAR OF BIRTH: 1995

EDUCATION: Tianjin Academy of Fine Arts, B.A., Tianjin,
                                      China, 2013-2017

                                      University of Windsor, M.Ed., Windsor, Ontario,
                                      2018-2021