



Synchronous video-based communication and online learning: an exploration of instructors' perceptions and experiences

Eric S. Belt¹  · Patrick R. Lowenthal² 

Received: 4 September 2021 / Accepted: 14 September 2022 / Published online: 27 October 2022
© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

Abstract

Historically, online instructors have primarily, if not solely, used asynchronous text-based communication to interact and communicate with students in online courses. However, despite this use, online instructors and students have expressed concerns and limitations with asynchronous communication. Research suggests that synchronous communication technology may address some of the limitations of asynchronous communication. Further, advances in synchronous video-based communication technology make it easier than ever to incorporate synchronous communication technology into online courses. However, comparatively, little is known about online instructors' experiences and perceptions of using synchronous communication technologies in online courses and how they think they can help with community development. The purpose of this study was to explore instructors' experiences and perceptions of synchronous communication technology. Thematic analysis of semi-structured interviews with 18 online instructors resulted in the following themes: (a) instructors use synchronous communication technology in multiple and various ways in online courses; (b) the perceived benefits of real-time visual communication outweigh the drawbacks identified; (c) the benefits of non-verbal communication depend on situational factors and how synchronous features are used; (d) productive and meaningful interaction requires intentional yet flexible facilitation during synchronous sessions; (e) synchronous sessions can provide a place for community to build and grow but they are not required for community development. Altogether, findings suggest that real-time visual communication may aid in community building in online courses but that its effectiveness depends on several situational factors, and that synchronous lecturing may be less conducive to developing classroom community in online courses. Results and future research directions are discussed.

Keywords Synchronous communication technology · Online learning · Classroom community · Higher education · Student engagement

1 Introduction

During the 1990s, educators became increasingly interested in the role community plays in teaching and learning (see Bransford et al., 2000; Brown & Campione, 1994; Rogoff, 1994). As colleges and universities began offering courses and programs online during the late 1990s, educators were particularly interested in how, if at all, a sense of community can be developed in online learning environments. Rovai (see Rovai 2001, 2002a, 2002b; 2002c; 2003; Rovai et al., 2004; Rovai & Wighting, 2005) and Garrison and his colleagues (see Garrison et al., 2000; Garrison, 2007; Garrison & Arbaugh, 2007; Garrison et al., 2010) were two central figures researching this problem in the early 2000s. Working from previous literature, Rovai (2002a) explained how classroom community involves spirit, trust, interaction, and common learning expectations. Then over a series of studies, Rovai (2001, 2002a, 2002b, 2002c, 2003) illustrated that a sense of classroom community can be developed in online courses.

Research like Rovai's suggests that a sense of classroom community rarely emerges on its own. Rather, there are things instructors do to help it develop. For instance, Rovai (2002a) argued that instructors need to attend to social presence, social equality, and teaching style, among other things to help it develop. Other researchers emphasized the importance of attending to instructional design and directed facilitation (Shea, 2006; Shea et al., 2006), using specific instructional strategies (e.g., problem-based learning) (Baturay & Bay, 2010), and leveraging the social side of teaching, such as collaboration, communication, and teamwork (Ritter et al., 2010) to help facilitate its development. Techniques like these focus on aspects of "teaching presence" and "social presence" and specifically on the overlap of these aspects, which is described as "setting the climate" in the Community of Inquiry (CoI) framework (Garrison et al., 2000). Some research suggests it is an instructor's responsibility to set the climate in an online course (see de la Varre et al., 2011; Olson & McCracken 2015; Parker & Herrington, 2015). However, how instructors set the climate varies and depends on a host of factors, including an instructor's teaching philosophy, their experience teaching online, situational factors (e.g., class size), as well as their selection of and effective use of communication technologies.

Online educators have historically relied predominantly, if not solely, on asynchronous text-based communication technology to interact and communicate in online courses (Lowenthal et al, 2017a; Shea & Bidjerano, 2009). There is good reason for this. Asynchronous text-based communication enables instructors and students to communicate and interact from any time or place, it can provide time to reflect and discuss over time, as well as to collaborate with people from all over the world (Garrison et al., 2000; Oztok et al., 2013). However, technological advances in synchronous video-based communication technology coupled with sociocultural factors influencing increased utilization of such technologies suggests synchronous teacher-student interaction in online courses may be more commonplace than ever before.

Still, even before COVID-19, online educators were increasingly using synchronous communication technology in traditionally asynchronous online courses (see Huang & Hsiao 2012; Olson & McCracken, 2015). Synchronous communication technology (e.g., web conferencing tools like Zoom) enables people to see and hear each other as they interact and communicate in real-time (Clark et al., 2015; Themelis & Sime, 2020). Research suggests that being able to see and hear each other in real-time can, among other things, help improve the development of and perceptions of classroom community in online courses (Hrastinski, 2008; Olson & McCracken, 2015). Yet, questions remain as to how instructors use synchronous communication technology and specifically their perceptions of using it in online courses.

Synchronous sessions, in particular, need further investigation as relatively little is known about the antecedents, behaviors, and consequences of such interventions in traditionally asynchronous online courses. Previous research suggests that direct instruction and discussion are common instructional approaches during synchronous sessions (see Beckwith 2020, Brown et al., 2016; Hrastinski, 2008; Francescucci & Foster, 2013; Olson & McCracken, 2015; Shoepe et al., 2020; Wang 2005), yet direct instruction and discussion can occur in other ways in traditionally asynchronous online courses. As such, a more nuanced and holistic understanding of instructor uses of and experiences with synchronous sessions is needed relative to perceived advantages and drawbacks.

Given the evolving changes of the postsecondary classroom, the lack of literature on instructors' use of synchronous video-based communication technology, and the potential of using this technology for classroom community development, we set out to in this qualitative study to explore instructor experiences and perceptions of using synchronous communication technology in online courses. In the following paper, we describe some background literature on synchronous communication, the methodology used for the study, the results of our inquiry, and then conclude with some implications for research and practice.

2 Background

Synchronous communication technology affords real-time interaction between students and instructors in online courses (Phelps & Vlachopoulos, 2020). Instructor perceptions of these technologies are critical to understanding how and why instructors use synchronous communication technology, especially in traditionally asynchronous online learning environments (Dennen et al., 2021; Lowenthal et al., 2021b). Yet, instructor perceptions of using synchronous communication technology in online courses have varied over the years (Lowenthal et al., 2021b; Perry & Steck, 2019; also see Palloff & Pratt 1999). Research suggests that demographic factors such as gender, age, years teaching online, institution type, and tenure status influence instructors' perceptions and use of synchronous communication technology in their online courses (Martin et al., 2019; Perry & Steck, 2019). At the same time, Perry & Steck (2019) found that greater exposure, familiarity, and comfortability with communication technologies may mitigate technophobias among online instructors.

Research suggests some instructors perceive synchronous communication technology as reducing the transactional distance between instructors and students (Bolliger & Halupa, 2018; Huang & Hsiao, 2012) and promoting social presence and a sense of community among students (Lin & Gao, 2020; Martin et al., 2013; Yilmaz, 2017). Even early on, Motteram (2001) argued that synchronous communication technology can support the social aspects of online courses, which later research supported (see Oztok et al., 2013; Martin et al., 2021; Rockinson-Szapkiw, 2009; Stein et al., 2007). For example, Rockinson-Szapkiw (2009) found that synchronous communication technology enhanced the development of community and social presence in an asynchronous online learning environment. Similarly, in a meta-analysis of synchronous online learning, Martin et al., (2021) found that the inclusion of synchronous sessions in online courses may support affective educational outcomes, especially with graduate and professional students. Stein et al., (2007) found that student interactions during synchronous chats formed a distinct pattern that began with the development of social presence “in a more casual, immediate environment than asynchronous discussion boards” (p. 113). Similarly, Oztok et al., (2013) suggested that “...synchronous communication may indeed serve to fill a social gap that may exist under asynchronous communication alone” (p. 92). However, few studies have examined instructor perceptions of using synchronous communication technology in terms of community development.

Belt & Lowenthal (2021a) found that the use of synchronous video communication technology is under-researched. While some research has explored synchronous video use in blended courses (e.g., connecting classrooms to classrooms or individuals to classrooms) (see Akbaba & Baskan 2017, Francescucci & Foster, 2013; Izmirli & Izmirli, 2019; Pardasani et al., 2012; Wang & Huang, 2018), comparatively fewer studies have investigated using synchronous video-based communication technology in fully online courses (viz., Hogan & Devi 2019; Olson & McCracken, 2015). Moreover, researchers have only relatively recently begun to investigate the affordances of synchronous video-based communication technology (Belt & Lowenthal, 2021a; Martin et al., 2017). Given this gap in the literature, the potential of video-based communication technology to improve social presence and community development in online courses, and its increased use of it since COVID-19, we set out to explore instructor experiences and perceptions of synchronous video-based communication technology, with a specific focus on using it for community building.

3 Methodology

A qualitative research design, centered around semi-structured interviews, was used to explore instructor experiences and perceptions of synchronous video communication technology. Thematic analysis is helpful when exploring qualitative data sets and a “qualitative research method that can be widely used across a range of epistemologies and research questions” (Nowell et al., 2017, p. 2). We began by getting Institutional Review Board approval (protocol 101-SB20-103) to conduct our study. Then during the summer of 2020, we sent out an invitation to participate in our study to several social media accounts and online groups and organizations affiliated with

professional higher education, education, and educational technology (e.g., American Educational Research Association, Association for Educational Communications and Technology) to find online educators who used synchronous communication technology in their online courses. We ended up interviewing 18 online educators. 15 participants taught online courses in higher education settings both before and during the COVID-19 pandemic and considered themselves proficient in the use of synchronous video communication technology; 3 participants indicated that they had never used synchronous video communication technology before the pandemic for teaching. Study participants were assigned pseudonyms to ensure participant anonymity and confidentiality. The interview questions were created to help explore instructor experiences and perceptions of synchronous video communication technology, with a specific focus on using it for community building. The interviews began with an informed consent and consisted of questions such as: (a) In what ways have you used synchronous technology when teaching online?; (b) What features do you use and why?; (c) How have you used video to create a sense of social presence, connectedness, community in the courses you teach? The interviews were conducted via video conference, recorded, and transcribed for analysis.

The interview data were analyzed by the first author using NVivo software to code, query, and visualize the data. Data analysis progressed from initial coding to pattern coding (Saldaña, 2015). The initial coding procedure combined descriptive and simultaneous coding techniques as well as highlighting quotes or passages that were striking (see *pre-coding*, Saldaña 2015). Simultaneous coding was helpful when participants' descriptions of synchronous teaching provided insights to both their uses of the technology (i.e., the how) as well as inferences into their intentions with such uses (i.e., the why). Pattern coding was used to categorize first cycle codes to derive themes from the data. The second author reviewed the coding to ensure consensus was met and to improve the trustworthiness of the analysis. Both researchers then reviewed and discussed the naming and definitions of each theme to enhance the rigor of this study. The major themes were then shared with study participants as a form of member checking to enhance the study's credibility as suggested by Lincoln & Guba (1985).

4 Results

We set out to better understand online instructors' experiences and perceptions of using synchronous communication technology in online courses. Five major themes emerged from the data (see Table 1). In the following section, we will elaborate on these themes and provide specific quotes to further illustrate the participants' perspectives where appropriate.

4.1 Theme one: instructors use Synchronous Video-based Communication Technology in multiple and various Ways

We were interested in how instructors use synchronous video-based communication technology in their online courses. For instance, were most instructors simply hold-

Table 1 Major Themes of Online Instructors Perceptions of Using Synchronous Video-based Communication Technology in Online Courses

Major Themes

Theme 1: Instructors use synchronous communication technology in multiple and various ways in online courses

Despite popular opinion, instructors do more than simply use synchronous communication technology to lecture. Participants reported how they used synchronous communication technology to hold class discussions, to assess and provide feedback to learners, as a general check-in (e.g., as a course kick-off or office hour), as well as to lecture.

Theme 2: Benefits of real-time visual communication outweigh drawbacks

Participants identified multiple benefits—such as, seeing each other or shared screens in real-time, helping to establish a sense of presence (e.g., getting to know one another), providing feedback, and real-time text-based chatting—as well as some drawbacks—such as technical difficulties (e.g., poor internet or broadband access leading to delays in audio and video feeds), time-consuming to both students and instructors, and overwhelming and burdensome on instructors (e.g., producing a synchronous session using various features)—of using synchronous communication technology. However, participants overwhelmingly suggested that the benefits of real-time visual communication outweigh the drawbacks identified.

Theme 3: Benefits of nonverbal communication depend on situational factors and how synchronous features are used

Synchronous communication technology can bring nonverbal communication into the online classroom. However, participants described how simply holding synchronous sessions does not guarantee that student webcams will be on, that they will be actively engaged, that there will be a stable internet connection for video, or that the videos will be large enough to make visual cues and nonverbal communication visible and helpful.

Theme 4: Productive and meaningful interaction require intentional yet flexible facilitation during synchronous sessions

Safe, interactive, and meaningful synchronous sessions do not happen on their own. Rather, participants described how they found different facilitation strategies such as creating a welcoming environment, reducing lecture time, inviting student participation and engagement, and responding to student needs as helpful mechanisms toward productive and meaningful interactions. Oftentimes, imploring these strategies required instructor improvisation and adaptability throughout synchronous sessions as each session was in and of itself unique.

Theme 5: Synchronous sessions can provide a place for community to build and grow but they are not required for community development

Synchronous sessions, and specifically the use of real-time visual communication, can create a place for community to develop by enabling participants the ability to see each other's nonverbal communication, hear each other, and develop a sense of immediacy in real-time. However, participants pointed out that this type of communication is not needed to develop a sense of community. They shared experiences where they were able to successfully develop a sense of community using only asynchronous communication as well as times where they were unable to leverage the affordances of synchronous communication because of situational factors (e.g., webcams turned off, class size).

ing synchronous sessions to lecture to their students or were they using it to hold office hours? And more specifically, what were they actually doing in these sessions? The major theme that emerged was that there was no one way that participants used synchronous sessions. Instead, participants reported how they used synchronous sessions to lecture, hold class discussions, assess learners, provide feedback, and as a general check-in (e.g., as a course kick-off or office hours). For instance, Terry explained:

I've used it for one-on-one tutoring. I've used it for regular class sessions. I've used it to administer ... well to proctor exams [and] to give myself a whiteboard.

Riley also described:

One [way] is to facilitate classroom discussions. Another one is individual counseling, tutoring sessions with students, either individually or in small group instruction. Another way that's related to that is virtual office hours. The difference between that and virtual office hours is that I'll have a time that's dedicated to a particular student or a small group of students, whereas with virtual office hours it's more like okay every Wednesday from seven to eight p.m. I'm going to be there so you can drop in as you want. So some of it is for guided instruction, guided individual tutoring, some is just open, that come to visit me in my virtual office.

Additional, though less common, uses included playing games with students, providing real-time annotation and feedback (e.g., giving audio/video feedback, audio-only, or text-based feedback in a shared document), and facilitating oral assessments of students in real-time.

4.2 Theme two: benefits of Real-Time Visual Communication Outweigh Drawbacks

We also wanted to better understand what instructors thought the advantages and disadvantages were of using synchronous video-based communication technology when teaching online courses that have traditionally only used asynchronous text-based communication. The major theme that emerged was that the benefits of real-time visual communication outweigh the drawbacks that can arise when adding this form of communication to online courses.

Participants consistently identified the advantages of synchronous video-based communication technology, and specifically holding synchronous sessions, as the ability to communicate with students in real-time while seeing each other or seeing the same thing on their devices through screen sharing. For instance, Calvin described how “it’s really efficient at bringing lots of different people together and you can go into presenter mode and have everyone see exactly what you see at the same time.”

Some specifically highlighted how real-time video can help build a sense of presence in online courses in different ways than using text-based communication. Riley described how “video technology made all the difference as far as students go, as far as presence, as far as reducing transactional distance.”

Others, though, focused simply on the benefits of real-time communication even when there might not be video or at times when some students chose not to have their cameras on. For instance, Claudia noted, “it just made a huge difference just to be able to have that chat space.”

Despite these advantages, participants noted some disadvantages of using synchronous communication technology. For instance, some pointed out how meeting in real-time can be burdensome for online students as Lauren explained how “it’s one more thing they have to keep up within a semester of things.” Others talked about some of the technical difficulties, such as poor internet and broadband access, which may lead to delays in audio or video, as well as how time-consuming and overwhelming it can be to host synchronous sessions using a variety of features (e.g., screen share, whiteboard, chat, polling, breakout rooms). Mary explained,

So I try to mix and match a whole bunch of different mediums and a whole bunch of different techniques to sort of like edit together kind of a show. Well, yeah, it kind of turns out to be a bit of a show, doesn't it? It's extremely time-consuming.

However, despite some of these disadvantages, participants still felt that a clear advantage of synchronous video-based communication technology, like holding synchronous sessions, was that the technology afforded “a place to get to know one another,” “a place for students to provide feedback to one another,” and “a place to see and hear each other in real-time.”

Real-time visual communication offers an additional element, lacking in traditionally asynchronous online courses, that more closely mirrors elements of in-person face-to-face courses. As Tina elucidated, “I’ve used technologies like Zoom for teaching to recreate the feeling of my face-to-face class” which typifies a tendency toward viewing in-person instruction as a basis for instructional comparisons.

4.3 Theme Three: Benefits of Nonverbal Communication Depends on Situational Factors and How Synchronous Features are Used

Synchronous video-based communication technology platforms have a variety of features. We wanted to better understand instructors’ experiences using some of these different features, and how their use might influence community development. The most used synchronous applications by participants were Zoom, WebEx, Teams, and Blackboard Collaborate (i.e., web conferencing applications). Each of these applications has similar features, including the ability to communicate in text, audio, and/or video (Skylar, 2009). The availability of these features often results in instructors and students interacting and communicating in different ways during synchronous sessions (e.g., some with their camera on and mic on, some with their camera off and mic off, and so on), which in turn can lessen or even nullify some of the aforementioned affordances of being able to see and hear each other in real-time. Participants discussed how instructors can control certain features (e.g., disabling the ability for students to turn their microphone on), but that there are some things they cannot control (e.g., forcing webcams to be on). Rather than disabling certain features, participants talked more about using certain participation norms or protocols. For instance, some would ask students to stay muted and then unmute when they wanted to say something, which Tina described as, “...almost like the new raise your hand.” While norms or protocols like these can be a helpful form of classroom management, participants discussed how they can accentuate a power differential in the classroom. For instance, Bernard described how practices such as muting microphones when joining a synchronous session can hamper real-time communication. He explained, “...now you immediately mute without really thinking about the innate message that’s being sent, that your voice might not be valued, you have to sit and wait and wait your turn....”

Consistently, though, when talking about different features of these applications, participants talked about webcams. Participants talked about how they valued and appreciated when students *chose* to turn their webcams on during synchronous sessions. However, participants noted that they did not require students to turn their webcams on. As previously mentioned, one of the key affordances of synchronous

sessions is the ability to see each other, and specifically see things such as nonverbal communication (e.g., body language, eye movement) in real-time. This nonverbal communication, while different from in-person, can provide context cues, feedback, or signals that can be used to gauge student engagement, and subsequently inform the classroom community. However, this nonverbal communication is essentially absent if students choose to have their webcams off. For instance, Mary explained:

It's more what I don't see that that's the problem. It's exactly the lack of visual cues that are so important for me to know. If I'm dragging on, it's time for me to change. Or do the students look confused, maybe I should reexplain this. Or I can see some are talking to each other, maybe they have a question, and so I'm lacking all these cues.

Participants explained how they felt like their students were disengaged and not paying attention when they had their webcams turned off. For instance, Calvin explained:

You do feel very much like you're teaching to a blank wall a lot of days. 70 students and for the entire course, nobody had their video on. We are sitting in our living room from eight to midnight, and we have no indication that anybody was even paying attention.

Some even talked about how using synchronous sessions, when students all had their webcams off, presented new challenges. For instance, participants talked about how difficult it can be talking to a screen full of avatars. Bernard explained:

Here's an avatar, or just even worse, here's a black screen that says [John] or something like that on it. Well, that in and of itself, is a brand-new form of nonverbal communication I've never had to deal with before.

Another challenge brought up was how one should interpret when a student chooses to turn their camera off midway through a synchronous session. George inferred that this type of behavior could be a way students signal that they need a break or some privacy:

When they turn off the camera or when they mute their microphones. It's like they need some space, right, some private space, or probably they are tired, they don't want to pay attention anymore.

However, with so many people working and attending school from home during the pandemic, there could be a host of other reasons why students choose to turn their cameras off during any given synchronous session.

Participants, though, also talked about how even when students do have their webcam on there can still be additional factors or constraints limiting the benefits of this type of communication technology such as: (a) students appearing in small thumbnail video displays (particularly when instructors use gallery or grid views); (b) slow loading videos; (c) multiple webcams turned on simultaneously; (d) convoluted eye-contact to name a few. For example, Mary talked about how the screen size and the number of students in a synchronous session can make it challenging to discern any visual cues and nonverbal communication. Mary explained that:

I have a class that has 40 students, so they are literally like little squares about half an inch high and about three-quarters of an inch wide. So it's very, and I'm on a laptop, so I gotta tell you, I'm not seeing, and I wear glasses, so I'm not seeing a lot of nonverbal here.

Further, participants talked about how some of the visual cues could actually be unfavorable. For instance, several participants described how seeing students' body language (e.g., eye movement, sitting upright, slouching, hand raising, facial expressions, mannerisms, head nods) could influence the climate of a synchronous session in not only positive but also negative ways. Many acknowledged that this also happens in traditional face-to-face classes, yet they found the experience was different when seeing it up close on a screen. The following quotes exemplify this point:

- *So when they're not looking at you or they're looking down or... whatever you feel like you've lost them. But I had to remind myself that was happening in the classroom anyway and it doesn't mean they're not paying attention, it's just more in your face in this format.*
- *And it's so easy to zone out and you're not, you know, you're most of the people are at home, right, so at home, you've got your cat, your kids, the laundry, you're hungry, and get up to the fridge. So there's a billion distractions that if you're in a classroom, you don't have. I mean, you might have them, but they're not there, they're just in your brain.*
- *With the students, it's the exact same as the classroom, if they're going to be sidetracked by their cell phone, it's going to happen whether they're on a Zoom or not.*

Finally, participants talked about other ways that webcams can inadvertently communicate things about a student. For instance, participants talked about how they would sometimes notice things about their students' surroundings and attire that they saw on the screen. In most instances, they found these details as welcoming and positive additions to the class. For instance, Calvin recounted that, "I like seeing that a student's nice and cuddled up in their blanket. We know they are in their happy place and they're listening, they're engaging, and it's great." Along the same lines, Margaret described how other on-screen appearances helped shape opinions of others within the community:

It's kind of cool to see someone's dog jump up on their lap and want to participate in the call, which breaks up the discussion a little, but I think it adds a little bit of personality to where people realize that we're all human and it sparks conversation, and it sparks additional knowledge of each other.

However, participants also described seeing things that they might not have otherwise seen in a face-to-face classroom, such as relaxed student attire. Lizzy explained how "I've had some students come to the meetings in some pretty questionable outfits."

Overall, it was clear that participants valued how features like webcams can help bring nonverbal communication into the online classroom and how this nonverbal communication can help improve communication and set the climate for a successful learning community. But they were quick to point out that webcams are not a panacea. They can present additional problems or challenges or even communicate negative nonverbal communication.

4.4 Theme four: productive and meaningful interaction require intentional yet flexible facilitation during synchronous sessions

Research has shown that despite any affordances, the effectiveness of any communication technology depends on how it is used (Lowenthal et al., 2017a). Thus, we wanted to know more about how instructors facilitated synchronous sessions and if any patterns emerged from start to end of any given session. Each participant described their facilitation strategies in different ways, though some commonalities include creating a welcoming environment, reducing lecture time, inviting student participation and engagement, and responding to student needs. We elaborate on these sub-themes below.

4.4.1 Creating a welcoming environment

Research suggests that one of the things lost in online courses is the informal discussions that often happen before, after, and at breaks in traditional in-person face-to-face courses (Dunlap & Lownethal, 2009). In this study, participants noted the importance of showing up early and, in particular, creating a welcoming environment. Several participants described starting a synchronous session with some form of music. Riley described playing his guitar on screen while waiting for all students to connect to the synchronous session. Cynthia, Calvin, and Lauren all described playing pieces of music at the beginning of synchronous sessions to help create a relaxed and welcoming environment for students “to ease them into the day” and “to help them remember where they are.” Calvin noted even taking students’ music requests as a way to engage students. Lauren further described asking students for their preferred entrance music. She explained, “I create a YouTube playlist of all the songs they submit, and I share this in class... they love it, they love getting to know each other that way.” Although some instructors described “awkward silences” throughout synchronous sessions that created hesitations among session participants, others felt starting a session with external audio tracks helped create a welcoming environment.

4.4.2 Reducing lecture time

Despite the varied uses of synchronous sessions that the participants described (e.g., direct instruction, discussion, assessment, feedback, office hours), participants were opposed to lecturing for an entire synchronous session. Participants felt that lecturing for an entire session limited student engagement and restricted their uses of the technology. In fact, several participants described using various features during synchronous sessions in lieu of or to supplement lecturing (e.g., polling, text-based chatting, screen sharing, whiteboarding, breakout rooms). Participants felt that lecturing for entire sessions negated the perceived benefits of real-time interaction and that lecturing aligned better to asynchronous content delivery forms. As Mary opined, “if they’re just sitting there receiving content probably most people are going to go for the asynchronous because then they can receive that content at their convenience,” and Gina noted, “If you’re just going to lecture, you might as well just record your lecture and make it look pretty and let people watch it on their own time and be able

to fast forward and go back and stuff.” Still, participants did not completely dismiss the notion of lecturing entirely. Rather, they described lecturing in short snippets of time between a few minutes and up to twenty minutes in length as potential ways to keep students engaged throughout synchronous sessions.

4.4.3 Inviting Student Participation and Engagement

Research has suggested that student engagement in online settings can be difficult to monitor through measurable activities (Dyment et al., 2020). In this study, several participants described “call[ing] on people by name,” “put[ting] a little bit of humor in,” “making eye contact,” and attempting to be “more real” and “more informal” as strategies that they perceived as encouraging student participation and engagement throughout synchronous sessions. Additionally, several participants felt that turning on their webcams during a session helped the students establish a rapport with their instructor and helped humanize their students’ experiences. The overarching sentiment from participants was that student participation and engagement reflected the climate of the synchronous session, often set by the instructor and their participation and engagement. As Calvin proffered, “We don’t have to be too formal. We can create this comfortable environment where students can really express who they are and what they are doing and how things are going in their lives.” There is no guarantee that inviting students to participate throughout synchronous sessions will increase engagement, although it was evident that participants were making concerted efforts in trying to provide opportunities for students to engage.

4.4.4 Responding to Student needs

The COVID-19 pandemic brought about emotional challenges to teaching and learning in synchronous online settings (Stewart, 2021). Participants in this study discussed how they, and their students, were managing stressful situations; synchronous sessions at times ended up being overly burdensome. Participants also described how, as educators, they felt it important to try to “provide a sense of empathy” and lessen students’ worries about various course-related tasks (e.g., meeting due dates, attendance at synchronous sessions). Although synchronous sessions, given the benefits of real-time communication, did provide a space for students to communicate individually and often more directly with their instructors about more than just course-related topics. As Lauren described:

Sometimes students cry. If they’re really stressed and that’s actually pretty typical... a lot of them have kids, they are super stressed at work, they have elderly parents a lot of times that they’re responsible for and they have all the same concerns that I have as you know a midlife human. That happens a lot for whatever reason, when it’s just me and the student talking, and they will either cry because they’re stressed, or they’ll cry out of relief... I always try to get them to laugh and relax, [I] always try to complement something that I see in their home. If they have pets, I just beg to see the pets. I can tell when a student is relaxing in their face. I can tell when they start smiling more, they start laughing, their hands start moving more, and they will kind of start joking back and then they’ll you know share something, and then

they'll start crying. If I have meetings with students, I'd say maybe a good seven will have a nice little cryfest and that's okay... I just sit there and I'm just like let it out, we all got emotions... I need them to know that I care about them.

When teaching, as evidenced by Lauren's recount, there are moments when instructor and student interactions require special care and attention, moments that go beyond the transactional nature of content delivery and Q&A. Participants described how despite their intentions for any given synchronous session they often had to adjust their approach as facilitators either at the beginning, during, or at the end of a synchronous session based on student needs.

4.5 Theme 5: Synchronous sessions can provide a place for community to build and grow but they are not required for community development

Finally, we were interested in if and how instructors used synchronous communication technology (which in the case of the participants in this study was predominantly holding synchronous sessions) to build a sense of classroom community. Participants held mixed views on this topic. Some participants talked about how they hoped holding synchronous sessions and the benefits of real-time visual communication could create a space for community to emerge. However, others felt that a sense of classroom community cannot be forced and must form organically based on the interests and motivations of others. Mary described the challenges associated with intentionally trying to create online communities:

I have tried in the past to create online communities with my students, and I've got to say, the jury's out on if people join communities because they want to join them or if they don't feel like joining them. I find that enforced community building does not arise out of its own. It's like in class, you'll always have the same ten students who talk, and I found that in online classroom communities the same thing happens. It's the same kids who are going to join. There is the intention [of community] that would be ideal, but I don't construct my classes according to that because I know that it's most likely not going to work.

Similarly, Bernard described how true community does not form when attendance is required of participants and alluded to the influence of teacher-student power dynamics therein:

But one of the negatives that comes out of [online community building] is that we might be unconsciously reproducing the interaction patterns based on societal power that we care online and we're going to have the people that tend to cluster together in ways that are unanticipated. I've used [synchronous communication technology] many times to build a sense of community, but oftentimes that community can end up as a stratified power structure rather than the idea that we really want to get along. If we put video online [it's not] all of a sudden going to be Kumbaya and I don't know how to get around that.

Conversely, others talked about how simply showing up, in real-time, was foundational for online communities to form. As Nancy explained, “[students] are making the effort to participate in those meetings and I feel that most of the time it has been beneficial to create a community.”

Some participants thought that there were some obvious advantages to using synchronous sessions for community building, such as the ability to see each other, hear each other, and interact in real-time. Gina explained, “they’re getting to see each other more in real-time, see each other’s faces. So having that helps but it’s not as necessary as I think a lot of people assume.” Gina and others pointed out that despite these advantages, it depends not only on things such as students having their webcams on but also on interacting and taking part in the synchronous sessions. Mary captures this overarching sentiment:

The hardest thing I found though is to get the interaction from the other side. So it’s still pretty much a one-way street. And I’m trying to make it a two-way street. But that’s going to take some time.

Participants also pointed out that they do not necessarily think synchronous communication is needed to develop a sense of community in online courses. Some described how asynchronous communication might lead to a better understanding of others. Gina continued:

I feel like people actually get to know each other better than I would expect through discussion boards and VoiceThreads and things, because I think they have the time to sort of process and interact with each other asynchronously because they really can digest what the other person did and sort of respond properly.

5 Discussion

We set out to better understand instructors experiences and perceptions of using synchronous communication technology in online courses and how they see its use relate to classroom community development. Five major themes emerged from our analysis: (a) instructors use synchronous communication technology in multiple and various ways in online courses; (b) the benefits of real-time visual communication outweigh the drawbacks identified; (c) the benefits of nonverbal communication depend on situational factors and how synchronous features are used; (d) productive and meaningful interaction requires intentional yet flexible facilitation during synchronous sessions; (e) synchronous sessions can provide a place for community to build and grow but they are not required for community development. In the following section, we discuss our findings in light of these findings and the purpose of the study.

5.1 Benefits and drawbacks of using synchronous communication technology in online courses

The benefits of real-time visual communication outweigh the drawbacks identified. Participants overwhelmingly preferred for students to have their webcams on during synchronous sessions. However, participants did not require this. Participants explained how having webcams on could introduce new challenges to online learning. Among other things, webcams could reveal equity issues that students might want to avoid sharing with the rest of their class (Bali, 2016; Bali & Meier, 2014). Participants also reported students having technical difficulties related to poor inter-

net connections that hindered webcam use. In addition, a few participants discussed behavioral differences among students of different genders and home life contexts (e.g., shared or lack of space, childcare) that influenced webcam use. Research on equity and access in synchronous online learning environments suggests some but not all issues may be mitigated by instructor action and awareness (see Ezra et al., 2021; Manzoor & Bart, 2021; Reinholz et al., 2020). Despite these challenges, participants suggested that webcam use was a way to “humanize” the communication and interaction taking place. Synchronous communication technology affordances, such as webcam use, may help humanize online learning experiences by providing additional context cues absent in other forms of communication (see DeWaard 2016; Parker et al., 2021). However, Bali & Meier (2014) and others have cautioned such convenient affordances as elitist and marginalizing.

Given the associated challenges with requiring students to turn their webcams on, instructor perceptions were mixed on how best to navigate the challenge. Some instructors were adamantly opposed to mandating student webcam use, others were less rigid and saw encouraging student webcam use as a mechanism for promoting community engagement that was helpful to informing the social climate of the classroom. These findings align with the work of Dennen et al., (2021).

Generally speaking, most online courses rely solely on asynchronous text-based communication. Despite some clear advantages to asynchronous text-based communication (e.g., convenience, efficiency, time-independent; (see Lowenthal & Moore, 2020; West & Borup, 2021a, 2021b), there are also clear limitations (e.g., lacking nonverbal cues and spontaneity, creating a sense of isolation or separation, taking time to develop conversations). Real-time visual communication adds an additional element that may not otherwise be present in traditionally asynchronous online courses, and this visual element may inform perceptions of classroom community in new or diverse ways as suggested by Rovai (2002b, 2002c).

Additionally, the benefits of nonverbal communication depend on situational factors and how synchronous features are used. Participants discussed several features of synchronous communication technology, yet predominantly focused on webcam use and nonverbal communication during synchronous sessions. Webcam use in synchronous sessions has gained researcher attention with greater exposure to synchronous communication technology worldwide (see Bedenlier et al., 2021, Gherheş et al., 2021; Kozar, 2016; Rajab & Soheib, 2021; Shockley et al., 2021), yet findings are mixed. For example, Shockley et al., (2021) found that webcam use during synchronous meetings may be what creates “Zoom fatigue” and in turn problematic for engagement. However, Bedenlier et al., (2021) found positive correlations between webcam use and student experiences (e.g., high group cohesion, open communication, good teacher-student interaction) in an online course. Participants in our study felt that when students’ webcams were on that they were better able to gauge student engagement and subsequently adjust their instructional approaches as needed, though class size and small video displays were confounding and limiting factors in many recounts. Student engagement is likely difficult to gauge regardless of webcam use, yet when webcams were on the visual communication available was preferable to the alternative.

5.2 Experiences using synchronous video-based communication in online courses

Instructors use synchronous communication technology in multiple and various ways in online courses. Lecture, discussion, feedback and annotation, assessments, and check-ins were all common uses reported by participants. However, some participants were vehemently opposed to lecturing for an entire synchronous session. Participants felt that lecturing should be used sparingly throughout synchronous sessions, despite the affordance of real-time communication and interaction. Researchers have recently compiled recommendations and tips for facilitating synchronous sessions in online settings that include limiting didactic instruction, increasing peer interaction and collaboration, and engaging with students empathetically (see Henriksen et al., 2020; Luke, 2021). In our study, it became evident that participants were attempting to optimize the affordances of the communication medium in other ways such as hosting discussions, whiteboarding, and screen sharing with students. This finding aligns with previous research which has shown that discussion-based synchronous sessions have been beneficial to building classroom community in online courses (Brown & Eaton, 2020; Jung & Brady, 2020).

Nearly all of the participants discussed preparing for synchronous sessions with a distinct purpose in mind (e.g., lecture, discussion, check-in, group work). However, their intentions were often met with some expected and unexpected challenges during their facilitation of any given synchronous session. For instance, technical difficulties (e.g., unclear audio, video delays, and internet and broadband access), managing multiple modes of communication (e.g., text-based chatting, audio, video, screen sharing) and a perceived lack of student engagement (e.g., uncommunicative behavior) were common and expected challenges based on participant interviews. Hoffman (2019) found that discourse throughout synchronous sessions appeared in distinct ways such as unified student engagement (i.e., a single discussion thread) or separate student engagement (i.e., multiple discussions threads). In the Hoffman study, separate student engagement using different forms of communication (e.g., text-based chat or audio) was less common though undisruptive and seemed to optimize the affordance of real-time communication. Conversely, other studies have suggested that instructors managing multiple forms of synchronous communication may be overwhelming (Cooner, 2010; Karal et al., 2011).

Several participants described different facilitation strategies that they perceived as proactive ways to mitigate some expected challenges such as creating a welcoming environment, reducing lecture time, inviting student participation, and responding to student needs. These strategies echo previous findings on instructor perceptions of communication technologies (Huang & Hsiao, 2012), instructor presence (Richardson et al., 2016; Richardson & Lowenthal, 2017b), and community building (Wickersham et al., 2007) in online learning environments. Richardson et al., (2016) found that instructor actions and behaviors, such as setting the tone, were perceived as important to establishing teaching presence. Taken together, phrases such as setting the tone, setting the climate, and creating a welcoming environment attempt to describe the overlap of teaching presence and social presence theorized by Garrison et al., (2000). Instructors may attempt to set the climate in synchronous sessions with

predefined facilitation strategies, yet student actions and behaviors remain relatively influential to the success of any strategy (see Cleveland-Innes & Garrison 2010).

Participants generally expected to provide students technical support with synchronous technology. However, some participants described unexpected challenges such as students crying, students appearing in unexpected attire on screen, or viewing a student's home life in the background. In these instances, instructors discussed their need to be empathetic, to exercise decorum, to respect student privacy, and to do so tactfully as appropriate to the teacher-student relationship. The instructional approaches discussed in these situations align to the concept of pedagogical tact that focuses on the affect, attitude, and improvisation that characterize teachers' engagement in various pedagogical situations (see Friesen & Osguthorpe 2018; Sipman et al., 2019; Van Manen, 2016). In discussing pedagogical tact, Sipman et al., (2019) emphasized the immediacy of teacher action in handling complex situations, and Friesen & Osguthorpe (2018) posited that "students and the conditions of the classroom demand flexibility and improvisation, and no amount of planning and strategy development can prevent this" (p. 3). Given the real-time communication and interaction taking place during synchronous sessions, it became evident that instructors were working to engage with students in a pedagogically tactful manner. Even though the aforementioned facilitation strategies were helpful to some instructors, synchronous sessions were still unpredictable and often required instructor flexibility and improvisation in ways that do not happen in online courses that rely solely on asynchronous communication.

5.3 Perceptions and experiences of using synchronous sessions for community development

Real-time communication via synchronous communication technology provides additional avenues for student-student and student-instructor interaction that may inform classroom community development and may not otherwise be present in traditionally asynchronous online learning environments. Still, participant perceptions were mixed on whether the inclusion of synchronous sessions in traditionally asynchronous online courses was helpful to building classroom community. On one hand, several participants thought that real-time visual communication helped establish rapport, roles, and norms, and inform their knowledge of others which aligns with previous research (see Slagter van Tryon & Bishop, 2009; Yi 2006). On the other hand, several participants thought that their actions and intentions had little to no influence on whether a sense of classroom community started to develop which aligns with previous research (see Oyarzun et al., 2021). In either case, our findings suggest that instructor facilitation of synchronous sessions is not the only way to build community in online courses. More specifically, our findings provide some support to the notion of synchronous lectures being less conducive to classroom community development. Participants felt that other uses of synchronous communication technology may aid community building in online courses (e.g., discussion, feedback, annotation, and check-ins), and each needs further investigation.

6 Limitations

The results from this study should not be generalized to all online instructors. First, the instructors who took part in this study were predominately involved in social sciences disciplines or the field of education; instructors working in different disciplines might have different experiences and perceptions of video-based communication technology. Second, interview data for this study were collected in the summer of 2020 amidst the COVID-19 pandemic. As a result, instructor perceptions of synchronous communication technology use in online courses may have been influenced by feelings of fatigue or other impressions during this unprecedented time. Third, we did not collect enough demographic data on our participants to understand some of the nuances that might impact their perceptions and use; additional research should be conducted on the relationship between certain demographics and perceptions of synchronous communication technology. Future, post-pandemic studies can either confirm or dispute these findings as time, exposure, and comfort with synchronous communication technology may influence results.

7 Conclusion

This study adds to a nascent field of inquiry. Relatively little is known about the communicative aspect of community with synchronous communication technology uses occurring between students and instructors in online courses. Instructor perceptions and experiences using synchronous communication technologies offer multiple perspectives and add to a growing body of research. Thematic analysis revealed that instructors use synchronous communication technology in multiple and various ways in online courses and that the perceived benefits of real-time visual communication outweigh the drawbacks identified—which in turn has implications for online educators and those managing online programs. These individuals likely need to begin thinking about how they can begin to intentionally integrate synchronous-based communication technology in more ways than in the past into their online courses and programs. This analysis also shows that the benefits of nonverbal communication depend on situational factors and how synchronous features are used. More research, as well as faculty development, needs to be conducted on how to maximize the benefits of nonverbal communication when teaching online. The study also concludes that productive and meaningful interaction requires intentional yet flexible facilitation during synchronous sessions, and synchronous sessions can provide a place for community to build and grow but they are not required for community development.

Findings from this study suggest that real-time visual communication may aid in community building. More specifically, imploring intentional yet flexible facilitation strategies during synchronous sessions may assist instructors in developing the teacher-student relationship further by reducing feelings of isolation common among online learners. However, participants in this study recognized the inherent limitations and challenges associated with requiring students to use their webcams during synchronous sessions; they encouraged webcam use as appropriate. Recognizing the difficulty that webcam (non)use nevertheless represents, we contend that such use

could be encouraged as a means toward building classroom community in online courses. Additional research, though, needs to be conducted on the contextual factors that might maximize webcam use. However, we acknowledge that classroom community development can occur in other ways.

The five themes identified and discussed in this study provide several avenues for future research. Future studies could explore the many ways instructors use synchronous communication technology (e.g., feedback and annotation, assessment, check-ins) and the different features (e.g., polling, breakout rooms, screen sharing, whiteboarding) more explicitly. Future studies could also explore differences in gender, age, social equity, and access relative to synchronous communication technology use and community building. Equity and access are pressing problem spaces as the efficiencies afforded by the use of synchronous communication technologies in online settings should not come at the expense of student inclusion. Lastly, future research could explore the influence of synchronous communication technology on the teacher-student relation in online settings relative to community, connectedness, and similar research constructs.

Funding: Not applicable.

Data Availability Not able to share.

Code Availability Not applicable.

Declarations

Conflict of interest We have no known conflicts of interest to disclose.

Ethics approval: Approved Protocol Number: 101-SB20-103.

Consent to participate: Not applicable.

Consent for publication Not applicable.

Competing interests: Not applicable.

References

- Akbaba, Y., & Baskan, F. (2017). How to merge courses via Skype? Lessons from an international blended learning project. *Research in Learning Technology*, 25(1), 1–18. <https://doi.org/10.25304/rlt.v25.1915>
- Dunlap, J. C., & Lowenthal, P. R. (2009). Tweeting the night away: Using Twitter to enhance social presence. *Journal of Information Systems Education*, 20(2), 129–136.
- Lowenthal, P., Dunlap, J., & Snelson, C. (2017). Live synchronous web meetings in asynchronous online courses: Reconceptualizing virtual office hours. *Online Learning Journal*, 21(4), 177–194. <https://doi.org/10.24059/olj.v21i4.1285>

- Richardson, J. C., & Lowenthal, P. (2017). Instructor social presence: Learners' needs and a neglected component of the community of inquiry framework. In A. Whiteside, A. Garrett Dikkers, & K. Swan, (Eds.), *Social presence in online learning: Multiple perspectives on practice and research* (pp. 86–98). Stylus.
- Lowenthal, P. R., & Moore, R. (2020). Exploring student perceptions of Flipgrid in online courses. *Online Learning*, 24(4), 28–41. <https://doi.org/10.24059/olj.v24i4.2335>
- Belt, E. S., & Lowenthal, P. R. (2021). Video use in online and blended courses: A qualitative synthesis. *Distance Education*, 42(3). <https://doi.org/10.1080/01587919.2021.1954882>
- Lowenthal, P. R., West, R. E., Archambault, L., Borup, J., & Belt, E. (2021). Faculty perceptions of using synchronous video-based communication technology. *Online Learning*, 25(4), 49–78. <http://dx.doi.org/10.24059/olj.v25i4.2890>
- Bali, M. (2016). Bringing out the human in synchronous and asynchronous media for learning. In W. Kilgore (Ed.), *Humanizing online teaching and learning*. <https://humanmooc.pressbooks.com/chapter/bringing-out-the-human-in-synchronous-and-asynchronous-media-for-learning/>
- Bali, M., & Meier, B. (2014). March 4). An affinity for asynchronous learning.Hybrid Pedagogy. <https://hybridpedagogy.org/affinity-asynchronous-learning/>
- Baturay, M. H., & Bay, O. F. (2010). The effects of problem-based learning on the classroom community perceptions and achievement of web-based education students. *Computers & Education*, 55(1), 43–52. <https://doi.org/10.1016/j.compedu.2009.12.001>
- Bedenlier, S., Wunder, I., Gläser-Zikuda, M., Kammerl, R., Kopp, B., Ziegler, A., & Händel, M. (2021). “Generation invisible?”. Higher education students’(non) use of webcams in synchronous online learning. *International Journal of Educational Research Open*, 2–2, 1–8. <https://doi.org/10.1016/j.ijedro.2021.100068>
- Beckwith, E. G. (2020). The importance of synchronous sessions in online asynchronous classes. In *Exploring online learning through synchronous and asynchronous instructional methods* (pp. 34–51). IGI Global. <https://doi.org/10.4018/978-1-7998-1622-5.ch002>
- Bolliger, D. U., & Halupa, C. (2018). Online student perceptions of engagement, transactional distance, and outcomes. *Distance Education*, 39(3), 299–316. <https://doi.org/10.1080/01587919.2018.1476845>
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. National Academy Press
- Brown, A. L., & Campione, J. C. (1994). Guided discovery in a community of learners. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 229–272). The MIT Press
- Brown, B., & Eaton, S. E. (2020). Using a Community of Inquiry lens to examine synchronous online discussions in graduate courses. In L. Wilton (Ed.), *Handbook of research on online discussion-based teaching methods* (pp. 229–262). IGI Global. <https://doi.org/10.4018/978-1-7998-3292-8.ch010>
- Brown, B., Schroeder, M., & Eaton, S. E. (2016). Designing synchronous online interactions and discussions. In W. A. Takeuchi, A. P. Babb, & J. Lock (Eds.), *IDEAS 2016: Designing for innovation selected proceedings* (pp. 51–60). University of Calgary <https://doi.org/10.11575/PRISM/5260>
- Clark, C., Strudler, N., & Grove, K. (2015). Comparing asynchronous and synchronous video vs. text based discussions in an online teacher education course. *Online Learning*, 19(3), 48–69. <https://doi.org/10.24059/olj.v19i3.510>
- Cleveland-Innes, M., & Garrison, R. (2010). The role of learner in an online Community of Inquiry: Instructor support for first-time online learners. In N. Karacapilidis (Ed.), *Web-based learning solutions for communities of practice: Developing virtual environments for social and pedagogical advancement* (pp. 167–184). IGI Global. <https://doi.org/10.4018/978-1-60566-711-9.ch013>
- Cooner, T. S. (2010). Creating opportunities for students in large cohorts to reflect in and on practice: Lessons learnt from a formative evaluation of students' experiences of a technology-enhanced blended learning design. *British Journal of Educational Technology*, 41(2), 271–286. <https://doi.org/10.1111/j.1467-8535.2009.00933.x>
- Dennen, V. P., Word, K. D., & Arslan, Ö. (2021). Webcams at work: A survey of learning professionals' practices and perceptions. http://purl.flvc.org/fsu/fd/FSU_libsubv1_scholarship_submission_1621457890_5284fd79
- DeWaard, H. J. (2016). Using video to humanize online instruction. In W. Kilgore (Ed.) *Humanizing Online Teaching and Learning*. <https://humanmooc.pressbooks.com/chapter/using-video-to-humanize-online-instruction/>

- Dymont, J., Stone, C., & Milthorpe, N. (2020). Beyond busy work: rethinking the measurement of online student engagement. *Higher Education Research & Development*, 39(7), 1440–1453. <https://doi.org/10.1080/07294360.2020.1732879>
- Ezra, O., Cohen, A., Bronshtein, A., Gabbay, H., & Baruth, O. (2021). Equity factors during the COVID-19 pandemic: Difficulties in emergency remote teaching (ert) through online learning. *Education and Information Technologies*, 26, 7657–7681. <https://doi.org/10.1007/s10639-021-10632-x>
- Francescucci, A., & Foster, M. (2013). The VIRI (virtual, interactive, real-time, instructor-led) classroom: The impact of blended synchronous online courses on student performance, engagement, and satisfaction. *Canadian Journal of Higher Education*, 43(3), 78–91. <https://doi.org/10.47678/cjhe.v43i3.184676>
- Friesen, N., & Osguthorpe, R. (2018). Tact and the pedagogical triangle: The authenticity of teachers in relation. *Teaching and Teacher Education*, 70, 255–264. <https://doi.org/10.1016/j.tate.2017.11.023>
- Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, 11(1), 61–72. <https://doi.org/10.24059/olj.v11i1.1737>
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the Community of Inquiry framework: A retrospective. *The Internet and Higher Education*, 13(1–2), 5–9. <https://doi.org/10.1016/j.iheduc.2009.10.003>
- Garrison, D. R., & Arbaugh, J. B. (2007). Researching the Community of Inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, 10(3), 157–172. <https://doi.org/10.1016/j.iheduc.2007.04.001>
- Gherheș, V., Șimon, S., & Para, I. (2021). Analysing students' reasons for keeping their webcams on or off during online classes. *Sustainability*, 13(6), 1–13. <https://doi.org/10.3390/su13063203>
- Henriksen, D., Creely, E., & Henderson, M. (2020). Folk pedagogies for teacher transitions: Approaches to synchronous online learning in the wake of COVID-19. *Journal of Technology and Teacher Education*, 28(2), 201–209
- Hoffman, E. (2019). The centrality of teaching presence: Using multiple modes to facilitate collaborative active engagement in a synchronous teacher online learning community. *Journal of Interactive Learning Research*, 30(2), 107–145
- Hogan, R., & Devi, M. (2019). A synchronous pedagogy to improve online student success. *International Journal of Online Pedagogy and Course Design*, 9(3), 61–77. <https://doi.org/10.4018/IJOPCD.2019070105>
- Hrastinski, S. (2008). Asynchronous and synchronous e-learning. A study of asynchronous and synchronous e-learning methods discovered that each supports different purposes. *Educause Quarterly*, 4, 51–55
- Huang, X. S., & Hsiao, E. L. (2012). Synchronous and asynchronous communication in an online environment: Faculty experiences and perceptions. *Quarterly Review of Distance Education*, 13(1), 15–30
- Izmirli, S., & Izmirli, O. S. (2019). Social presence techniques and strategies in a blended course: Student satisfaction and suggestions. *Educational Policy Analysis and Strategic Research*, 14(4), 201–217. <https://doi.org/10.29329/epasr.2019.220.12>
- Jung, H., & Brady, C. (2020). Maintaining rich dialogic interactions in the transition to synchronous online learning. *Information and Learning Sciences*, 121(5/6), 391–400. <https://doi.org/10.1108/ils-04-2020-0096>
- Karal, H., Çebi, A., & Turgut, Y. E. (2011). Live authority in the classroom in video conference-based synchronous distance education: The teaching assistant. *Turkish Online Journal of Distance Education*, 11(3), 50–62
- Kozar, O. (2016). Perceptions of webcam use by experienced online teachers and learners: A seeming disconnect between research and practice. *Computer Assisted Language Learning*, 29(4), 779–789. <https://doi.org/10.1080/09588221.2015.1061021>
- Lin, X., & Gao, L. (2020). Students' sense of community and perspectives of taking synchronous and asynchronous online courses. *Asian Journal of Distance Education*, 15(1), 169–179. <https://doi.org/10.5281/zenodo.3881614>
- Lincoln, Y. S., & Guba, E. G. (1985). Establishing trustworthiness. *Naturalistic Inquiry* (pp. 289–331). Sage

- Luke, K. (2021). Twelve tips for using synchronous virtual classroom technologies in medical education. *MedEdPublish*, 10(1), 1–16. <https://doi.org/10.15694/mep.2021.000066.1>
- Manzoor, R., & Bart, W. (2021). Expanding equitable access or exacerbating existing barriers?: Reexamining online learning for vulnerable student populations. In R. Y. Chan, K. Bista, & R. M. Allen (Eds.). *Online teaching and learning in higher education during COVID-19* (1st ed., pp. 107–119). Routledge. <https://doi.org/10.4324/9781003125921>
- Martin, F., Ahlgrim-Delzell, L., & Budhrani, K. (2017). Systematic review of two decades (1995 to 2014) of research on synchronous online learning. *American Journal of Distance Education*, 31(1), 3–19. <https://doi.org/10.1016/j.compedu.2020.104009>
- Martin, F., Budhrani, K., & Wang, C. (2019). Examining faculty perception of their readiness to teach online. *Online Learning*, 23(3), 97–119. <https://doi.org/10.24059/olj.v23i3.1555>
- Martin, F., Parker, M., & Allred, B. (2013). A case study on the adoption and use of synchronous virtual classrooms. *Electronic Journal of E-learning*, 11(2), 124–138
- Martin, F., Sun, T., Turk, M., & Ritzhaupt, A. D. (2021). A meta-analysis on the effects of synchronous online learning on cognitive and affective educational outcomes. *International Review of Research in Open and Distributed Learning*, 22(3), 205–242. <https://doi.org/10.19173/irrodl.v22i3.5263>
- Motteram, G. (2001). The role of synchronous communication in fully distance education. *Australasian Journal of Educational Technology*, 17(2), 131–149. <https://doi.org/10.14742/ajet.1787>
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1–13. <https://doi.org/10.1177/1609406917733847>
- Olson, J., & McCracken, F. (2015). Is it worth the effort? The impact of incorporating synchronous lectures into an online course. *Online Learning Journal*, 19(2), 1–12. <https://doi.org/10.24059/olj.v19i2.499>
- Oyarzun, B., Hancock, C., Salas, S., & Martin, F. (2021). Synchronous meetings, community of inquiry, COVID-19, and online graduate teacher education. *Journal of Digital Learning in Teacher Education*, 37(2), 111–127. <https://doi.org/10.1080/21532974.2021.1890653>
- Oztok, M., Zingaro, D., Brett, C., & Hewitt, J. (2013). Exploring asynchronous and synchronous tool use in online courses. *Computers & Education*, 60(1), 87–94. <https://doi.org/10.1016/j.compedu.2012.08.007>
- Palloff, R. M., & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for the online classroom*. Jossey-Bass
- Pardasani, M., Goldkind, L., Heyman, J. C., & Cross-Denny, B. (2012). How much does the distance in distance education matter? Our students speak. *Social Work Education*, 31(4), 406–421. <https://doi.org/10.1080/02615479.2011.573547>
- Parker, N., Mahler, B. P., & Edwards, M. (2021). Humanizing online learning experiences. *Journal of Educators Online*, 18(2), 119–129
- Perry, D., & Steck, A. (2019). Changes in faculty perceptions about online instruction: Comparison of faculty groups from 2002 and 2016. *Journal of Educators Online*, 16(2), <https://doi.org/10.9743/jeo.2019.16.2.8>
- Phelps, A., & Vlachopoulos, D. (2020). Successful transition to synchronous learning environments in distance education: A research on entry-level synchronous facilitator competencies. *Education and Information Technologies*, 25, 1511–1527. <https://doi.org/10.1007/s10639-019-09989-x>
- Rajab, M. H., & Soheib, M. (2021). Privacy concerns over the use of webcams in online medical education during the COVID-19 pandemic. *Cureus*, 13(2), 1–8. <https://doi.org/10.7759/cureus.13536>
- Reinholz, D. L., Stone-Johnstone, A., White, I., Sianez Jr, L. M., & Shah, N. (2020). A pandemic crash course: Learning to teach equitably in synchronous online classes. *CBE—Life Sciences Education*, 19(4), 1–13. <https://doi.org/10.1187/cbe.20-06-0126>
- Richardson, J. C., Besser, E., Koehler, A., Lim, J., & Strait, M. (2016). Instructors' perceptions of instructor presence in online learning environments. *International Review of Research in Open and Distributed Learning*, 17(4), 82–104. <https://doi.org/10.19173/irrodl.v17i4.2330>
- Ritter, C., Polnick, B., Fink, I. I., R., & Oescher, J. (2010). Classroom learning communities in educational leadership: A comparison study of three delivery options. *The Internet and Higher Education*, 13(1–2), 96–100. <https://doi.org/10.1016/j.iheduc.2009.11.005>
- Rockinson-Szapkiw, A. (2009). *The impact of asynchronous and synchronous instruction and discussion on cognitive presence, social presence, teaching presence, and learning* (Order No. 3370135) [Doctoral dissertation, Regent University]. ProQuest Dissertations Publishing
- Rogoff, B. (1994). Developing understanding of the idea of communities of learners. *Mind culture and activity*, 1(4), 209–229

- Rovai, A. P. (2001). Building classroom community at a distance: A case study. *Educational Technology Research and Development*, 49(4), 33–48. <https://doi.org/10.1007/bf02504946>
- Rovai, A. P. (2002a). Building sense of community at a distance. *The International Review of Research in Open and Distributed Learning*, 3(1), <https://doi.org/10.19173/irrodl.v3i1.79>
- Rovai, A. P. (2002b). Development of an instrument to measure classroom community. *The Internet and Higher Education*, 5(3), 197–211. [https://doi.org/10.1016/s1096-7516\(02\)00102-1](https://doi.org/10.1016/s1096-7516(02)00102-1)
- Rovai, A. P. (2002c). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education*, 5(4), 319–332. [https://doi.org/10.1016/s1096-7516\(02\)00130-6](https://doi.org/10.1016/s1096-7516(02)00130-6)
- Rovai, A. P. (2003). The relationships of communicator style, personality-based learning style, and classroom community among online graduate students. *The Internet and Higher Education*, 6(4), 347–363. <https://doi.org/10.1016/j.iheeduc.2003.07.004>
- Rovai, A. P., Wighting, M. J., & Lucking, R. (2004). The classroom and school community inventory: Development, refinement, and validation of a self-report measure for educational research. *The Internet and Higher Education*, 7(4), 263–280. <https://doi.org/10.1016/j.iheeduc.2004.09.001>
- Rovai, A. P., & Wighting, M. J. (2005). Feelings of alienation and community among higher education students in a virtual classroom. *The Internet and Higher Education*, 8(2), 97–110. <https://doi.org/10.1016/j.iheeduc.2005.03.001>
- Saldaña, J. (2015). *The coding manual for qualitative researchers*. Sage
- Shea, P. (2006). A study of students' sense of learning community in online environments. *Journal of Asynchronous Learning Networks*, 10(1), 35–44. <https://doi.org/10.24059/olj.v10i1.1774>
- Shea, P., & Bidjerano, T. (2009). Community of Inquiry as a theoretical framework to foster “epistemic engagement” and “cognitive presence” in online education. *Computers & Education*, 52(3), 543–553. <https://doi.org/10.1016/j.compedu.2008.10.007>
- Shea, P., Li, C. S., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *The Internet and Higher Education*, 9(3), 175–190. <https://doi.org/10.1016/j.iheeduc.2006.06.005>
- Shockley, K. M., Gabriel, A. S., Robertson, D., Rosen, C. C., Chawla, N., Ganster, M. L., & Ezerins, M. E. (2021). The fatiguing effects of camera use in virtual meetings: A within-person field experiment. *Journal of Applied Psychology*, 106(8), 1137. <https://doi.org/10.1037/apl0000948>
- Shoepe, T. C., McManus, J. F., August, S. E., Mattos, N. L., Vollucci, T. C., & Sparks, P. R. (2020). Instructor prompts and student engagement in synchronous online nutrition classes. *American Journal of Distance Education*, 34(3), 194–210. <https://doi.org/10.1080/08923647.2020.1726166>
- Sipman, G., Thölke, J., Martens, R., & McKenney, S. (2019). The role of intuition in pedagogical tact: Educator views. *British Educational Research Journal*, 45(6), 1186–1202. <https://doi.org/10.1002/berj.3557>
- Skylar, A. A. (2009). A comparison of asynchronous online text-based lectures and synchronous interactive web conferencing lectures. *Issues in Teacher Education*, 18(2), 69–84
- Slagter van Tryon, P. J., & Bishop, M. J. (2009). Theoretical foundations for enhancing social connectedness in online learning environments. *Distance Education*, 30(3), 291–315. <https://doi.org/10.1080/01587910903236312>
- Stein, D. S., Wanstreet, C. E., Glazer, H. R., Engle, C. L., Harris, R. A., Johnston, S. M., Simons, M. R., & Trinko, L. A. (2007). Creating shared understanding through chats in a community of inquiry. *The Internet and Higher Education*, 10(2), 103–115. <https://doi.org/10.1016/j.iheeduc.2007.02.002>
- Stewart, W. (2021). A global crash-course in teaching and learning online: A thematic review of empirical Emergency Remote Teaching (ERT) studies in higher education during Year 1 of COVID-19. *Open Praxis*, 13(1), 89–102. <https://doi.org/10.5944/openpraxis.13.1.1177>
- Themelis, C., & Sime, J. A. (2020). From video-conferencing to holoportation and haptics: How emerging technologies can enhance presence in online education?. In S. Yu, M. Ally, A. Tsinakos (Eds.) *Emerging technologies and pedagogies in the curriculum. Bridging human and machine: Future education with intelligence* (pp. 261–276). Springer. https://doi.org/10.1007/978-981-15-0618-5_16
- Van Manen, M. (2016). *Pedagogical tact: Knowing what to do when you don't know what to do*. Routledge
- Wang, C. H. (2005). Questioning skills facilitate online synchronous discussions. *Journal of Computer Assisted Learning*, 21(4), 303–313. <https://doi.org/10.1111/j.1365-2729.2005.00138.x>
- Wang, Q., & Huang, C. (2018). Pedagogical, social and technical designs of a blended synchronous learning environment. *British Journal of Educational Technology*, 49(3), 451–462. <https://doi.org/10.1111/bjet.12558>

- West, R. E., & Borup, J. (2021a). *Teaching with asynchronous video*. EdTech Books. https://edtechbooks.org/asynchronous_video
- West, R., & Borup, J. (2021b). The power of asynchronous video. EDUCAUSE Review. <https://er.educause.edu/blogs/2021/2/the-power-of-asynchronous-video>
- Wickersham, L., Espinoza, S., & Davis, J. (2007). Teaching online: Three perspectives, three approaches. *AACE Journal*, 15(2), 197–211
- Yi, J. (2006). Externalization of tacit knowledge in online environments. *International Journal on E-learning*, 5(4), 663–674
- Yilmaz, F. G. K. (2017). Social presence and transactional distance as an antecedent to knowledge sharing in virtual learning communities. *Journal of Educational Computing Research*, 55(6), 844–864. <https://doi.org/10.1177/0735633116688319>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

Authors and Affiliations

Eric S. Belt¹ · Patrick R. Lowenthal²

✉ Eric S. Belt
eric.belt@umaryland.edu

Patrick R. Lowenthal
patricklowenthal@boisestate.edu

¹ Faculty Center for Teaching and Learning, University of Maryland Baltimore, 620 W. Lexington St, 21201 Baltimore, MD, USA

² Educational Technology, Boise State University, 1910 University Dr, Boise, Idaho, 83702 Idaho, USA