

# It's Happy Hour Somewhere: Videoconferencing Guidelines for Traversing Time and Space

## C'est l'happy hour quelque part : directives de vidéoconférence pour traverser le temps et l'espace

Agnieszka Palalas, Rebecca E. Heiser and Ashley Gollert

Volume 48, Number 4, 2022

Special Issue

URI: <https://id.erudit.org/iderudit/1097222ar>

DOI: <https://doi.org/10.21432/cjlt28267>

[See table of contents](#)

Publisher(s)

The Canadian Network for Innovation in Education

ISSN

1499-6677 (print)

1499-6685 (digital)

[Explore this journal](#)

Cite this article

Palalas, A., Heiser, R. & Gollert, A. (2022). It's Happy Hour Somewhere: Videoconferencing Guidelines for Traversing Time and Space. *Canadian Journal of Learning and Technology / Revue canadienne de l'apprentissage et de la technologie*, 48(4), 1–21. <https://doi.org/10.21432/cjlt28267>

Article abstract

Time seems to be moving at lightning speed with busyness unsustainably being “celebrated” and not allowing for sufficiently deep interaction with learning content, others, and the experience of which we are part, including our interactions in videoconferencing sessions. One benefit of videoconferencing is that it can address time and distance boundaries. With this advantage also comes a challenge - the pressures of time and time not being used purposefully often negatively impact the online learning experience and the digital wellness of its participants. Considering that, the reported study inquired: what are the videoconferencing guidelines in relation to temporal space to support digital wellness in online learning in higher education? Drawing on a systematic review of the relevant literature of the last decade, temporal guidelines have been distilled to promote the design of videoconferencing-based learning that is conducive to successful learning while maintaining digital well-being. The article organizes the literature review findings according to the categories identified through the secondary data analysis of its three preceding studies. Based upon 42 articles that met the inclusion and exclusion criteria in the first phase of the research design, we negotiated and determined thirteen temporal guideline themes described as time management, essentialism, purposefulness, agility, social presence, attention, inclusion, cooperation, respect, technology preparedness, creativity, evaluation, and safety. Further research is recommended to explore the various aspects of design in more depth and tackle the less frequently addressed themes of creativity, evaluation, and safety, focusing on pedagogy and human-centred approaches.



## It's Happy Hour Somewhere: Videoconferencing Guidelines for Traversing Time and Space

C'est l'happy hour quelque part: directives de vidéoconférence pour traverser le temps et l'espace

**Agnieszka (Aga) Palalas**, Athabasca University, Canada

**Rebecca E. Heiser**, Athabasca University, Canada

**Ashley Gollert**, Athabasca University, Canada

### Abstract

Time seems to be moving at lightning speed with busyness unsustainably being “celebrated” and not allowing for sufficiently deep interaction with learning content, others, and the experience of which we are part, including our interactions in videoconferencing sessions. One benefit of videoconferencing is that it can address time and distance boundaries. With this advantage also comes a challenge - the pressures of time and time not being used purposefully often negatively impact the online learning experience and the digital wellness of its participants. Considering that, the reported study inquired: what are the videoconferencing guidelines in relation to temporal space to support digital wellness in online learning in higher education? Drawing on a systematic review of the relevant literature of the last decade, temporal guidelines have been distilled to promote the design of videoconferencing-based learning that is conducive to successful learning while maintaining digital well-being. The article organizes the literature review findings according to the categories identified through the secondary data analysis of its three preceding studies. Based upon 42 articles that met the inclusion and exclusion criteria in the first phase of the research design, we negotiated and determined thirteen temporal guideline themes described as time management, essentialism, purposefulness, agility, social presence, attention, inclusion, cooperation, respect, technology preparedness, creativity, evaluation, and safety. Further research is recommended to explore the various aspects of design in more depth and tackle the less frequently addressed themes of creativity, evaluation, and safety, focusing on pedagogy and human-centred approaches.

**Keywords:** Videoconferencing; Digital wellness; Time; Guidelines; Instructional design

## Résumé

Le temps semble s'écouler à la vitesse de l'éclair, avec la saturation des tâches étant "célébrée" de manière insoutenable et ne permettant pas une interaction suffisamment profonde avec le contenu de l'apprentissage, les autres et l'expérience dont nous faisons partie, y compris nos interactions dans les sessions de vidéoconférence. L'un des avantages de la vidéoconférence est qu'elle permet de s'affranchir des limites de temps et de distance. Cet avantage s'accompagne également d'un défi : les contraintes de temps et le temps qui n'est pas utilisé de manière réfléchie ont souvent un impact négatif sur l'expérience d'apprentissage en ligne et le bien-être numérique de ses participants. Compte tenu de ce qui précède, cette étude a examiné : quelles sont les lignes directrices en matière de vidéoconférence par rapport à l'espace temporel pour soutenir le bien-être numérique dans l'apprentissage en ligne dans l'enseignement supérieur ? En s'appuyant sur un examen systématique de la littérature pertinente de la dernière décennie, des lignes directrices temporelles ont été distillées pour promouvoir la conception de l'apprentissage par vidéoconférence qui est propice à un apprentissage réussi tout en maintenant le bien-être numérique. L'article organise les résultats de la révision de la littérature en fonction des catégories identifiées par l'analyse des données secondaires de ses trois études précédentes. Sur la base de 42 articles qui ont satisfait aux critères d'inclusion et d'exclusion dans la première phase de la conception de la recherche, nous avons négocié et déterminé treize thèmes de lignes directrices temporelles décrits comme la gestion du temps, l'essentialisme, le caractère intentionnel, l'agilité, la présence sociale, l'attention, l'inclusion, la coopération, le respect, la préparation technologique, la créativité, l'évaluation et la sécurité. Il est recommandé de mener d'autres recherches afin d'explorer plus en profondeur les différents aspects de la conception et de s'attaquer aux thèmes moins fréquemment abordés que sont la créativité, l'évaluation et la sécurité, en se concentrant sur la pédagogie et les approches centrées sur l'humain.

*Mots-clés* : Vidéoconférence ; bien-être numérique ; temps ; directives ; conception pédagogique

## Introduction

Online educators who utilize videoconferencing solutions must embrace two realities. The first is a sense of urgency over time - a limited commodity that is precious in online learning due to its socio-emotional and pedagogical value. The second is savouring the timelessness of learning and reflection. Berg and Seeber (2016) suggest that educators should "...advocate deliberation over acceleration. We need time to think, and so do our students. Time for reflection and open-ended inquiry is not a luxury but is crucial to what we do" (p. x). Time is a critical learning design component to activate a learning environment that supports and sustains learner cooperation, integration, and a sense of belonging to achieve academic success (Meeuwisse et al., 2010). Moments spent together engaging in videoconferencing platforms (e.g., Microsoft Teams, Blackboard, and Zoom) can reduce the distance between online learners and instructors by offering a dedicated space for real-time interaction and communication. While the need to cultivate deep thought and human interaction collides with the culture of speed, researchers agree that "time constraints are barriers to integrating critical thinking

skill” (Snyder & Snyder, 2008, p. 93). In addition, the pressures to learn and teach *efficiently* with declining resources of time have been found to be detrimental to participants’ well-being (Buckholdt & Miller, 2013).

The study reported herein addresses the need for guidelines to help online educators and instructional designers navigate the temporal requirements and pressures of videoconferencing. We asked: what are the videoconferencing guidelines in relation to temporal space to support digital wellness in online learning in higher education? This article proposes time-related guidelines distilled from a larger survey we conducted on videoconferencing learning design. Due to the extensiveness of the multiphase research, this report concentrates on recommendations regarding the usage of time in videoconferencing. By employing a systematic review of the relevant literature of the last decade, the article organizes its findings according to the thematic categories identified through the secondary data analysis of its four preceding studies (Palalas, 2018; Palalas et al., 2018, 2020) which explored learning design that promotes holistic digital wellness of online graduate students.

## Digital Context

Although videoconferencing and other digital technologies enable us to be better connected than ever in the virtual space, unbalanced and often excessive interactions with digital devices might deter successful learning experiences and outcomes. The present-day online learning context is threatened by digital distraction caused by information overload targeting our attentional capacity through multiple digital channels (Levy, 2016; Palalas, 2018; Pegrum & Palalas, 2021). These distractions are coupled with a digital disorder, i.e., misinformation, disinformation, and fake news (Pegrum & Palalas, 2021; Wardle & Derakhshan, 2017), as well as digital disconnection “with digital users being superficially present online but in actuality disconnected from the self ...and, relatedly, from others” (Pegrum & Palalas, 2021, p. 3).

Consequently, the pre-existing challenges of online education, related to its physical and emotional distance (Moore, 2013) as well as technological and pedagogical challenges, have now been magnified, potentially leading to fragmented attention and chronic stress negatively impacting physical and mental health issues (Couros, 2019; Dobelli, 2020; Wenger, 2019). Additional challenges that may negatively impact student well-being and mental health include such polarized experiences as boredom versus overwhelm, anxiety related to limited access and ability to participate in online learning versus students feeling excessively connected, mood changes due to curriculum requirements and design perceived by students as ineffective or as overly ambitious, stress over online exams and assessments, lack of online netiquette, and many other related concerns (Irawan et al., 2020; Mamun et al., 2020; Moawad, 2020; Saxena, 2020).

The critical stressors identified by recent research involve technical difficulties, diminished learner capability and confidence levels, time challenges, distractions, frustration, anxiety and confusion, lack of emotional and physical attention, and limited digital literacy skills (Saxena, 2020). Building on earlier research by Palalas (2018) and Palalas et al. (2018, 2020), which indicates that online graduate students mention a variety of difficulties with attention in the context of digital

learning; they mention being perpetually digitally overwhelmed, experiencing persistent distraction, and experiencing chronic distractibility, caused by information overload and by multiple digital spaces concurrently demanding their attention. Consequential multitasking may lead to addictive behaviours, depression, anxiety, and other mental health issues, as well as reduced empathy or prosocial attitudes (Bonnardel et al., 2018; Melo et al., 2020). An increasing number of studies also warn of the distracting effects of screens, particularly mobile screens, combined with social media and broader Internet access in learning and other contexts (Felisoni & Godoi, 2018; Ward et al., 2017; Whelan et al., 2020), which may also be correlated with depression and anxiety (Page, 2019).

The Palalas (2018) and Palalas et al. (2018, 2020) study participants also list the following challenges experienced in online learning: the hyper personal dimension of digital communication; privacy and safety concerns; the feeling of isolation in the world of hyper connection; mental health and burnout; an ever-increasing pace; emotional and physical exhaustion and frustration having to do more in less time due to all the various demands coming from professional and personal lives, and resultant increasing pressures on their self-regulation and time management, just to mention the most glaring ones which impact the online learning experience and also the overall wellness of the participants. While appreciating the flexibility afforded by online learning, the students described their digital learning experience using the following phrases: “no time to think,” “no time off,” “expected to be working 24/7,” “need to produce quickly,” “sense of overload and confusion,” and “stressed by the always-on lifestyle and its requirements.” The glaring concerns related to the issue of time instigated the current study and search for more meaningful and healthy use of digital pedagogies and technologies in relation to temporal features/strategies in videoconferencing spaces.

## **Digital Wellness**

Feedback from past studies (Palalas, 2018; Palalas et al., 2018, 2020) pointed to the significance of a whole-person approach to learning in the digital space, including the emotional, social, mental, spiritual, physical, and cognitive dimensions of online learning and their many constituents. The learners’ (and instructors’) holistic well-being, although attracting little attention prior to the lessons learned during the worldwide hastily migration of learning to remote delivery, has now concerned more learning designers (Joseph & Trinick, 2021) and educational policymakers around the globe (Higgins & Goodall, 2021) who seek to implement teaching and learning practices (content and facilitation) that contribute to the holistic wellness of learners, including their mental-physical health, rather than merely cognitive outcomes (albeit impacted by the learner’s overall well-being). We have adopted a related notion of Digital Wellness defined by the Digital Wellness Institute as “the optimum state of health and well-being that each individual using technology is capable of achieving” (Blankson & Hersher, 2021, p. 4).

Drawing on the Digital Flourishing® Wheel (Digital Wellness Institute, 2020), other similar frameworks that address digital users’ wellness, and the findings of the preceding studies (Palalas, 2018; Palalas et al., 2018, 2020), the following eight dimensions of digital wellness for online learners have been identified as essential: cognitive, social, emotional, spiritual, physical, digital identity,

environmental, and productivity. They are considered holistically in our current study and addressed in the discussion of the findings.

## **Methods**

### **Phased Qualitative Protocol**

Our research is framed with a holistic lens aligned to digital wellness as defined above. In order to understand evidence-based approaches and distill guidelines for online distance learning educators and instructional designers using videoconferencing tools in higher education contexts, we used a phased research protocol. The first phase, i.e., the larger systematic review, was guided by the question: what are the guidelines for effective practice for learning designers with video conferencing in online higher education? In the second phase, we employed a secondary data analysis to explore the temporal aspects of videoconferencing and select the guidelines that promote participant well-being. This article reports on the second phase related to the use of time in videoconferencing to support successful learning and digital wellness in online learning in higher education.

### **Systematic Review**

By using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) to explore empirical research findings and address the primary research question (Moher et al., 2009; Zawacki-Richter et al., 2020), we were able to reduce bias and draw reliable conclusions for educators to implement video conferencing guidelines within their contexts and practice (Gopalakrishnan & Ganeshkumar, 2013). In this initial research phase, we utilized five databases, including Discover, Google Scholar, Science Direct, Springer, and Taylor and Francis, with a Boolean operator as a search strategy to evaluate peer-reviewed videoconferencing studies conducted in formal higher education settings and published in English between 2011 and 2021. Next, we used Rayyan, a software solution for systematic reviews (Ouzzani et al., 2016) to screen and negotiate meaning from 169 potential articles and synthesized 82 articles to inform explicit guidelines presented through the literature. Articles eligible for this study must include evidence-based guidelines from empirical studies regarding video conferencing tools employed in distance learning experiences in undergraduate and graduate contexts. Once the inclusion criteria were applied, we narrowed the results to 42 articles before proceeding to the second phase of the research.

### **Secondary Structural Analysis**

Based on the preliminary findings of the systematic review, additional secondary data analysis was conducted using an inductive, structural coding strategy (Saldaña, 2016) to categorize temporal themes within the data corpus and inform video conferencing wellness guidelines for online distance learning stakeholders. We negotiated and determined 13 temporal themes (Table 1), which were selected based on the code book generated during the larger systematic review (i.e., the first phase); the descriptions of the codes were revised to reflect the focus on time. We then reread each article with video conferencing guidelines to identify the references accordingly.

**Table 1***Themes of Temporal Space in Video Conferencing Guidelines*

Theme	Description ( <i>references to...</i> )
Time management	processes and strategies to organize, plan, or prepare for an optimal learning experience using video conferencing tools
Purposefulness	intentional pedagogical and technological design and strategy decisions
Social presence	social interaction activities, the degree of feeling authentic or the belief in intimacy and interpersonal engagement among participants in the video conference event
Attention	asynchronous supplementary supports and conditions as learning design and facilitation strategies to structure the learning experience during, before, and/or after the synchronous event to distribute learning, promote attentive engagement, focus concentration, and prioritize specific content and/or activities efficiently
Inclusion	providing equitable access, accessibility, and inclusive learning experiences for all participants
Cooperation	interactions among peers and the instructor to support engagement, cohesion, and structure
Agility	the instructor's ability to quickly and effectively maneuver, adjust, and facilitate an optimal learning experience for all learners, despite deficient conditions and factors
Respect	regarding participant needs or expectations, or consideration to participant perceptions and satisfaction
Technology preparedness	the intentional use of time to train and prepare instructors and students in the use of video conferencing technologies
Essentialism	learning and instructional design decisions to limit and/or prioritize content, structural and strategic elements and components to include what is meaningful and essential for successful learning processes and outcomes

Theme	Description ( <i>references to...</i> )
Creativity	reconceptualizing the functionality of the video conferencing tool to create conditions for learning
Evaluation	efforts to support continuous improvement and reflective practice
Safety	privacy, security, and ethical considerations to ensure all participants feel confident and comfortable engaging in an authentic and protected learning environment

### Findings

Based upon 42 articles that met the inclusion and exclusion criteria in the first phase of the research design, coding resulted in ten significant categories to address our research question. Additionally, *creativity*, *evaluation*, and *safety* codes were applied to the data corpus, but their count frequency was below 30 references which we deemed insignificant to report from this analysis phase. Table 2 demonstrates the total frequency counts by code reference across the 42 articles and articulates the code definitions that three coders used to iterate and negotiate meaning from the findings and recommendations of peer-reviewed empirical studies.

**Table 2**

*Frequency of Codes in Video Conferencing Guidelines*

Code reference	Reference frequency
Time management	117
Purposefulness	96
Social presence	74
Attention	69
Inclusion	54
Cooperation	50
Agility	49
Respect	47
Technology preparedness	45
Essentialism	34



The research team documented over 635 references with a significant count (n=117) of explicit references to *time management* guidelines. Time management references ranged from less than desirable outcomes, such as “valuable teaching time was lost on something that could have been planned prior to the session” (Divanoglou et al., 2018), to preventative practices including, “Participants should have opportunities before the session to test and play with their earphones, microphones and the features of the online tools. It is advisable to schedule 10–15 minutes extra at the start of a session to sort out any technical issues” (Vuuren & Freisleben, 2020, p. 274). Scholars cited specific recommendations on the length and frequency of video conferencing sessions; for example,

Results suggest something of a ‘tipping point’ of three to four sessions per 12-week semester course, with a maximum of 1½ hours per session. Beyond this, it is likely that use would be considered intrusive and could detract from student independence. This particularly applies to international students contending with time zones. (Falloon, 2012, p. 121)

We identified references (n=96) to *purposefulness* described as the intentional pedagogical and technological design and strategy decisions. Since distance education is often defined as the “planned learning that normally occurs in a different place from teaching, requiring special techniques of course design and instruction, communication through various technologies, and special organizational and administrative arrangements” (Moore & Kearsley, 2011, p. 2), it’s not surprising that the purposefulness code emerged so frequently. Articles that included references to purposefulness provided learning design guidance such as, “During the meeting, instructors should... have music playing as students enter; this helps with audio setup... Display a set of instructions and meeting agenda that each student will see upon joining the session” (Wang et al., 2013, p. 25).

In addition, many articles referred to *social presence* (n=74) with effective practices to “allow time for student attendees to introduce themselves, including names, current roles in education, and what they hope to gain from this webinar” (Gautreau et al., 2020, p. 7). In particular, Falloon (2012) reports that “Some students commented that much relationship formation groundwork had been done prior to the [video conference] classroom sessions and that they served more to consolidate or evolve existing relationships to a different level” (p. 113). Additionally, scholars Wang and Chen (2012) recommend,

that text chat plays a supplementary role to oral and visual interaction, in order to bring a sense of immediacy and authenticity to collaborative learning in a cyber face-to-face classroom. Thus, collaborative task design needs to ensure a proper balance between text chat, and oral and visual interaction. (p. 324)

The *attention* code (n= 69) draws upon references to blending the affordances of synchronous and asynchronous modalities to create a learning experience structure that focuses learner attention and concentration on the video conferencing event. One example of the attention reference draws from the work of scholars Vuuren and Freisleben (2020), in which they state,

The funnelling of attention from various physical spaces through the screen into the online room can invite a unique kind of intensity that is not derived from the perception of bodies, but from the world's one is looking into, and the curiosities found there. The editing out of all which is not relevant to the interaction by the frame of the computer window and the simultaneous lure of what is off-screen does create an intensity that, if maintained, brings a level and depth of focus that can be highly beneficial for learning, while at the same time it remains fragile and susceptible to fracturing. To create and maintain this focus while minimizing the possibility of fracturing, the facilitator must work with the other forms of boundary creation to contain the engagement. (p. 275)

Additionally, the attention code references challenges and pressures to facilitate and learn in a video conferencing environment, such as “There’s no time to waste, you just do have to move on ... I find I need to concentrate and really keep things together, and it’s a different sort of environment in that way, it’s quite intense” (Cornelius, 2014, p. 265).

We employed the *inclusion* code (n=54) to identify specific references to the affordances of video conferencing learning experiences as an extension to a virtual environment that holds time and space between human proximity. In one example, Tonsmann (2014) describes “an important and unexpected benefit of this teaching modality, one that could be aptly employed for teaching mobility-challenged individuals such as handicapped persons and wounded veterans” (p. 58). Additionally, Falloon (2012) expands the context and design considerations for international student participation in a video conference environment and reports that different time zones presented an additional logistical challenge for international students, with some in Canada and the Middle East needing to work late into the night or early morning to participate... Interestingly, none of them saw this as a major issue for the number of times the classrooms were used but commented that if more frequent use was required, their thinking might change. As one put it, “as long as we know, we opt in on that basis. We have the choice— it’s our responsibility” (p. 120).

Of similar frequency and aligned closely to the *social presence* code (n=74), we defined *cooperation* (n=50) as references to interactions among peers and the instructor to support engagement, cohesion, and structure. An example delineated from the secondary data analysis describes the challenges of building cooperation in video conferencing experiences, “having limited capacity for only one speaker to talk at a time, discussions take a longer time and also the participants may have to repeat their utterances many times if two people talk at the same time” (Gedera, 2014, p. 98).

We discovered a theme focused on the facilitator’s ability to quickly and effectively maneuver, adjust, and facilitate an optimal learning experience for all learners, despite deficient conditions and factors. The *agility* code (n=49) was utilized to describe the role of the instructor in a video conferencing environment. Farooq and Matteson (2016) claim that “in addition to facilitation and scaffolding purposeful critical reflection, also included monitoring the ongoing technical concerns during the session” (p. 277). Additionally, Singhal (2020) suggests, “The key is to be flexible and improvise if the technology does not align with the intended goals... The instructor has to be vigilant” (p. 2713).

An emerging theme was identified as *respect* (n= 47), in which we coded references to guidance on the regard participant needs or expectations or consideration to participant perceptions and satisfaction. In one example, Alhlak et al. (2012) state, “time management creates a professional respectful impression” (p. 108), whereas Kan (2011) reported challenges with students participating across international time zones, “my undergraduates became antsy about prolonging dialoguing on difficult issues as it neared dinnertime, while HNU participants had difficulties remaining attentive as the body clocks for these early risers were not charged with adequate vibes at daybreak” (p. 13).

In addition to *purposefulness* (n=96) and *agility* (n=49) codes, we negotiated a theme on *technology preparedness* (n=45) to describe the intentional use of time to train and prepare instructors and students for the use of video conferencing technologies. Kobayashi (2015) explicitly calls on instructors and instructional designers to “[t]ake time to train students on how to use the system and expect that some students may need additional support” (p. 8). Also, Divanoglou et al. (2018) caution that without ample technology preparedness, “technical problems encroached on teaching time, which impeded their learning” (p. 94) and “valuable teaching time was lost because teachers didn’t know tech and didn’t use it right” (p. 99).

*Essentialism* (n=34) was codified for instructors and instructional designers to consider “the potential for less content to be covered” (Bensafa, 2014, p. 93) and to “place time restrictions on each task in order to encourage productivity” (Bower et al., 2015, p. 10). The essentialism code is exemplified by Mpungose (2021) who found,

that time is a critical element in offering effective online lectures; lecturers outlined that lectures of 1-h duration are more productive than those of 2 to 3 hours because students do not get bored and are left still wanting to learn more. This suggests that online lectures need different time schedules, and it should become the duty of the university management to work on time schedules that can maintain the effective use of Zoom for e-learning. (p. 11)

Three additional inductive structural codes were developed for the secondary analysis, including creativity, evaluation, and safety, as identified in Table 1. However, the frequency of the counts for these codes was insignificant, which is revisited in the following discussion.

## **Temporal Guidelines**

As evidenced by the results, temporal space delineations in video conferencing studies frequently provide time management and purposefulness recommendations to guide instructors and instructional designers who employ videoconferencing technologies to facilitate learning. However, present technologies continue to carry significant challenges to digital wellness when designing instruction in a synchronous context. It is prudent to draw attention to the implications and recommendations for future research in implementing the distilled temporal guidelines to support digital wellness within learning, design, and instructional processes. We recognize that digital wellness is not explicitly considered within the literature. Therefore, we have embedded a human dimension for

the wellness of students in online learning by summarizing recommendations into two categories of guidelines, planning and implementation, as outlined in the following sections.

### **Planning Guidelines**

The temporal aspect that attracted the most attention pertains to time management. When scheduling a videoconference session across borders and multiple time zones, the facilitator must consider the time of day the videoconference takes place (Kan, 2011; Mpungose, 2021; Saitta et al., 2011). Videoconferencing sessions should be scheduled when learners can participate “with reciprocal enthusiasm” (Kan, 2011, p. 13), recognizing the mental and physical exhaustion that might result from the participants spending significant amounts of time on alternate digital commitments. An important consideration during the initial planning and implementation of a videoconferencing session is its length of time. Scholars suggest that the optimal duration of a session ranges from 30 to 90 minutes (Alhlak et al., 2012; Correia et al., 2020; Hoyt et al., 2013; Mpungose, 2021; Smith et al., 2020). Engaging in shorter sessions lessens the strain on learners and allows for more concentrated dialogue to evolve. Our exploration of the literature has determined that shorter sessions are more productive than those of a longer duration. Smith et al. (2020) reported that students often multitask during long synchronous sessions and that “if the professor used solely lecture as the pedagogical approach, there was very little that could keep the students focused the whole time” (p. 204). Shorter sessions lead to greater engagement and enthusiasm for future learning. In interactive sessions whereby learners share their thoughts and opinions on a topic, the instructor must consider the appropriate amount of time for each activity; a maximum of 15 to 20 minutes of discussion before including another learner-centered activity is ideal for maintaining interest and structure during the session (Richardson et al., 2012; Singhal, 2020; Smith et al., 2020). During these shorter sessions, consideration must be given to how breaks are implemented. A short period of instruction or dialogue, approximately 30 to 45 minutes in length, followed by a 10 to 15-minute break, allows learners to step away and return ready to engage in the lesson (Alhlak et al., 2012). These built-in interactions maintain learners’ engagement for the duration of the session and encourage further participation through additional platforms.

### **Implementation Guidelines**

Participation is a key component of successful video conferencing sessions, and learners should come prepared to engage in collaborative discussions and activities. At the same time, to address the digital wellness of learners, instructors are encouraged to implement impromptu accommodations, such as recording lectures or reducing the amount of screen time to address the limitations to participation that may unexpectedly present themselves. Offering learners the opportunity to revisit the material later leads to more efficient and effective learning (Foronda & Lippincott, 2014; Hussein, 2016; Lewis et al., 2020). This type of adjustment is expressed across the reviewed literature and encapsulated through the agility code.

Learners and instructors must plan out the content and processes concerning an individual’s ability to interpret and apply information. Providing students with learning materials at least 24 hours in advance of the scheduled session helps them familiarize themselves with and reflect on the material

being discussed (Alhlak et al., 2012; Hoyt et al., 2013; Lewis et al., 2020). When presenting information for the first time during a session, students do not have adequate time to understand and reflect on the material. However, when provided at least 24 hours in advance, student attentiveness and participation are better supported as they have time to develop their understanding, leading to a more concentrated and thought-provoking discussion of the topics at hand (Smith et al., 2020). Preparedness, which also encompasses the concept of technical preparedness, is essential in creating a well-balanced synchronous space that respects all learners' cognitive abilities and skills. It is imperative to consider technology preparedness when planning a synchronous videoconferencing session. Each synchronous platform displays unique features that instructors and students must be able to utilize before, during, and after a synchronous session. Technology preparedness includes training instructors and students to be familiar and confident with the videoconferencing technology before engaging in the formal learning session (Gautreau et al., 2020; Kobayashi, 2015); this may also be addressed by opening the session approximately 10 to 15 minutes early to allow testing technical equipment and troubleshooting any potential issues (Foronda & Lippincott, 2014; Vuuren & Freisleben, 2020). Additionally, an emotional sense of feeling prepared removes barriers to allow all participants in the videoconferencing environment to collaborate and align with the collective learning goal. Instructors and learners will then enter the learning space feeling prepared, safe, and ready to participate in the learning community.

Digital wellness can be further increased through conversation with others, enabling intimate connections within the learning community (Almendingen et al., 2021), thereby leveraging social presence. Learners might be more willing to engage in an in-depth conversation when social connections have been previously established. During the initial 15 to 20 minutes of a new session, offer students the opportunity to connect socially with other members of their learning community through a short pre-instructional conversation session to engage with other students (Gautreau et al., 2020). These short introductory sessions allow the facilitator to build a sense of community throughout the cohort, leading to a safe and respectful learning environment (Hoyt et al., 2013; Kan, 2011). The more time participants spend together synchronously in videoconference events, the more they feel connected (Joseph & Trinick, 2021). Based upon the greater sense of connection, awareness of each individual's social capacity could be optimized and lead to the creation of a collective digital identity.

### **Implications for Future Research**

Although we know from previous research that facilitators should reflect on their instructional design decisions and determine appropriate pedagogical strategies to create the conditions for effective learning (Çakıroğlu et al., 2016; Laurillard, 2013). Most literature in our analysis did not call attention to the intersection of quality and effective usage of time. Our research found few references regarding *evaluation* as a procedural tool to collect information for continuous improvement and reflective practice. While Gedera (2014) mentions the importance of taking the time for a 10 to 15-minute debriefing activity for student reflection and decompression, we did not find any other explicit mentions of evaluating the usefulness of the hours and minutes spent on digital screens. With a much

larger volume of time spent online rather than offline, facilitators and instructional designers need to reflect on the effectiveness of the time spent on individual platforms (Tarus, 2021).

Likewise, with a primary focus on learner-centred design, it's surprising to see the lack of *safety* references in video conferencing studies in higher educational contexts. As Correia et al. (2020) defines, “safety, which includes privacy and security, is also a major concern when using videoconferencing systems for online learning and teaching because of learners’ privacy” (p. 444). This is particularly important, given ethical review board guidelines, the Federal privacy laws, and localized institutional data privacy protocols operationalized in higher education contexts worldwide. Within our analysis, we recognized the value of references to privacy, security, and ethical considerations to ensure all participants feel confident and comfortable to engage in an authentic and protected learning environment in both phases of our study. As detailed by Vuuren and Freisleben (2020), creating boundaries to protect sensitive information that may be inadvertently displayed is essential for creating a safe learning environment. The authors state “These boundaries are physical and temporal, as well as conceptual and emotional. Participant safety relies heavily on the facilitator’s ability to create and maintain these boundaries, especially in the absence of four physical walls” (Vuuren & Freisleben, 2020, p. 247). Further research is required to explore these issues in more depth as education is rapidly migrating in online spaces.

## Conclusion

From the temporal perspective, the videoconferencing space offers numerous affordances that, if leveraged appropriately, can promote a rich, inclusive learning experience that respects the digital wellness needs of learners and allows them to participate fully in technology-enabled education while maintaining the optimum state of their well-being. With digital technologies dynamically advancing in the background regardless of the educational field, the online learning design focus should shift to human-centered pedagogical strategies that transverse a specific videoconferencing platform or other learning technologies, including learning management systems (LMS). As observed by Schwier (2021), “Universities struggle with which LMS they should adopt, but too few conversations are held about how courses are designed and delivered...” (p. ix). They raise a timely question highlighting the lack of progress in distance education theory: “In a learning ecology that invites innovation and change, and apparently demands it, why do organizations apparently hold so tenaciously to fairly traditional and conservative approaches to distance education?” (p. ix). Indeed, based on the evidence collected during our research, insufficient attention has been given to innovative approaches to learning in the videoconferencing space to prevent ever-increasing digital hazards, such as zoom fatigue (Bailenson, 2021) or digital burnout (Bozkurt & Sharma, 2020). We have proposed a set of videoconferencing guidelines to serve as a springboard to such conversation and further empirical research. The aspect of time deserves attention as this resource has become an “endangered” commodity in our fast-paced reality.

For many of us, including the students who spoke about the pressures of time negatively impacting their online learning experience, time seems to be moving at lightning speed with busyness unsustainably being “celebrated,” and not allowing for sufficiently deep interaction with the learning content, with others, with the experience of which we are part. In future studies, the perception of time and our relationship to time could be viewed from a novel perspective and with regard to Nakamura and Csikszentmihalyi’s (2014) observation that when we are “in flow” and “the passage of time, a basic parameter of experience, becomes distorted because attention is so fully focused elsewhere” (p. 92), we can experience a sense of timelessness while genuinely and wholly engaged in the activity at hand. “Slow approaches” to teaching and learning should also be considered (Berg & Seeber, 2016; Boulous Walker, 2017; Frith, 2020) to further inform the design of effective videoconferencing-based learning going forward.

## References

- Alhlak, B. A., Ramakrisnan, P., Hameed, Z. S., & Mohseni, H. R. (2012). Video Conference: Integrated Tool for Identifying CSF in Education Development in UiTM. *Procedia - Social and Behavioral Sciences*, 67, 102–113. <https://doi.org/10.1016/j.sbspro.2012.11.311>
- Almendingen, K., Morseth, M. S., Gjølstad, E., Brevik, A., & Tørris, C. (2021). Student's experiences with online teaching following COVID-19 lockdown: A mixed-methods explorative study. *Plos One*, 16(8), 1–16. <https://doi.org/10.1371/journal.pone.0250378>
- Bailenson, J. N. (2021). Nonverbal overload: A theoretical argument for the causes of Zoom fatigue. *Technology, Mind, and Behavior*, 2(1). <https://psycnet.apa.org/doi/10.1037/tmb0000030>
- Bensafa, A. (2014). Using video conferences for ESP postgraduate students: An example of distance learning at the University of Tlemcen/Algeria. *Revista Românească pentru Educație Multidimensională*, 6(2), 79-95. <https://doi.org/10.18662/rrem%2F2014.0602.06>
- Berg, M., & Seeber, B. K. (2016). *The slow professor: Challenging the culture of speed in the academy*. University of Toronto Press. <https://doi.org/10.1111/fcsr.12321>
- Blankson, A., & Hersher, N. (2021). *Digital Wellness: Your playbook for thriving in the remote work era*. Wiley Beyond. <https://universityservices.wiley.com/wp-content/uploads/2021/01/2021-DigitalWellness-eBook.pdf>
- Bonnardel, V., Biddington, T., May, B., Jones, R., & Roffey, S. (2018). Toward the implementation of contemplative practices in higher education. *Journal of Perspectives in Applied Academic Practice*, 6(3), 3-13. <https://doi.org/10.14297/JPAAP.V6I3.362>
- Boulous Walker, M. (2017). *Slow philosophy: Reading against the institution*. Bloomsbury Academic.
- Bower, M., Dalgarno, B., Kennedy, G. E., Lee, M. J., & Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education*, 86, 1-17. <https://doi.org/10.1016/J.COMPEDU.2015.03.006>
- Bozkurt, A., & Sharma, R. C. (2020). Education in normal, new normal, and next normal: Observations from the past, insights from the present and projections for the future. *Asian Journal of Distance Education*, 15(2). <http://dx.doi.org/10.5281/zenodo.4362664>
- Buckholdt, D. R., & Miller, G. E. (Eds.). (2013). *Faculty stress*. Routledge.
- Çakıroğlu, U., Kokoç, M., Kol, E., & Turan, E. (2016). Exploring Teaching Programming Online through Web Conferencing System: The Lens of Activity Theory. *Journal of Educational Technology & Society*, 19(4), 126–139. <http://www.jstor.org/stable/jeductechsoci.19.4.126>
- Cornelius, S. (2014). Facilitating in a demanding environment: Experiences of teaching in virtual classrooms using web conferencing. *British Journal of Educational Technology*, 45(2), 260-271. <https://doi.org/10.1111/bjet.12016>



- Correia, A.-P., Liu, C., & Xu, F. (2020). Evaluating videoconferencing systems for the quality of the educational experience. *Distance Education*, 41(4), 429–452. <https://doi.org/10.1080/01587919.2020.1821607>
- Couros, A. (2019). #77 – Attention literacy with Alec Couros. [Interview by W. Richardson.] *Modern Learners*. <https://modernlearners.com/77-alec-couros/>
- Digital Wellness Institute (2020). <https://www.digitalwellnessinstitute.com/>
- Divanoglou, A., Chance-Larsen, K., Fleming, J., & Wolfe, M. (2018). Physiotherapy Student Perspectives on Synchronous Dual-Campus Learning and Teaching. *Australasian Journal of Educational Technology*, 34(3), 88–104.
- Dobelli, R. (2020). *Stop reading the news: A manifesto for a happier, calmer and wiser life*. [Trans. C. Waight.] London: Sceptre.
- Falloon, G. (2012). Inside the virtual classroom: Student perspectives on affordances and limitations. *Journal of Open, Flexible and Distance Learning*, 16(1), 108–126. <https://doi.org/10.3316/informit.384108311721545>
- Felisoni, D. D., & Godoi, A. S. (2018). Cell phone usage and academic performance: An experiment. *Computers & Education*, 117, 175–187. <https://doi.org/10.1016/j.compedu.2017.10.006>
- Foronda, C., & Lippincott, C. (2014). Graduate nursing students' experience with synchronous, interactive videoconferencing within online courses. *Quarterly Review of Distance Education*, 15(2), 1.
- Frith, U. (2020). Fast lane to slow science. *Trends in Cognitive Sciences*, 24(1), 1–2. <https://doi.org/10.1016/j.tics.2019.10.007>
- Gautreau, C., Dailey, K., & Evans, L. (2020). Building Virtual Bridges: Engaging Online Learners through an Interactive Webinar Series. *Journal of Educators Online*, 17(2).
- Gedera, D. S. P. (2014). Students' Experiences of Learning in a Virtual Classroom. *International Journal of Education and Development Using Information and Communication Technology*, 10(4), 93–101.
- Gopalakrishnan, S., & Ganeshkumar, P. (2013). Systematic reviews and meta-analysis: Understanding the best evidence in primary healthcare. *Journal of Family Medicine and Primary Care*, 2(1), 9–14. <https://doi.org/10.4103/2249-4863.109934>
- Higgins, J., & Goodall, S. (2021). Transforming the well-being focus in education: A document analysis of policy in Aotearoa New Zealand. *International Journal of Qualitative Studies on Health and Well-being*, 16(1), 1879370. <https://doi.org/10.1080/17482631.2021.1879370>
- Hoyt, J., Howell, S., Lindeman, S., & Smith, M. (2013). The Feasibility of Offering Videoconferencing Courses: Quality Issues and Lessons Learned. *Journal of Continuing Higher Education*, 61(2), 94–103. <https://doi.org/10.1080/07377363.2013.796255>

- Hussein, H. E. M. (2016). The Effect of Blackboard Collaborate-Based Instruction on Pre-Service Teachers' Achievement in the EFL Teaching Methods Course at Faculties of Education for Girls. *English Language Teaching*, 9(3), 49–67. <http://dx.doi.org/10.5539/elt.v9n3p49>
- Irawan, A. W., Dwisona, D., & Lestari, M. (2020). Psychological impacts of students on online learning during the pandemic COVID-19. *KONSELI: Jurnal Bimbingan dan Konseling (E-Journal)*, 7(1), 53-60. <https://doi.org/10.24042/kons.v7i1.6389>
- Joseph, D., & Trinick, R. (2021). “Staying Apart Yet Keeping Together”: Challenges and Opportunities of Teaching During COVID-19 Across the Tasman. *New Zealand Journal of Educational Studies*, 56(2), 209–226. <https://doi.org/10.1007/s40841-021-00211-6>
- Kan, K. H. (2011). Meeting Face to Face= Seeing Eye to Eye?: Interglobal Dialogue via Videoconference. *International Journal of Education and the Arts*, 12(10). <https://www.learntechlib.org/p/52011/>
- Kobayashi, M. (2015). Students' Evaluation of Google Hangouts through a Cross-Cultural Group Discussion Activity. *Turkish Online Journal of Distance Education*, 16(2), 28–39. <http://dx.doi.org/10.17718/tojde.98784>
- Laurillard, D. (2013). *Teaching as a design science: Building pedagogical patterns for learning and technology*. Routledge.
- Lewis, P. J., Catazano, T. M., Davis, L. P., & Jordan, S. G. (2020). Web-based Conferencing: What Radiology Educators Need to Know. *Academic Radiology*, 27(3), 447–454. <https://doi.org/10.1016/j.acra.2019.05.017>
- Mamun, M. A., Chandrima, R. M., & Griffiths, M. D. (2020). Mother and son suicide pact due to COVID-19-related online learning issues in Bangladesh: An unusual case report. *International Journal of Mental Health and Addiction*, 1-4.
- Meeuwisse, M., Severiens, S. E., & Born, M. P. (2010). Learning environment, interaction, sense of belonging and study success in ethnically diverse student groups. *Research in Higher Education*, 51(6), 528-545. <https://doi.org/10.1007/s11162-010-9168-1>
- Melo, C., Madariaga, L., Nussbaum, M., Heller, R., Bennett, S., Tsai, C.-C., & van Braak, J. (2020). Editorial: Educational technology and addictions. *Computers & Education*, 145. <https://doi.org/10.1016/j.compedu.2019.103730>
- Moawad, R. A. (2020). Online learning during the COVID-19 Pandemic and Academic Stress in University Students. *Revista Românească pentru Educație Multidimensională*, 12(1 Sup2), 100-107. <https://doi.org/10.18662/rrem%2F12.1sup2%2F252>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine*, 6(7), e1000097. <https://doi.org/10.1016/j.jclinepi.2009.06.005>

- Moore, M. G. (2013). *The theory of transactional distance*. In *Handbook of distance education* (pp. 84-103). Routledge.
- Moore, M. G., & Kearsley, G. (2011). *Distance education: A systems view of online learning*. Boston, MA: Cengage Learning.
- Mpungose, C. B. (2021). Lecturers' reflections on use of Zoom video conferencing technology for e-learning at a South African university in the context of coronavirus. *African Identities*, 1-17. <http://dx.doi.org/10.1080/14725843.2021.1902268>
- Nakamura, J., & Csikszentmihalyi, M. (2014). *The concept of flow*. In *Flow and the foundations of positive psychology* (pp. 239-263). Springer, Dordrecht.
- Ouzzani, M., Hammady, H., Fedorowicz, Z. (2016). Rayyan—a web and mobile app for systematic reviews. *Systematic Reviews* 5, 210. <https://doi.org/10.1186/s13643-016-0384-4>
- Page, K. (2019). *College mindfulness training: Reducing student life stress and improving academic performance*. Routledge.
- Palalas, A. (2018). Mindfulness in mobile and ubiquitous learning: Harnessing the power of attention. In S. Yu, M. Ally, & A. Tsinakos (Eds.), *Mobile and ubiquitous learning: An international handbook* (pp. 19-44). Singapore: Springer. [https://doi.org/10.1007/978-981-10-6144-8\\_2](https://doi.org/10.1007/978-981-10-6144-8_2)
- Palalas, A. (2019). Mindfulness for human-centred digital learning. *Argentinian Journal of Applied Linguistics*, 7(2), 110-125.
- Palalas, A., Mavraki, A., Drampala, K., & Krassa, A. (2018, April). Mindfulness in online and blended learning: Collective autoethnography. In A. Palalas, H. Norman, & P. Pawluk (Eds.), *Blended learning in the age of social change and innovation: Proceedings of the 3rd World Conference on Blended Learning* (pp. 84-96). Greece: International Association for Blended Learning.
- Palalas, A., Mavraki, A., Drampala, K., Krassa, A., & Karakanta, C. (2020). Mindfulness Practices in Online Learning: Supporting Learner Self-Regulation. *The Journal of Contemplative Inquiry*, 7(1).
- Pegrum, M., & Palalas, A. (2021). Attentional Literacy as a New Literacy: Helping Students Deal with Digital Disarray. *Canadian Journal of Learning and Technology*, 47(2). <https://doi.org/10.21432/cjlt28037>
- Richardson, J. C., Fox, W. S., & Lehman, J. D. (2012). Scenarios for Teacher Education Programs. *Tech Trends*, 56(5), 17–24. <https://doi.org/10.1007/s11528-012-0595-z>
- Saitta, E. K. H., Bovvdon, M. A., & Geiger, C. L. (2011). Incorporating Service-Learning, Technology, and Research Supportive Teaching Techniques into the University Chemistry Classroom. *Journal of Science Education and Technology*, 20(6), 790–795.
- Saldaña, J. (2016). *The coding manual for qualitative researchers*. Sage.

- Saxena, K. (2020). *Coronavirus accelerates pace of digital education in India*. EDII Institutional Repository.
- Schwier, R. A. (2021). Foreword: An attendant posture. In Martha F. Cleveland-Innes and D. Randy Garrison (Eds), *An Introduction to Distance Education: Understanding Teaching and Learning in a New Era*. (2nd ed., pp. vii-x). Routledge.
- Singhal, M. (2020). Facilitating Virtual Medicinal Chemistry Active Learning Assignments Using Advanced Zoom Features during COVID-19 Campus Closure. *Journal of Chemical Education*. <https://doi.org/10.1021/acs.jchemed.0c00675>
- Smith, J., Schreder, K., & Porter, L. (2020). Are They Paying Attention, or Are They Shoe-Shopping? Evidence from Online Learning. *International Journal of Multidisciplinary Perspectives in Higher Education*, 5(1), 200–209.
- Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Journal of Research in Business Education*, 50(2), 90.
- Tarus, L. (2021). Digital Well-Being between Lifestyles in Limited Pandemic Conditions and the Varied Offer of Social Platforms. *Revista Universitara de Sociologie*, 17(2), 234–244.
- Tonsmann, G. (2014). A Study of the Effectiveness of Blackboard Collaborate for Conducting Synchronous Courses at Multiple Locations. *InSight: A Journal of Scholarly Teaching*, 9, 54–63. <http://dx.doi.org/10.46504/09201404to>
- Vuuren, P. J. van, & Freisleben, C. F. (2020). How to catch a flying pig: Facilitating embodiment work in online rooms. Research in Drama Education: *The Journal of Applied Theatre and Performance*, 25(2), 268–285. <https://doi.org/10.1080/13569783.2020.1730169>
- Wang, C. X., Jaeger, D., Liu, J., Guo, X., & Xie, N. (2013). Using Synchronous Technology to Enrich Student Learning. *Tech Trends*, 57, 20–25. <https://doi.org/10.1007/s11528-012-0626-9>
- Wang, Y., & Chen, N.-S. (2012). The collaborative language learning attributes of cyber face-to-face interaction: The perspectives of the learner. *Interactive Learning Environments*, 20(4), 311–330. <https://doi.org/10.1080/10494821003769081>
- Ward, A. F., Duke, K., Gneezy, A., & Bos, M. W. (2017). Brain drain: The mere presence of one's own smartphone reduces available cognitive capacity. *Journal of the Association for Consumer Research*, 2(2), 140–154. <https://doi.org/10.1086/691462>
- Wardle, C., & Derakhshan, H. (2017, Sep. 27). Information disorder: Toward an interdisciplinary framework for research and policy making. Strasbourg: Council of Europe. <https://edoc.coe.int/en/media-freedom/7495-information-disorder-toward-an-interdisciplinary-framework-for-research-and-policy-making.html>
- Wenger, C. I. (2019). Teaching attention literacy: A case for mindfulness in the composition classroom. *Pedagogy: Critical Approaches to Teaching Literature, Language, Composition, and Culture*, 19(1), 53–78. <https://doi.org/10.1215/15314200-7173752>

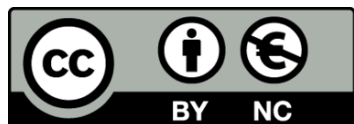
- Whelan, E., Najmul Islam, A. K. M., & Brooks, S. (2020). Applying the SOBC paradigm to explain how social media overload affects academic performance. *Computers & Education, 143*.  
<https://doi.org/10.1016/j.compedu.2019.103692>
- Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., & Buntins, K. (Eds.) (2020). *Systematic reviews in educational research: Methodology, perspectives and application*. Springer Nature.

## Authors

**Dr. Agnieszka (Aga) Palalas** is Associate Professor and EdD Program Director in the Open, Digital, and Distance Education Program at Athabasca University, Canada. Drawing from over 25 years of experience as a face-to-face and online educator, instructional designer, and an IT programmer, combined with her two-decade-long mindfulness practice, Aga researches and designs digital learning for the whole person, which nourishes the intellect, body, and mind of the individual and the community. Email: [agapalalas@athabascau.ca](mailto:agapalalas@athabascau.ca)

**Rebecca E. Heiser** serves as the Interviews Editor with the American Journal of Distance Education and acts as the student advisory board member with ICDE's Global Doctoral Consortium. Her research interests include quality dimensions in transnational distance education, internationalization strategies, and systems perspectives of open, online and distance education. Email: [rheiser1@athabasca.edu](mailto:rheiser1@athabasca.edu)

**Ashley Gollert** is a member of the Faculty of Education with the University of Lethbridge, Canada. Her main teaching focus is with assessment and evaluation. Ashley's current research focuses on integrating Indigenous ways of knowing and doing in the Canadian K-12 classroom environment. Email: [agollert1@athabasca.edu](mailto:agollert1@athabasca.edu)



© 2022 Agnieszka Palalas, Rebecca E. Heiser, Ashley Gollert

This work is licensed under a Creative Commons Attribution-NonCommercial CC-BY-NC 4.0 International license.