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Instructional communication competence and instructor social presence: Enhancing teaching and learning in the online environment

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Instructional communication competence and instructor social presence: Enhancing teaching and learning in the online environment

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Editorial: Instructional communication competence and instructor social presence: enhancing teaching and learning in the online environment

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Editorial on the Research Topic
Instructional communication competence and instructor social presence: enhancing teaching and learning in the online environment

Introduction

Research since the early 2000s has pointed to the fast pace at which new technologies are penetrating the academy and thus increasing the demand for online courses and programs (Allen and Seaman, 2007; Schuster and Finkelstein, 2008; Mansbach and Austin, 2018). In Spring 2020, the COVID-19 pandemic unexpectedly resulted in yet more widespread migration from in-seat classrooms to online education at all grade levels, drastically changing higher education (Aoun, 2020). From the elementary school level through and including higher education, e-teaching and learning has quickly become commonplace with digital platforms taking the place of in-person desks and chairs. An array of issues related to online teaching and learning (OTL) spawned a dynamic body of scholarship in various academic disciplines, intent on examining both the challenges and opportunities inherent in online education as a pedagogical innovation (Morreale and Westwick, 2020; Scherer et al., 2021).

Because of their disciplinary subject matter, scholars in two areas of inquiry, Educational Technology and Instructional Communication, took particular interest in examining online teaching and learning. *Educational Technology* is defined as the study and ethical application of theory, research, and best practices to advance knowledge as well as mediate and improve learning and performance through the strategic design, management and implementation of learning and instructional processes and resources (Association for Educational Communications Technology, 2024). *Instructional Communication* refers to

the study of the human communication process across all learning situations independent of subject matter, grade level, or the learning environment (Myers, 2018). Two of the editors of this Research Topic represent the field of educational technology, in particular the study of "instructor social presence" or more simply "social presence." The other two editors represent the field of instructional communication, which studies the concept of "instructor immediacy." The substance and call for submissions to this Research Topic emerged from collaborative discussions of these editors about their approaches to research about presence and immediacy, particularly in the online environment. The call listed specific topics for contributors and manuscripts including:

1. Critical challenges and unique opportunities in the online environment
2. Discipline-specific approaches to online pedagogy
3. Strategies for instructors' transitioning from in-seat to online education
4. Best practices for designing and developing online courses
5. Instructional methods for engaging students in online courses
6. Methods for assessing student learning in the online environment

The call resulted in 13 submitted abstracts, with 12 invited to submit full manuscripts; 17 full manuscripts were submitted and reviewed by the four editors and by invited external reviewers; and 13 were accepted for publication, for an acceptance rate of 76.47%. Using qualitative thematic analysis (Glaser and Strauss, 1999), the 13 articles clustered conceptually into three topical areas: *Social Presence, Instructional Communication Competence,* and *Other Influencing Factors*. Although used in different ways over the years, *social presence* is generally defined as a sense that one is a "real" person and "there" (Lowenthal, 2010). *Instructional communication competence* is the teacher-instructor's motivation, knowledge, and skill to select, enact, and evaluate effective and appropriate, verbal and non-verbal, interpersonal and instructional messages, filtered by student-learner development and reciprocal feedback (Worley et al., 2007).

Following is a brief commentary about each of the 13 articles that constitute this Research Topic, with particular thanks to the contributing scholars.

Social presence

Meaningful Connection in Virtual Classrooms: Graduate Students' Perspectives on Effective Instructor Presence in Blended Courses

> McNeill and Bushaala surveyed 206 college instructors about their knowledge of and attitudes toward online teaching and computer-mediated communication apprehension (CMCA). Survey results suggest instructors' CMCA is a significant negative predictor of instructors' communication satisfaction with online student interactions, job satisfaction, and motivation to teach online.

The i-SUN Process to Use Social Learning Analytics: A Conceptual Framework to Research Online Learning Interaction Supported by Social Presence

> Castellanos-Reyes et al. provide a conceptual framework to make network analysis in education (SLA) accessible for researchers investigating learners' interactions in the online environment. Derived from network theory and online learning literature, the proposed framework has three main steps: interaction selection, social presence alignment, unit of analysis and network type, and network statistical analysis tests.

Toward a Comprehensive Framework of Social Presence for Online, Hybrid, and Blended Learning

> Kreijns et al. present a framework that combines social information processing, construal level, and telepresence theories to explain social presence. That framework suggests social presence is shaped by the messages we receive, our psychological distance from others, and our sense of being in a shared physical or virtual space.

Instructional communication competence

Challenges and Instructor Strategies for Transitioning to Online Learning During and After the COVID-19 Pandemic: A Review of Literature

> Richards and Thompson pointed to a need for more multidisciplinary and international discussions and examinations of online education pedagogy that bridge disciplinary boundaries. To respond to that need, they provide a literature review about challenges and instructor strategies for online learning transitions during and after the COVID-19 pandemic.

Faculty Computer-Mediated Communication Apprehension During Shift to Emergency Remote Teaching: Implications for Teacher-Student Interactions and Faculty Organizational Outcomes

> Farris et al. investigated whether instructors' computer-mediated communication apprehension (CMCA) would predict their job satisfaction, motivation, and retention, regardless of their preparation for and perceived usefulness of online teaching modalities ($N = 204$). The findings indicate instructor CMCA is a strong negative predictor of those three outcomes.

Graduate Teaching Assistants' Challenges, Conflicts, and Strategies for Navigating COVID-19

> Acheme and Biwa found that graduate teaching assistants (GTAs) experienced challenges with (a) online instruction, (b) students, and (c) personal challenges. The GTAs also

reported they (a) employed empathy and flexibility, and (b) created boundaries and consulted others about conflict management strategies.

Wait, I Can't Do That Anymore!: Pandemic Teacher Immediacy in College Communication Classes

Chatham-Carpenter and Malone explored how communication instructors adapted their teaching strategies to maintain immediacy with students during the COVID-19 pandemic. Interviews with 15 instructors revealed efforts to employ traditional nonverbal immediacy behaviors (e.g., eye contact and facial expressions) and verbal strategies (e.g., inviting participation and providing feedback).

Other influencing factors

Distance Learning and Face-to-Face Learning in PBL Course During Pandemic in Pathophysiology Discussion

Chen et al. surveyed the learning effects of face-to-face (FF) and distance learning (DL) in two medical (problem-based-learning) PBL courses. Tutors and students graded both courses for five key areas (participation, communication, preparation, critical thinking, and group skills). Results showed reduced participation, communication, and group skills in DL classes compared to FF classes.

Exploring Undergraduates' Perceptions of and Engagement in an AI-Enhanced Online Course

Sadegh-Zadeh et al. explored 35 students' perceptions of synchronous online learning that occurred in an AI-enhanced online course delivered using MS Teams. Students reported that Microsoft Teams motivated them to participate more actively, leading to a better comprehension of course materials and AI-enhanced features within the Teams platform further augmented the online learning experience.

Having it Both Ways: Learning Communication Skills in Face-to-Face and Online Environments

Eklund and Isotalus examined students' perceptions of a communication skills course that transitioned from face-to-face to online during the COVID-19 pandemic. Five themes emerged from thematic analysis of open-ended responses: positive and neutral perceptions of the course, challenges in online communication, perceptions of public speaking, and feedback effectiveness. Findings suggest that while students valued the online format for its organization and peer connections, they faced difficulties with conversations, non-verbal cues, and differences in online public speaking.

'Hold the Course(s)!' A Qualitative Interview Study of the Impact of Pandemic-Triggered Contact Restrictions on Online Instruction in Community-Based Family Medicine Teaching

Steffen et al. conducted 12 interviews in 2019 and 2020 focused on pandemic-triggered contact restrictions on online instruction in family medicine courses. A six-step model for the digital transformation of family medicine teaching was developed: "The calm before the storm," "The storm hits," "All hands on deck," "Adrift," "Reset course," and "The silver lining."

Low-Income Transfer Engineering Undergraduates' Benefits and Costs of Online Learning During COVID-19

Lee et al. examined how low-income transfer engineering undergraduate students perceived benefits and costs of online learning during the pandemic. The study found the benefits and costs related to (1) the learning environment, i.e., self-regulation skills, saving time, saving money, closer to the family, and working at home; (2) the format of instruction, i.e., studying at own pace and easier to obtain a better grade; and (3) external factors, i.e., housing concerns and financial issues.

Time and Day: Trends in Student Access to Online Asynchronous Courses in Communication Demonstrate Time Poverty in Action

LeBlanc III analyzed data from the learning management system to examine student access patterns in online asynchronous courses. Data from 1,201 students across 31 course sections revealed significant curvilinear trends in access times by day and week, indicating students tailor their study schedules around personal commitments. The results challenge the feasibility of synchronous courses for students and highlight the need f to consider student time constraints when teaching online.

Author contributions

SM: Writing—review & editing, Supervision, Project administration, Formal analysis, Conceptualization. PL: Writing—review & editing, Supervision, Project administration, Formal analysis, Conceptualization. JT: Writing—review & editing, Supervision, Project administration, Formal analysis, Conceptualization. LO: Writing—review & editing, Supervision, Project administration, Formal analysis, Conceptualization.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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'Hold the course(s)!' – a qualitative interview study of the impact of pandemic-triggered contact restrictions on online instruction in community-based family medicine teaching

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The COVID-19 pandemic has been identified as a catalyst for the digitalization of medical education. Less is known about the specific impact of the pandemic on decentralized, community-based education, such as in General Practitioner practices. The aim of this study is to understand the impact of the digital transformation process, triggered by the COVID-19 pandemic. As, family medicine courses involve both university-based and community-based teaching, this study focuses the mode and quality of instruction and instructors in family medicine teaching. A qualitative interview study was conducted. The participants ($N = 12$) of a multi-perspective Quality Circle in family medicine teaching were interviewed twice: first, in 2019, about digitalization in family medicine teaching in Tübingen, Germany, not yet aware of the global changes and local transformation that would take place shortly thereafter. Second, in a follow-up interview in 2020 about the transition process and digitalization following the impact of contact restrictions during the pandemic. Grounded Theory was used as a qualitative research approach to analyze the complex processes surrounding this transformation. By analyzing the interviews with various stakeholders of community and university-based teaching, a model for the digital transformation process of family medicine teaching at the University of Tübingen in response to an external stimulus (the pandemic) was developed. It involves six chronological steps: "The calm before the storm," "The storm hits," "All hands on deck," "Adrift," "Reset course," and "The silver lining." This model seeks to understand the process of digital transformation and its impact on the teaching institution (medical faculty of the University of Tübingen, Institute for General Practice and Interprofessional Health Care) and instructors from an integrated perspective and thereby critically revisits prior concepts and opinions on the digitalization of medical teaching. Insights gained are presented as key messages.

KEYWORDS

digital transformation, family medicine teaching, grounded theory, medical education, online education, online instruction, pandemic

Introduction

With COVID-19's effects on nearly all aspects of society, the pandemic's impact on medical teaching was not in the headlines. However, profound effects on medical teaching were observed worldwide as contact restrictions in many countries led to a transition from in-seat teaching to mostly online instruction (1–3).

Already prior to the pandemic, the use of online instruction in medical education had become more common (4, 5). In most universities in Germany, some online instruction had been implemented before the COVID-19 pandemic but was mostly restricted to individual pilot projects and thus heterogeneous (6). Among other reasons, lecturers' lack of experience with online instruction methods and uncertainties regarding data protection regulations played a role in the nationwide low level of implementation (7, 8).

With the transformation processes during the COVID-19, roles and responsibilities of medical educators (General Practitioners (GP) teachers, other teachers employed at the university for teaching, teaching coordinators, and supporting staff) changed to include new aspects, such as moderating video conferences, and creating or distributing meaningful digital content, such as podcasts (9). Various authors reported their initial concerns were reduced after using digital formats (10–12). Other concerns, such as the difficulty of achieving meaningful feedback without face-to-face contact, were confirmed (13–15).

These concerns address key elements of instructional communication and teaching competencies, which include both the subject knowledge and the ability to communicate that knowledge engagingly. Being able to elicit attentiveness, emotional engagement, and being able to process feedback given by students in the ensuing communication loop are further competencies of successful teachers (16, 17).

The overall experience of online instruction was described as enriching, and many aspects were found to be worthwhile maintaining to complement in-seat teaching (18–24). Concerning lecturers' attitudes at a later stage in the pandemic, Dorfsman et al. identified three types: The enthusiasts who are interested in long-term change but do not get into specifics, the experienced ones who have substantially changed their teaching styles and plan to maintain online instruction in the future, and the critics who have adapted to the circumstances but yearn to return to the "normal" pre-COVID-19 teaching situation (25).

Students found that online instruction had the potential to support individual learning and promoted learner engagement (26–28). They evaluated the digital formats positively for the transfer of theoretical knowledge (29, 30) while also pointing out deficiencies in practical content and applicability to clinical practice (14, 15). The effects of online instruction on the learning process were rated overall as beneficial (31, 32). During the COVID-19 pandemic, the understanding of medical students' roles changed from the predominant role of learners to that of medical providers (33). As a result, students in their final years of schooling were integrated more quickly and intensively into the clinical routine. At the same time, less advanced students were denied access to practical training (2, 34). The burden on many medical students increased, especially in cases of pre-existing mental illnesses (35, 36) or with financial hardships (37–40).

Digitalization in community-based teaching in family medicine – a blank spot on the map

Most research related to the digital transformation of teaching has focused on university-based teaching. Less attention has been paid to the digitalization of teaching in decentralized or community-based settings (e.g., clerkships in outpatient GP practices) (41) during the pandemic. Teaching in these settings presents complex challenges due to the independence of such environments from university-based teaching, the incorporation of various stakeholders, and the complex social interaction with those stakeholders (42–44). Before the pandemic, digitalization of teaching and quality management of decentral teaching formats in Germany had been identified as two major areas in need of improvement (45, 46). During the pandemic, only a few examples of online instruction in family medicine were published in Germany, such as the blended learning approach described by the family medicine department in Homburg (24, 47, 48).

In summary, little is known about how the transformation of digitalization during the pandemic affected community-based teaching, instructional communication and communication between university-based medical educators and community-based GP teachers. An integrated analysis of the perspectives of said stakeholders on the digitalization of medical teaching, especially under externally imposed restrictions, has hitherto not been considered in this area of interest.

Aim of the study

The aim of the study is to derive a model for the digital transformation of family medicine teaching based on the experiences of stakeholders before and after the pandemic. Based on our model and lessons learned during the pandemic, the study aims to describe how to approach the digital transformation of community-based teaching formats in family medicine teaching.

Methods

This qualitative interview study took place in two phases during 2019 (before the pandemic and contact restrictions) and 2020 (during the first semester under COVID-19 restrictions) at the Institute for General Practice and Interprofessional Health Care at the University of Tübingen in southern Germany. It follows the Standards for Reporting Qualitative Research (49).

Setting

The Institute for General Practice and Interprofessional Health Care in Tübingen is part of a university hospital system in southern Germany. It cooperates with about 250 family medicine teaching practices located within a radius of 70 km around the city of Tübingen. During the first two weeks of each semester, 160 students complete a clinical clerkship in one of those practices (50). Before the COVID-19 pandemic, family medicine teaching in Tübingen was predominantly

in-seat. The first online instruction formats had been planned prior to the pandemic and were to be piloted in the summer semester of 2020. The COVID-19 pandemic led to the following drastic restrictions on teaching: There was a general obligation to wear a mask. Bedside teaching was dropped. Group sizes were severely restricted due to distancing regulations. Consequently, many courses had to be digitized much sooner than originally planned, starting with the summer semester of 2020. The family medicine clinical clerkship in the community GP teaching practices was canceled. Other formats, like a physical examination course at the university, could be offered by using blended learning, simulation patients, and robust hygiene measures.

Study design and data collection

The first round of interviews took place between October 16th, 2019 and November 15th, 2019 in the context of a study that examined the organization and function of a Quality Circle (QC) for family medicine teaching in Tübingen. A QC is a format in which participants meet regularly to discuss challenges and potential solutions related to a particular professional topic. The QC for family medicine teaching in Tübingen consists of relevant stakeholders in family medicine teaching, both from the university and community-based practice settings. In the QC study, individuals were interviewed about the structure and function of the QC in the context of an observed session on the digitalization of medical teaching at the university and in communities. The number of interview partners for the interview was limited by the number of participants in the QC ($N = 13$). All members of the QC except for MTS, who led the interviews ($N = 12$, 100%) agreed to participate in the first interview in 2019.

Starting in the summer semester of 2020, in-seat teaching had to be replaced almost entirely by online teaching due to the COVID-19 pandemic. To conduct the follow-up interviews on the transformation process in this changed situation, the interviewees from the first phase were contacted again. All but one of the prior interview partners ($N = 11$, 92%) took part in the follow-up interviews at the end of the first digital semester under COVID-19 restrictions from August 3rd, 2020 to October 3rd, 2020.

After providing informed consent to participate in the study, QC members were interviewed individually either in person or by telephone in the first interview phase. In the second interview phase all interviews were done by telephone due to contact restrictions. MTS conducted all interviews. A semi-structured interview outline was used for both rounds of interviews. The first interview of each phase was considered a pilot interview. It was reviewed by the author team regarding interview style, structure, and contents, leading to minor changes to the interview outline. Among other topics, such as the work processes and methods of the QC, the first interview outline explored the digitalization of family medicine. A translated version from the original German is included as a supplement (see Supplementary Table S1). In the second interview phase, the outline was expanded with questions about processes surrounding the online instruction that was taking place (for the translated outline, see Supplementary Table S2). The interviews were recorded using a digital audio recorder (Tascam DR-22WN), transcribed verbatim, and depersonalized using pseudonyms. During both interview phases the transcripts revealed a thematic saturation after nine (first phase) and ten interviews (second phase) concerning the digitization and transformation process. At that point, new codes no longer had to be added to the coding system but rather the data could be integrated into the existing coding scheme.

Data analysis

The transcripts were analyzed with a Grounded Theory (GT) approach using the MAXQDA Software (VERBI Software GmbH, Berlin). Analysis was performed in three consecutive steps, as proposed by Strauss and Corbin (51). We chose GT as a methodological approach due to the lack of pre-existing literature and our aim of exploring the transition processes with open minds rather than preformed judgments.

The analysis process took place in three consecutive steps, beginning with open coding, in which the data material was broken into separated parts, carefully coded, and sorted into categories (51). The coding frame was developed on the basis of the first two interviews of the second interview phase. The coding frame was then discussed, adapted, and refined by RK and MTS. This coding framework was then used by MTS to code all remaining 21 interviews from both interview phases. After a break of at least four weeks, the interviews were coded again by MTS to ensure a high-density model. Discrepancies in coding processes were discussed within the author team and resolved through consensus building.

In the subsequent axial coding, cross-connections were formed between the categories using the proposed coding paradigm by Strauss and Corbin (51). Some important aspects in the transformation process were only mentioned retrospectively in the second interview phase. GT allows this to be included in the analysis, providing a missing consideration for the broader implementation of digital formats. In the last step, selective coding, the resulting axial codes were connected to each other in a more abstract way to encompass the entire data material in a core variable (51).

Within the research process, intermediate results were presented and discussed multiple times in an interdisciplinary research group workshop for qualitative methods led by a sociologist and qualitative researcher. The results were presented at a conference attended by GP teachers and university representatives and discussed there in the context of a peer-check (52). During these discussions among the authors and with colleagues experiencing digital transformation at other universities, a depiction with images and symbols from the nautical world arose and was deemed descriptive and illustrative. The following analysis refers to such images and metaphors where appropriate.

Research team and reflection

Both the relationship between the interviewee and the researcher and the researcher's engagement with the material may affect the analysis. Therefore, each author's background will shortly be outlined (53): MTS is an assistant physician, a participant of the QC since 2019, and she wrote her dissertation on the QC. During the time of the interviews, MTS was a medical student. HF is a GP teacher with working experience in both German and international outpatient settings. SJ is a GP and head of the Institute of General Practice and

Interprofessional Health Care at the University of Tübingen. RK is a GP and teaching coordinator, founder of the QC, and its moderator. As teaching coordinator, he was responsible for the digital transformation process at the Institute in Tübingen during the pandemic.

Results

Interview partners and population

The interview duration was 22 min, on average. The following Table 1 shows the characteristics of the interview partners sorted by gender, age, and profession. To ensure the anonymity of this small sample, the data is sorted separately.

Open coding

Table 2 presents the main categories resulting from open coding: Perception of teaching, Transformation process, Future structuring, Comments about Quality Circle, and Communication.

Axial coding

Three codes were elaborated in the axial coding. The analysis results are documented with text passages, with 'P_XX_19' showing a quote from the first interviews in 2019 and 'P_XX_20" a quote from the second interviews in 2020.

The first code, *The impact on those involved in the transformation towards online instruction*, describes the effects of the transition on individual stakeholders. For example, this included how interviewees with varying levels of experience coped with uncertainties of the pandemic environment and resulting restrictions. The experiences of the first digital semester also made interviewees abandon their initial preferred approach of slow, deliberate digital transformation as they realized it was not feasible. The transformation led to logistical advantages but also to increased social inequities and the loss of some central components of the curriculum, such as supervised professional development.

> *P_08_19: "But I think the topic [of digitization] is still relatively far away from actual implementation, which makes it difficult to assess at this point."*

TABLE 1 Characteristics of the interview partners.

Category	Item	Count (%)
Sex	Female	9 (75%)
	Male	3 (25%)
Age (year)	20–29	3 (25%)
	30–39	3 (25%)
	40–49	2 (17%)
	50–59	4 (33%)
Profession	Medical students	3 (25%)
	GP teachers	3 (25%)
	Course management and administration	3 (25%)
	Other	3 (25%)

TABLE 2 Codesystem.

Main category	Categories and subcategories level 1
Perception of teaching	Online instruction can do many things but not everything
	Impact of the transition on personal development
	What educators learn • Different starting conditions of the interview partners
	Obstructive processes/problems • Attentiveness reduced, difficult in online formats • Cancellation of courses • Practical content is insufficient • Improvements are needed • Lack of personal contact • Burden of transition
	Advantages of online instruction • Technology as an expansion of the teaching method • Shows potential even for the discussion of difficult topics such as professionalism and emotional aspects of learning • Digitization makes logistics easier • Independence as regards location of learner and educator is considered positively
Process of transition	Special challenges in medical teaching
	Lack of uniform implementation by the faculty
	Exacerbation of social inequities
	Uncertainty at the beginning
	Dealing with technical aspects • Guidance on technology provided by the institute • There was no alternative to dealing with it
	Polarized opinions about digitization
	Pandemic as a driver of digitization
	Digitization is inevitable
	Adaptation of formats of projects • Much tolerance/enthusiasm at the beginning • Students appreciate free collaboration • Surprisingly quick transformation • Learning by doing in digitization • Fast reaction required • Teaching was adaptable • Firmer rules of conversation in webinars needed

(Continued)

TABLE 2 (Continued)

Main category	Categories and subcategories level 1
Future structuring	Digitization needs a clear goal
	Dependence on external circumstances
	Work load remains high
	Uncertainty is stressful
	Changes in university teaching • Digitization is complex
	Digital formats should be adopted
	Educators are optimistic
	Feedback on digital formats needed
Comments about QC	QC has not played a major role
	Interest in other topics for QC
	Work of QC of the last months was/has been valuable
Communication	Sense of togetherness has been strengthened
	Communication structures need time
	Exchange among departments varies
	Poor accessibility due to home office
	Leadership was necessary
	Information came too late
	Exchange of information was cumbersome and slow

> *P_01_20: "And then it rather resulted that we had to train all our lecturers, […] in the shortest possible time."*

The second code, *The transformation of university teaching*, addresses the transformation process on an institutional level (both at the university and in community-based teaching). Widespread implementation of online instruction would have been difficult to imagine in the first interview phase. During the transformation process, networking and organizational experience expanded. Many teaching formats turned out to be in need of improvement but surprisingly capable of change. The transition, hastened by the external force of COVID-19, was retrospectively viewed as major step.

> *P_08_20: "So a lot happened, […] the exchange nationally and internationally has increased immensely for us during this time. […] I think that the knowledge has increased considerably."*

The third code, *What educators learned,* contains separate codes that encompass the special role of educators in the transformation process. The rapid conversion to online instruction placed additional demands on educators, compounded by the fact that there was no alternative to dealing with digitalization. Some interview partners expressed the feeling of having been "thrown in the deep end, "which corresponds to the statements from the first interview phase where participants expressed insecurities and resentment toward digitalization. Educators described a decrease in their overall skepticism toward digital formats. Nevertheless, they remained critical and described an increased awareness of what could be reasonably implemented digitally.

> *P_03_19: "So I came there (to the QC-session about digitization) feeling a bit unprepared […] because in my personal everyday-life in general practice I really have almost nothing to do with digitization."*

> *P_03_20: "Well, I've always felt a certain 'contra' against digitization because I always think – perhaps unjustifiably – that you could feel too comfortable in this digital world and no longer perceive what is actually really important. But I got used to it […] and then was pushed along by the obligation of having to do it at all, and I'm grateful for that, it was good for me."*

Selective coding

The three phenomena described in the axial coding are encompassed by the selective code and visualized in the following model (see Figure 1). It describes the process of transition toward online instruction during the COVID-19 pandemic at the Institute of General Medicine and Interprofessional Health Care at the University of Tübingen from the perspective of the participants of a multiperspective QC on teaching family medicine. It includes six chronological phases, each of which required specific adaptations from individual stakeholders, the organization, and the interactions between them.

Stage 1: The calm before the storm

The stakeholders involved in teaching family medicine – students, educators in community-based family medicine practices, lecturers, faculty and staff at the Institute of General Medicine and Interprofessional Health Care – had different attitudes and skill sets concerning digitalization and teaching digital formats. This difference in outlook between students and lecturers was already apparent in the 2019 interviews.

> *P_03_19: "I was just impressed by how much input came from the students regarding all these web seminars and formats which I find very exciting but am not familiar with myself."*

> *P_01_19: "[…] I found it also became clear that the students are significantly further along in the topic of digitization than the teaching physicians."*

In 2019, there were only rudimentary approaches to digitizing teaching. Earlier that year, a course was plotted that was meant to ease the idea of digital transformation in family medicine teaching for cautious or inexperienced stakeholders. The goal was to have everybody on board and progress at a velocity that was suitable for stakeholders not yet ready for the digital transformation of teaching.

> *P_12_19: "It [digitization] is also something that is still very much in its infancy, at universities in general, and probably also overall.*

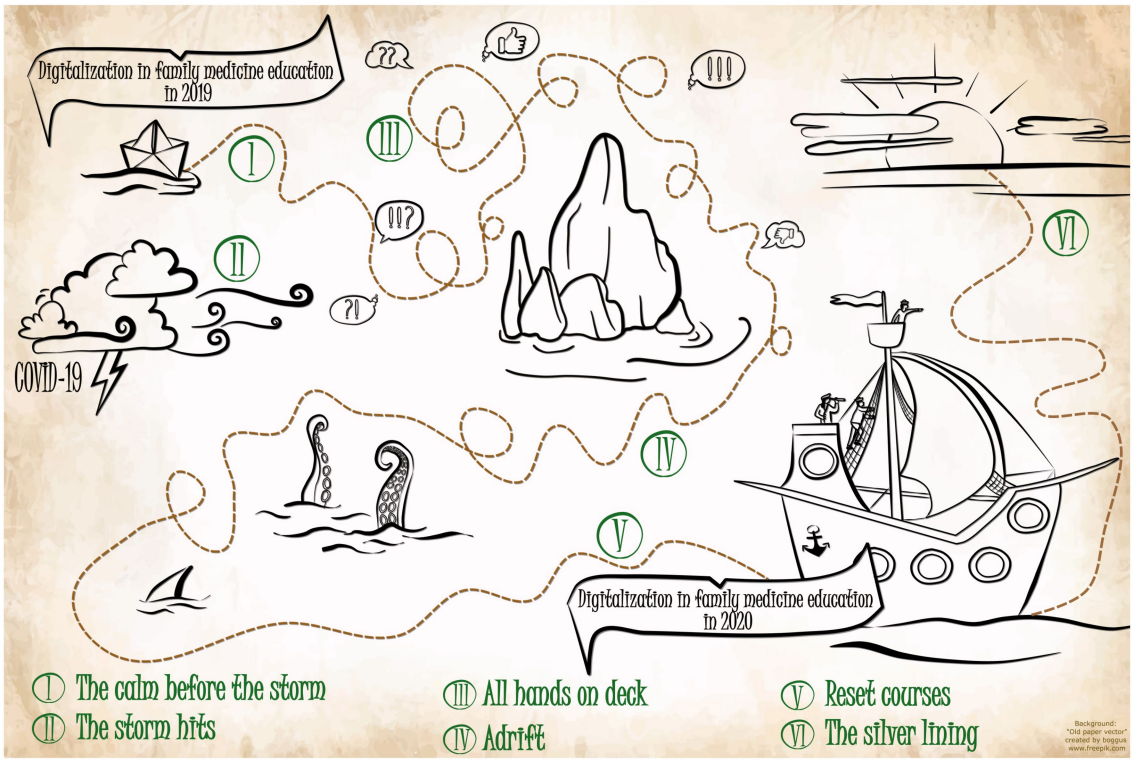

FIGURE 1
Selective code model "Hold the course(s)".

> *P_04_19: "And what has stuck is that digitization has arrived in very different ways for everyone. […] What I found fascinating was that for some it doesn't play any role at all."*

Medical educators saw little potential for digital formats in some family medicine courses.

> *P_03_19: "Some of the [family medicine courses] have very little to do with digitization. For example, in the physical examination course, the topic of digitization simply doesn't play any role at all."*

Within the group of teaching physicians, skills and attitudes regarding the digitalization of teaching and digital teaching methods, as well as digital skills in clinical practice, varied:

> *P_01_19: "What was interesting, for example, was that the teaching doctors had very different experiences with the topic of digitization in GP practice. For example, […] a practice that is totally paper-based, where really only the billing is done digitally and […] a super modern practice […] "*

Before the first semester under pandemic conditions, only a small-scale and cautious approach was conceivable for the interview partners, and aspects of a broader implementation were not actively considered.

> *P_08_19: "I think the topic [digitization] is still relatively far away from actual implementation, though, which makes it difficult to assess now. Just the fact that it is being talked about and seriously considered is a good result."*

> *P_11_20: "Yes, well, I don't think people given it [digitization] much thought before."*

Stage 2: The storm hits

Teaching modes during the summer semester of 2020 were largely dictated by the infection control measures of the COVID-19 pandemic. The pandemic and the related restrictions were a storm that hit stakeholders in the Institute and in teaching practices, like many others around the world, unprepared. The course planned in 2019 had to be abandoned.

> *P_02_20: "This phase of uncertainty was then replaced by a phase of action, […] where it was somehow clear that we now had to make the courses digital. […] It was a phase where we […] were under time pressure because digital courses had to be available."*

The family medicine clinical elective was canceled as there appeared to be no viable adequate digital replacement.

> *P_01_20: "[…] We also said that there is just a line […] at the clinical elective which we cannot carry out digitally and we are not allowed to carry it out in-seat, so then we have to drop it."*

GP teachers had to prioritize their clinical work and fight the pandemic instead of focusing on teaching. Medical students were needed to help in hospitals:

> *P_09_20: "Well, Corona meant that teaching came up far short. […] The focus was only on helping out in the hospital and supporting the teams. […] There wasn't so much capacity to turn to things like teaching us students theoretical contents. There were also increased cancellations of seminars [as part of a structured clinical rotation], because they were not digitized immediately."*

The unpredictability of the pandemic situation and the resulting uncertainty of courses put a strain on students:

> *P_11_20: "I found it a pity that as a student you had the feeling that you are a bit on your own or that you have to be somehow open to swift changes and be present all the time because you don't know when it will continue."*

Furthermore, differences in technical equipment and learning environments made social inequities more visible.

> *T_07_20: "And with the students, but also with the educators, this social inequality is also reflected in their housing. If I have small children and I only have a two-room apartment […] or whether I have a four-room apartment or a house where a babysitter can possibly be booked […], that's a very, very huge difference."*

The disparity in terms of technical equipment was even more stark within the group of students, and in some cases surfaced along with significant emotional distress.

> *P_07_20: "And those students who did not already have good technical equipment had a big problem. We also received feedback from students, some of whom were quite desperate because they couldn't dial in because they didn't have a stable Internet connection."*

Stage 3: All hands on deck

Due to the pandemic, new concepts had to be developed and implemented with great effort and within a very short time to continue teaching at all.

> *P_10_20: "You had to be very flexible, very spontaneous. It was incredibly exhausting to also cover the needs properly. In terms of time and of course in terms of content. I perceived teaching overall to be exhausting and challenging."*

These makeshift solutions then had to be developed further under significant time pressures. This led to uncoordinated, rapid changes in teaching formats, methods, and concepts on previously unknown paths and with sometimes excessive demands on educators. All efforts were made to prevent the teaching and learning ship from sinking, to return to the nautical picture. It was thrown off course.

> *P_01_20: "In both cases, I think this semester really required the greatest efforts that have ever been made for teaching by really everyone involved, […] you had to make both the content and the conversion from analogue, or in-seat teaching, to digital in a very short time."*

The course corrections caused stakeholders to find themselves in uncomfortable, previously unknown waters. In the course of the summer semester of 2020, those involved in teaching had to adapt quickly to this new teaching environment. Individual learning processes took place. These included technical skills, such as operating video conferencing software, but also didactic skills, such as moderation of online seminars. Although there were formal training sessions, e.g., on how to operate software, most skills were learned directly within the teaching process in an experiential or self-taught way. In the interviews before the transition, some educators expressed concern that they would not be able to keep up with new digital formats. Due to the transition, educators described a loss of their instructional communication competencies, especially these that characterized and defined them in their educator role.

> *P_01_20: What is really completely lost, however, is everything that characterizes me to some extent as a lecturer, that you sometimes make a joke or that you sometimes clown around or something like that, so you can transmit humor quite badly via this medium, unfortunately.*

The realization that there was no viable alternative quickly reduced the initial skepticism toward digital formats.

> *P_03_20: "Yes, and with online instruction, I also got to know and appreciate the advantages of it and that was an important thing for me because on my own I wouldn't have dealt with it, I just wouldn't have felt like it."*

Stage 4: Adrift

As the first waves of the pandemic receded in July of 2020, these initial learning processes and events were followed by frustration about the compromise or makeshift solutions: while they had fulfilled their initial purpose, in retrospect they turned out to be unsatisfactory as time went by.

> *P_08_20: "I am basically still positive, but I also still see many, many aspects from another side, from a rather sobering side."*

For example, the use of digital teaching methods is particularly limited in practical, "hands-on" course contents.

> *P_07_20: "We have done these […] complementary care methods completely online but in the long run it is not possible to convey everything that way and maintain the same quality. That's just the way it is. For a short time, there was hope that it might be possible but that has not been fulfilled.*

The clinical elective in the community-based practices were described as offering unique experiences that could not be substituted digitally:

> *P_01_20: "We did it in the sense that we offered a digital substitute but nobody can tell me that you can digitally replace the workplace-based experience in the family medicine clinical elective."*

The rapidity with which the transition took place highlighted the requirements and limitations as well as points of conflict and possibilities to cooperate in digitalization, none of which were mentioned in the first interviews in 2019.

> *P_08_20: "The problem is […] the short-term nature […] that put quite a strain on the summer semester […] apt to make you perceive a basically good thing as disadvantageous and difficult, in that you simply have to revise a lot of things in a very short time and perhaps don't find the best solution and there are many uncertainties."*

The QC in family medicine met in July of 2020 and provided an opportunity for an exchange of experiences and evaluation of formats.

> *P_01_20: "I think the QC was really useful this semester, especially for this debriefing, in which we collected all perspectives on how this semester was experienced. […] We didn't have a meeting during the Corona period, but the way of thinking, the experience from the previous QCs, has of course influenced me very strongly."*

Participants shared their frustration about how online instruction limited their repertoire in instructional communication competencies, such as humor.

> *P_08_20: "I always like to say that when we talk about it [the online instruction in the first semester under contact restrictions] or things like that: I'm someone who also works with humor and examples and so on, and you can forget that in an online context, it doesn't work."*

Stage 5: Reset course

After the waves had calmed, some educators questioned teaching concepts and contents, including the extent to which digitalization could meaningfully take place in family medicine teaching. At this point, everyone involved refocused on the plotted course and again set sail toward the general direction outlined before the pandemic. Thanks to individual and collective experiences, previously unknown hurdles could now be navigated. Thus, concepts and contents were already evaluated and adapted during the semester.

> *P_04_20: "Now we've just done it and it actually worked but now we're learning, […] what we can do better and we don't discuss it for five years beforehand, […] but we do it now and then see what we can do better".*

According to the interview partners, digitalization had changed university teaching and would continue to do so, bringing with it new kinds of challenges.

> *P_03_20: "[…] You post a question in the chat room and then it takes a while until someone answers and then I have a single answer from someone and I still don't know how it is with the rest of the group. […] That's a big problem […] that you can't depict in any way. It has something to do with the group experience and also with the possibilities of facial expressions."*

Stage 6: The silver lining

The interview partners also saw digital formats as important tools for specific, targeted use in family medicine teaching, complementary to in-seat teaching.

> *P_10_20: "You simply have to distinguish between courses that require presence, where you also have to give the student the opportunity to practice and to ask questions directly while practicing. And if you want to impart knowledge, which works very well via theoretical paths and webinars, […] You should weigh the options and split it up if necessary. That's my experience now from the summer semester."*

The experiences during the exclusively digital semester shaped participants' views on quality management and the evaluation of digital methods. The goal of training family physicians well can continue to be pursued, enriched by experiences that would never have been made without the pandemic situation.

> *P_02_20: "In this respect, I believe that by doing everything digitally, it became clear what cannot be done with online instruction. […]. But overall, I think positively and yes, with a few new questions, like 'How do I ensure quality now?'."*

Discussion

By conducting interviews with different stakeholders on teaching and learning in university-based and community-based settings, a model of the digital transformation process of family medicine teaching during the pandemic at the University of Tübingen was developed. The participants of the QC in family medicine teaching found the restrictions imposed by the COVID-19 situation to shape the process of digital transformation of teaching. The pandemic permanently changed both university and community-based family medicine teaching. It also challenged individual stakeholders and their communication, both in class (student-instructor), on the institutional level (instructor-instructor, instructor-course management), and between sectors (university and community-based). The experience-based model allows an analysis of the digital transformation process in family medicine teaching caused by a strong external stimulus. The six stages allow for the following structured comparison of requirements, needs and effects in a reflection of existing literature. Lessons learned are highlighted in Boxes 1–6 after each stage.

Stage 1: The calm before the storm

Before the pandemic, the participants described the digital teaching methods in family medicine as only available in rudimentary approaches, which corresponded to the general situation throughout Germany (6). GP teachers at the university hospital are primarily physicians who also instruct medical students. They have little or no

formal training in medical education since medical didactics training is not mandatory in Germany. The results of this study revealed, in line with previous research, that stakeholders had different levels of prior knowledge and experience with online instruction as well as different attitudes toward it (7, 8).

The educators' instructional communication competency was mainly derived from personal experiences of in-seat training. They had little or no concept on how to expand to online instruction. Just because digital formats have been growing in popularity for a few years (4, 5) did not mean that all stakeholders shared this interest or were ready to come on board. Surveying the status quo is therefore essential for determining the starting point for further development (45). The cautious, small-step approaches that had been envisioned did not involve community-based teaching. There was neither a focus or common goal for the digitization of teaching nor a clear concept of how to get everyone on board according to their capabilities. These might have helped maintain a more determined course during the following stage.

BOX 1 Lessons learned in Stage 1 "The calm before the storm"

- Reflecting on the status quo is essential in order to identify aspects in need of improvement.
- Different stakeholders have different attitudes, experiences, and instructional communication competencies that must be considered.
- Different teaching settings and the unique prerequisites of each setting should be considered.
- The incorporation of individual experiences from in-seat teaching to online instruction needs guidance.

Stage 2: The storm hits

In Tübingen, the start of the pandemic and the restrictions imposed on faculty and GP practices showed how vulnerable community-based teaching in GP practices was (29): Contact restrictions during the summer semester of 2020 led to a shutdown of the majority of bedside and workplace-based learning opportunities out of concern for patients' and students' health, exacerbated by GP teachers' clinical engagement in the pandemic. Since a digital simulation could not be developed in such a short amount of time without prior planning, in Tübingen the course was substituted with a clinical case report write-up, which all stakeholders found inferior to workplace-based teaching in GP practices. The case write-up did not provide any opportunity for communication exchange between the stakeholders. The preference of bed-side teaching has been described by both educators and medical students, mainly due to personal and emotional engagement and direct feedback (9, 14, 48, 54).

The sudden introduction of digital-only teaching as a reaction to contact restrictions affected stakeholders differently: *Medical students*, while least challenged by new digital tools and most positive toward the methods (14), were affected by the sudden shift toward digital-only teaching and the uncertainty related to their lectures and courses. As other research has shown, participants of our study identified aggravated social disparities for students (37–39) and increased pressures (35, 36).

In contrast to medical students, *medical educators* had a steeper learning curve in terms of digital skills (9). GP teachers especially stated they would not have taken this step without proper cause. GP teachers had to leave their familiar roles and settings and develop new skills to perform confidently in this unfamiliar virtual terrain. Lacking ideas or skills to transfer their educational competencies to virtual classrooms, the learning curve was steepest for them. Bereft of alternatives, they either had to hold fast to the railing or drop out of teaching altogether, which regrettably, some did (55). The metaphor of educators holding on to the railing is significant: even though there was no clear concept of the transformation process to online instruction at the time, these community-based GP teachers were willing to continue working together with medical educators at the institute in the hope that a solution would be found. Trust in the leadership of the teaching organization was a key element.

BOX 2 Lessons learned in Stage 2 "The storm hits"

- A strong stimulus can provide tailwinds and direction for the digitalization process of teaching but may lead to reactive measures instead of proactive planning.
- The stimulus affected stakeholders differently but generally diverged their attention from teaching and learning toward other, more immediate goals.
- Hands-on teaching, especially in community-based settings with a loose association with the university, is a vulnerable setting at such times.
- Clear leadership and an associative bond to the teaching organization are protective factors in such a stage.

Stage 3: All hands on deck

Stakeholders' reactions toward the ensuing digitalization process of family medicine teaching ranged from anxiety to curiosity and confidence, from initial rejection to gratefulness for the opportunity. Online instruction tools had been available before and during the pandemic. However, very few such instruments were routinely used in medical teaching in Germany. Interview participants stated that, initially, known in-seat formats were simply replaced with digital formats – under the motto 'same, but digital'. This simple 1:1 conversion from in-seat to digital ensured that teaching did not have to stop altogether. Case reports from other universities confirm this (41, 56). However, too little attention was given to the fact that educational and communicative strategies needed to be adjusted to the digital setting.

Most available research also points out the Herculean task of digitizing available courses (9, 19, 40, 57). Participants reported that the shift to online teaching also comprised changes in their instructor role: In asynchronous formats, new functions such as content creators and curators arose. Instructors shifted to instant messaging communication with students.

In synchronous video formats (such as videoconferences), the shift also challenged their role as instructors and their communication with student groups. In medical workplace-based teaching especially, the value of the teaching physician as a role model has been demonstrated. If a teacher is not able to be eminent and elicit responses in his or her students, learning is not optimal (9). GP teachers' frustration of not being able to use humor in their digital

interactions illustrates the importance of interpersonal components in instructional communication even in medical education.

Stakeholders acknowledged efforts by the university to provide technical and methodical support for online instruction. By having some technical stressors of online teaching alleviated by moderator training, technical instruction, and help in organizing video calls, educators could again focus on their competencies and eminence as physicians and role models.

However, community-based educators expressed regret about insufficient collaboration on didactic concepts and the application of online instruction methods (41). Opportunities for networking (e.g., with other faculty members or educators) both within the Institute and nationally were found lacking, which mirrors existing research (21). The example of Homburg's approach to digitalization of decentral teaching formats might have helped faculty in Tübingen and led to a much better experience for medical students than writing a case report. In retrospect, a lack of low-threshold, easily accessible cross-regional exchange on digital solutions during the pandemic has become painfully obvious. This exchange of ideas could have facilitated the creation of a network on instructional communication competence for medical educators, which points to a need to address further on a national level in the post-COVID-19 world (13, 41, 58, 59). In our nautical model, there would be not one but a plethora of tiny ships bobbing and floating in treacherous waters, with too little communication between vessels.

BOX 3 Lessons learned in Stage 3 "All hands on deck"

- Being forced to try out new practices can reduce inhibitions and prejudices against online instruction.
- Learning by doing works for digitalization, if there is trust in the organization and support available.
- Peer-teaching is a useful and low-threshold option.
- Communication is key, not only within the classroom but also between educators (within faculty), between sectors (university-community) and between faculties – but underdeveloped in Germany.

Stage 4: Adrift

Medical students in the interviews and other research described the lack of hands-on teaching as the greatest downside of the digital shift (13, 23, 34), highlighting the need for critical evaluation of newly digitized courses (14, 29). From the initial, more reaction-driven stages, participants voiced increasing insecurity and frustration during the third and fourth stages of the transformation, which is consistent with several case reports (2, 21, 40, 60). Many stakeholders' assumptions about the limitations of online instruction from the first interview phase were confirmed (5, 14, 15, 18, 29). However, the negotiations initiated in these stages also led to a differentiation of ideas of what online instruction could and could not achieve (41). Important aspects of instructional communication like humor or emotional involvement (17) were described as insufficiently addressed.

According to the interview participants, the ensuing frustration was natural and necessary to reassess the current position of online instruction after the first semester. These reflections came naturally due to the significant changes and new experiences and should take place explicitly when implementing courses to align reality with stakeholder perceptions.

When workplace-based learning became feasible again later in the pandemic, experiences made with decentral teaching formats generated new perspectives for such scenarios. For example, synchronous digital seminars enabled course managers to continue to connect learners from various distant learning sites to each other (48) – one learning effect being that decentral teaching could be supplemented but not substituted digitally. Further evaluation of these tools for medical education could contribute to the routine implementation of digital communication channels, enabling remote learning and professional activities across regions in community-based teaching (11).

The key to collecting this information and providing a marketplace for constructive communication and exchange of ideas was, in the case of our institution, a quality circle in community-based teaching in which stakeholders and interview participants participated (46). It allowed integration of perspectives by educators and students and an evaluation of the situation.

BOX 4 Lessons learned in Stage 4 "Adrift"

- Experiences made with digital tools change attitudes and behaviors and allow a reassessment of the change processes.
- A substitution of medical teaching for digital formats is not feasible, especially when it comes to bedside teaching in community-based settings.
- Stakeholder frustration with digital tools is an important indicator of what works and what does not – it should be discussed explicitly and with an open mindset.
- Teaching formats should be reflected upon promptly and frequently.
- Community-based teaching can be supplemented by digital means, especially by using digital networking tools to connect community-based teaching sites.
- A multiperspective QC on teaching can provide a forum for such an exchange and for individual efforts to be made visible.

Stage 5: Reset course

Personal negotiations, the exchange of experiences, and assessments about the digitalization of family medicine teaching in the quality circle led to a consensus about how to continue as an organization. Individual efforts had been made already, but this deliberate discussion, with integration and negotiation of stakeholders' ideas and experiences in the development of a new course, was important for the subsequent semesters. While this process of realigning the course of the ship was experienced as burdensome, it ultimately led to a reduction in individual skepticism and to an adaptation of teaching to the specific community-based teaching environment. A central exchange of ideas on instructional communication competencies enriched the quality circle participants and facilitated the implementation of communication strategies on the community level.

Educators exhibited similar attitudes as those described by Dorfsman (25) with respect to the different teaching formats. For example, GP teachers craved a return to hands-on bedside teaching in family medicine practices. At the same time, they were pleased with

the possibilities that blended learning offered for the physical examination course and teaching across regional distances in a community-based setting. Overall, concerns about trying out the new technical possibilities decreased in all interviewed stakeholders, which mirrors available research (10–12).

The Institute for General Medicine and Interprofessional Health Care was tasked with providing recommendations and best practice examples for digitalizing medical content. They also worked on plotting a new course for subsequent semesters of online instruction, consistently asking the stakeholders about their experiences and incorporating their expectations into new course plans. This "bottom-up" process seems a promising approach in the management of community-based teaching and provided a platform for an exchange about instructional communication (50).

BOX 5 Lessons learned in Stage 5 "Reset course"

- The general direction of change processes should build upon concrete stakeholder experiences and should be negotiated proactively.
- Concrete goals should be formulated, consistently expanded, and reflected upon.
- A suitable framework for reflection should be used (e.g., a QC on teaching).

Stage 6: The silver lining

Participants made it clear that the goal of family medicine teaching remains the same: To train competent physicians to serve the needs of their communities. Unanimously, participants consented that digitalization of family medicine teaching must promote this goal. The wealth of experience gained through the transition has sharpened the focus on digitization. It occurred first in individual stakeholders affected by a strong external stimulus. By trial and error and by sharing insights on methods that could meaningfully contribute to family medicine teaching, the organization as a whole learned. After this process, the participants had a clear vision of digitization in family medicine and regarded it as a meaningful component for the future of community-based teaching. Being forced to leave shallow, well-trodden waters and adapt to a new setting, they also gained new individual competencies in didactics and communication.

Worldwide, COVID-19 had a cataclysmic effect on medical teaching (1–3, 58). Our model, based on different stakeholders' experiences, can be abstracted and applied to major external influences on teaching in the future. In general, experiences of digital transformation shape attitudes and skills, and vice versa. If a significant need arises without alternatives, even the most cautious in-seat education enthusiast can and will "walk the plank" toward digitalization and benefit from the experience. Students are happy to follow along and get in the boat but emphasize the importance of maintaining a personal touch in their studies. This is particularly critical as it can be assumed to be conducive to learning and a shared goal between educators and students (17).

On the institutional level, important cornerstones have been laid. According to neoinstitutionalist doctrine, large institutions, such as universities, base their actions on legitimacy vis-à-vis their environment and its norms and expectations (61). The shift to digital-only teaching can be seen as a major external factor that could trigger a profound change process (62). At least for university hospital teaching, a number of stakeholders have improved their teaching competencies and developed a more differentiated view of online instruction and its implementation in the medical curriculum (18–22, 41). A more systematic implementation of online instruction in this setting can be expected in the future. For community-based teaching in GP practices, the potential of online instruction has not been fully realized and should remain a focus of future efforts in curricular management and medical education research. At the very least, GP teachers have become more conscious of the fact that they are not only physicians but also educators, with the latter role requiring both a certain skill set and a different mindset. While this may be known on some level, it is too seldom made explicit. For the community-based teaching setting especially, an integrated perspective as provided by the QC in Tübingen seems practical and helpful, both in institutional QM efforts and medical education research.

Another aspect worth considering in the future is the impact of the COVID-19 pandemic on social inequities. This was mentioned by interview partners in our study and has also gained attention among researchers (37–40, 63). This underlines again the need for considering social aspects in transforming medical education – with and without digitalization. A multi-layered, multi-perspective approach as provided by the QC could facilitate an awareness and consideration of social inequities in teaching (64).

BOX 6 Lessons learned in Stage 6 "The silver lining"

- The goal of family medicine teaching has remained the same, but the method by which this can be achieved has been adapted.
- In how far digitalization can help achieve this goal has been adapted.
- Individual experiences have contributed to organizational learning processes. Those must now be used to plan ahead and work toward the didactic goal, mindful of the strengths and limitations of digitalization.

Strengths and limitations

Our study design enables a comprehensive view of different stakeholder viewpoints on the transformation process from in-person to online instruction. In the literature, description of the transition is mainly limited to retrospective analyses and observations (2, 19, 24, 48). The two phases of interviews before and after the transition created a unique data set that depicts the initial situation unbiased by the change process. No data on the transformation process itself was collected in the first interviews. This was only considered retrospectively. This study fills a gap with its before-and-after comparison and the consideration of an integrated view of the stakeholders. To capture a more comprehensive view of online family medical teaching and instructional communication, a follow-up study that adds the after-pandemic perspective to the results described here is needed.

Since the GT method allows for a high degree of flexibility (65), statements that did not play a role in the first interview phase but were mentioned in the second interview phase could be included in the analysis. To generate a dense model of the transformation process,

the usual steps, such as analytical induction to test and modify a preliminary hypothesis, were performed consistently on the entire data material (66). Following Glaser (67), the constant comparison was performed for quality assurance and new codings were again compared with already analyzed material to continuously involve all the material in the research process and to be sure that the derived model represented the whole data (68).

Following Malterud's method to evaluate the sample size of qualitative research, the sample size in this study is small (69). The challenges in recruiting participants during the pandemic were softened by the commitment and existing communication channels of the quality circle for family medicine teaching (46). Nevertheless, conducting interviews during the pandemic was subject to the unpredictability of the pandemic and therefore constantly changing regulations and a generally tense situation. GP teachers especially were challenged by having to maintain patient care in their GP practices. The fact that they responded to our interview invitation shows how motivated the GP teacher participants were. Regarding the experiences of different stakeholders with the transformation processes in family medicine teaching in Tübingen, the analysis yielded a theoretical saturation. Therefore, data collection was terminated after the second interview phase (70). The results are valid for the local transformation process but, despite the local setting, the model shows promising consistency with national and international results. A derivation of general principles for digital transformation is therefore to be seen as limited under the aspect of the local context.

To further increase credibility, especially considering the involvement of the author team in the QC, the research process was continuously documented (68) and presented to uninvolved GP teachers and other researchers in a so-called peer debriefing or member check (68, 71) at conferences (52) and in qualitative methodological workshops, which allowed for some external validation of the results.

Conclusion

Based on the results and supported by the literature, future digital or mixed-digital projects should be easier and faster to implement. In the current context, the results of this study and the literature suggest retaining in-seat formats, especially to maintain quality in practical, hands-on courses. Thus, in-seat teaching is not replaced but merely complemented by online instruction to offer students the most versatile learning experience possible and support their professional development. Quality management should involve all those involved in teaching at their respective levels of knowledge.

As the likelihood of further extreme pandemics has increased in recent decades (72), we should strive to learn from our experiences of the COVID-19 pandemic. The presented key messages can help navigate upcoming challenges in medical education.

1. Reflecting on the status quo is fundamental in order to identify aspects that need improvement.
2. Despite the same stimulus, the conversion process had different effects on different groups of stakeholders.
3. A strong stimulus to try things out can reduce inhibitions and thus make some individual experiences and learning processes in education possible in the first place. In this context, peer teaching is a useful and low-threshold option.
4. In order not to drift aimlessly, concrete goals should be formulated and consistently expanded upon with reflections. This process should take place in a suitable framework (e.g., QC).
5. The quality of new teaching formats should be reflected upon and adjusted as promptly as possible considering instructional communication.
6. The goal of family medicine teaching has remained the same. The means to achieving it have been expanded on an instructor level by adapting instructional communication competencies and by the new method of online instruction.

There may be formats or methods available that we hesitate to use for teaching. It may behoove all those involved in education to develop the courage and initiative to jump ship on occasion and release new concepts or formats, even when they aren't fully developed. Instead of waiting for the next external force, like pandemic restrictions, to push us along into treacherous waters, let us plot and chart our own course of travel!

Author's note

We use the term "transformation" in this paper to refer to the transition toward using digital media that had been in planning and whose implementation was sped up significantly by external forces, namely the COVID-19 pandemic and related restrictions.

Data availability statement

The pseudonymized data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Ethics review board of University of Tübingen (021/2019BO2). The patients/participants provided their written informed consent to participate in this study.

Author contributions

M-TS: study idea, data collection, qualitative analysis, manuscript draft, and prepared Figure 1. HF: review, editing manuscript, and English proofreading. SJ: project funding, review, and editing manuscript. RK: study idea, qualitative analysis, prepared Figure 1, review, and editing manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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The i-SUN process to use social learning analytics: a conceptual framework to research online learning interaction supported by social presence

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Interaction is an essential element of online learning and researchers had use Social Learning Analytics (SLA) to understand the characteristics of meaningful interaction. While the potential for network analysis in education (i.e., SLA) is valuable, limited research has considered how best to use this emerging field to inform meaningful interaction in online settings. Online learning researchers need a concise and simplified framework for SLA to support interaction in online learning environments. Therefore, we present a conceptual framework to make SLA accessible for researchers investigating learners' interactions in online learning. The framework includes concepts from network theory and the online learning literature integrated into a new perspective to analyze learners' online behaviors and interactions. We analyzed existing models and frameworks to show how network analysis has been used in online learning resulting in a conceptual environment to investigate learner interaction. The proposed i-SUN framework has four main steps: (1) interaction, (2) social presence alignment, (3) unit of analysis definition, and (4) network statistics and inferential analysis selection. We also identified five ways in which the i-SUN model contributes to the advancement of SLA in online interaction research and provide recommendations for empirical validation. As part of a sequence of manuscripts, we seek to offer a unique perspective to online learning researchers and practitioners by focusing on the social and pedagogical implications of applying network analysis to understand online learning interaction.

KEYWORDS

interaction, social presence, social learning analytics, network analysis, conceptual framework, online learning, distance education, social network analysis (SNA)

1. Introduction

Although online learning has been established as an effective learning mode compared to face-to-face learning (Pei and Wu, 2019), challenges to facilitating online learning persist. Instructors and learners perceive difficulties in meaningfully connecting with one another, establishing an effective presence, and developing communication strategies that support intentional relationships, and eventually, learning (Richardson et al., 2015). As learning is generally considered a social activity (Vygotsky, 1978b; Bruner, 1990; Bandura, 2002; Lowyck, 2014), these challenges can greatly impact student success in online environments.

Learning analytics (LA) has been one way in which researchers consider the effectiveness of online learners' interactions in supporting student success by combining education and data science to inform instructional design (Ifenthaler and Yau, 2020).

The social nature of learning demands external support (i.e., scaffolding; Wood et al., 1976; Vygotsky, 1978a) and interaction (Moore, 1989) among instructors, peers, or the learning environment. Yet, the assumptions of traditional statistical analysis (i.e., independence of observations) limit research questions and can be misaligned with the interdependency that emerges in online learning. As a result, Social Learning Analytics (SLA) has emerged as a sub-field of LA, offering educators and researchers new opportunities for analyzing learning interactions from a perspective that reflects the interdependent nature of learning. SLA focuses on "understanding connectivity and the development of social relationships, and how this can be used to promote learning through social interaction" (De Laat and Prinsen, 2014). Ferguson and Buckingham Ferguson and Shum, 2012 explain that SLA is a socio-constructivist approach to learning analytics in which learning occurs through interaction and collaboration. However, previous research on interaction in online learning using SLA has relied primarily on descriptive analysis rather than inferential SLA (Jan et al., 2019). Inferential SLA analysis allows researchers to estimate learners' interactions over time (e.g., Zhang et al., 2016; Poquet and Jovanovic, 2020; Castellanos-Reyes, 2021) or statistically compare different types of learner networks (e.g., Kellogg et al., 2014). Nevertheless, SLA faces the interdisciplinary challenge of bridging the social network analysis field that rooted in graph theory and sociology with the educational research field. Lack of rigor in the implementation of SLA results in unsystematic reporting of network measures without sound theoretical foundation on what they mean within the learning context resembling to what Poquet and Joksimovic (2022) call a "cacophony of networks."

Methodological approaches that acknowledge the social nature of learning are not enough to support meaningful connections in online learning because they lack the theoretical guidelines to identify which interactions are relevant for establishing a sense of community. Researchers and practitioners have used the social presence construct to understand affective interactions in online learning environments and design online learning experiences that foster such interactions (Fiock, 2020). Social presence posits those members of an online learning community can project themselves as real to others in the online environment (Swan, 2021). Traditionally, social presence interactions have been analyzed from a learner-learner point of view for mutual construction of meaning (e.g., Kyei-Blankson et al., 2019; Castellanos-Reyes, 2021; Lim, 2023). Yet, online learning environments allow for other types of interaction like those between learners and instructors, learners and content (Moore, 1989), learners and network (i.e., social media) (Dennen, 2013), and learners and the rules that govern the broader community (e.g., netiquette, curricula, institutional guidelines) (Jonassen and Rohrer-Murphy, 1999; Engeström, 2001; Yamagata-Lynch, 2010). It is the coherence between the methodological approach, in this case SLA, and the theoretical perspective of social presence that supports educational researchers to draw rigorous and sound conclusions. Thus, it is urgent to have guidelines for online learning researchers conducting SLA that are theoretically sound and contextualized to the complexity of distance education.

While the potential for using SLA and network analysis methods to investigate learning is great, limited research has considered how best to use this emerging field to inform evidence-based practices in online settings. Furthermore, existing frameworks on SLA in online learning focus only on learner-learner interaction to form online communities (e.g., Jan and Vlachopoulos, 2019) without accounting for other types of interaction like learner-interface. For example, collaborative annotation of textbooks for community development (Sun et al., 2023) or intelligent tutoring systems (Ebadi and Amini, 2022). One potential reason for limited research in this area is a lack of conceptual frameworks that can be used to guide the implementation of SLA and a subsequent robust research process. Online learning researchers and practitioners need a concise and simplified SLA framework to support interaction in online learning environments.

The multiplicity of network analysis terms combined with the lack of theoretical integration of online learning interaction and social presence theory compounds the challenge of implementing SLA. In response to the call for "refinement and rigor" in SLA (Poquet and Joksimovic, 2022), we propose a conceptual framework for educators and researchers to understand online learning interaction through SLA and social presence. To guide the development of this framework, we used concepts from communication networks theory and online learning literature integrated into a new perspective to analyze and assess learners' online behaviors and interactions. We first synthesize and critically evaluate the existing literature about SLA frameworks and interaction frameworks in relation to social presence. Then, we provide specific network analysis indicators for researching interaction from a social presence perspective. Next, we discuss the benefits and challenges of implementing the proposed SLA conceptual framework to investigate online learning interaction. Finally, we provide suggestions for future research that could serve as guidelines in this area for researchers.

2. Literature review

The literature review section is divided into five main sections. First, we define social presence in the online learning context. Then, we evaluate the foundational interaction theories and frameworks for online learning in the light of social presence. In the third section, we address recent frameworks in SLA specific to online learning. The last two sections include a table synthesizing the relationship between the frameworks and social presence to support SLA while providing recommendations on how research can use SLA measures.

2.1. Social presence in online learning

Grounding in the telecommunications field (Short et al., 1976), Gunawardena and Zittle (1997) introduced social presence to

distance education as "the degree to which a person is perceived as *real* in mediated communication" (p. 9). This definition has been increasingly used in the online learning field by practitioners and researchers alike (Castellanos-Reyes, 2020) and incorporated as part of the Community of Inquiry (CoI) framework. The CoI is a constructivist process-model that describes the components of an online learning experience (Garrison, 2017a; Swan, 2021). Since its inclusion as part of the CoI, social presence has been widely used to research online learning and guide the design of high-quality learning experiences (Fiock, 2020). Nevertheless, the conceptualization of social presence among researchers is not without controversy. For example, Kreijns et al. (2022) challenged the conceptualization of social presence, arguing that researchers confound the social presence's definition with the technology affordances and the interpersonal connections among students.

Despite the definition of social presence being widely debated (Kreijns et al., 2022; Shea et al., 2022), we adhere to the definition of social presence as the extent to which online learners perceive themselves and others as "real people" (Garrison et al., 2000; Rourke et al., 2001; Shea et al., 2022). Social presence is theorized to include three components: open communication (e.g., replying on a discussion board), affective communication (e.g., expressing emotions or liking others' work), and cohesive responses (i.e., addressing peers by name) (Garrison, 2017b; Shea et al., 2022). Social presence is essential in online learning because it influences student satisfaction (Richardson et al., 2017) and performance (Garrison and Arbaugh, 2007; Cui et al., 2013; Joksimović et al., 2015). Social presence has been used to explain interaction in computer-mediated environments, for example, interactions among members of an online community and their interactions with the course activities in the learning experience (i.e., "meet your classmates" activity, discussion board, reading assignments) (Richardson and Swan, 2003).

2.2. Models of online learning interaction and their limitations

In this section, we surveyed prominent models of online learning interaction frameworks as indicated by the Handbook of Distance Education (Dennen, 2019). We reviewed three foundational interactions theories and frameworks in relation to online learning. First, Moore's theory of transactional distance (1998) because of its longstanding history to explain distance learning interaction (Bernard et al., 2009). Second, the Interaction Analysis Model (IAM) (Gunawardena et al., 1997) because it was conceptualized on text-based communication which was the foundation of distance education delivery (Stewart et al., 2023). Third, we introduce activity theory, which was initially conceptualized to understand complex learning environments. Although activity theory was conceptualized for traditional in-person education (Jonassen and Rohrer-Murphy, 1999; Engeström, 2001; Yamagata-Lynch, 2010). Dennen (2019) contextualized the theory to online learning environments, offering a framework for considering additional elements of the distance learning ecosystem. We guide our review based on the social presence construct. Table 1 synthesizes this section.

2.2.1. Moore's theory of transactional distance (1993)

Moore's theory aimed to explicitly identify interaction and clarify traditionally vague and ambiguous concepts such as distance, independence, and interaction (1989). Moore explained that transactional distance referred to the psychological and communications space that separates the learner and the instructor (Moore, 1993). Moore (1993) formulated the concept of transactional distance as a function of dialogue, instructional structure, and learners' autonomy. Further, he explained that transactional distance is greater in pre-recorded sessions with little learner-instructor dialogue, but internal dialogue among learners is greater. Conversely, transactional distance reduces in instructional programs designed as live virtual meetings where there's a two-way interaction between learners and instructors, with less structure and more learner-instructor dialogue. Based on this, Moore proposed three main types of interaction: learner-content, learner-instructor, and learner-learner interaction (1989). There is a need to balance the kind of interaction based on the learner's capacity and needs, the instructors' teaching philosophy, and the nature of the subject (Moore, 1993; Falloon, 2011). Scholars have expanded Moore's original concept of transactional distance to include the interaction between learner and the interface (Hillman et al., 1994) and learner and the network (Dennen, 2013). Specifically, learner-network interactions refer to those behaviors that occur external to the class environment (Dennen, 2019) like communicating with others outside the class who might share similar interests or expertise (Dennen, 2013).

Moore's theory does not address the affective and cohesive components of social presence. Instead, it adopts a learner-centered approach as a focus. In other words, how the individual learner interacts with content, instructor, and other learners, almost singularly or in a linear fashion. Such linearity restricts the complexity of an online learning experience, especially one that includes multiple means of communication. Moore (1993) acknowledges that highly interactive media allow for more intensive and dynamic dialogue. The social presence construct is a helpful lens to evaluate Moore's theory because it includes a community aspect that allows for a more dynamic and complex explanation of interaction in online learning.

2.2.2. Gunawardena et al. (1997) interaction analysis model

Gunawardena et al. (1997) made the case that quantitative participation analysis and self-reported satisfaction within an online learning conference environment are not sufficient for determining the quality of interaction and the quality of the learning experience. As such, they proposed content analysis or interaction analysis of transcripts as being essential to evaluating the quality of interaction. Interaction in this model (Gunawardena et al., 1997) is rooted in the learning sciences in the work of Jordan and Henderson (1995), who described interaction analysis as human-human interaction and human interaction with objects

TABLE 1 Models of online learning interaction and their limitations.

Theory/model name	Interaction constructs	Limitations
Transactional Distance (Moore, 1989; Hillman et al., 1994; Dennen, 2013)	Learner-learner, learner-instructor, learner-content, learner-interface, learner-network.	• Quantification of distance (no scale or qualitative description) • Limited/empirical evidence to support (Reyes, 2013) despite previous meta-analysis (Bernard et al., 2009). • Lack of specificity in theoretical foundations/philosophical foundations and how this is later applied (Goel et al., 2012)
Interaction Analysis Model (Gunawardena et al., 1997)	Five phases: I. Sharing/comparing information II. Discovery of dissonance III. Negotiation and meaning IV. Testing and modification of synthesis V. Agreement statement(s)	• It is limited to mutual communication and co-creation of knowledge (i.e., discussion boards). • Role of instructor not apparent. • Assumes uniform construction of knowledge "quilt" as perceived by evaluator; does not define how to evaluate overall knowledge construction (despite the assumption that multiple versions of knowledge exist among participants). • It does not consider multiple media types and interactivity inherent in modern media.
Activity Theory (Engeström, 1987; Yamagata-Lynch, 2010)	Tension among: Subject (learner), Tools, Rules, and Community (e.g., students, instructors) Division of labor.	• Qualitative focus to research complex systems. • There is room for ambiguous interpretation of the components of activity theory, possibly due to translation of terminology and "conflicting schools of thought" (Bedny and Karwowski, 2004, p. 135).

in their environment. Interaction is, therefore, an "ongoing social process" in which people collaborate, learn, and recognize what they have learned (Gunawardena et al., 1997, p. 403). There is not hierarchical relationship among participants in this model, and therefore, it is not teacher centered. Here, participants are equal in the hierarchy. Interaction is also viewed as informal and voluntary as the learning process naturally unfolds among participants, as a co-creative process rather than an assessment of student performance. Ultimately, interaction is described as a "totality of interconnected and mutually-responsive messages… 'interaction' is the entire gestalt formed by the online communications among the participants...in relation to each other and in a manner which reflects each other's presence and influence" (Gunawardena et al., 1997, p. 407). Gunawardena (1995) adopts a multi-constructed approach to social presence in describing how important and "real" a person "feels" in mediated communication through intimacy (e.g., eye contact, nonverbal cues) and immediacy (e.g., psychological distance, relatability). In relation to the Interaction Analysis Model, social presence is a potential predictor that influences learning outcomes positively. However, interaction is not reflected between the learner and the content, nor is the relationship between the learner and the interface highlighted.

2.2.3. Activity theory in online learning

Activity theory allows researchers to explore learning as an activity system and describes the elements that influence learning (Dennen, 2019). Activity systems "support a systematic and systemic approach to understanding human activities and interactions in real-world complex environments" (Yamagata-Lynch, 2010, p. 1). In activity theory, complex learning environments are conceptualized as "natural situations where multiple individuals are involved in shared activities within a single or multi-organized context" (Yamagata-Lynch, 2010, p. viii). Originating from Vygotskys' theoretical perspective, activity theory was developed by Egeström and later adapted to the educational context by Yamata-Lynch (Dennen, 2019). Engeström (1987) represented activity theory with a triangular model in which the vertices show the components of the complex system, and the sides, the tensions among them.

Despite activity theory being originally conceptualized to understand organizational change in educational contexts from a systemic perspective and to guide the design of constructivist learning environments (Yamagata-Lynch, 2010). Dennen (2019) explained that "activity theory encourages the view that online classes are complex ecosystems" (p. 252) in which tension among parts prompts learning. The online learning activity system framework comprises tools, rules, a community (e.g., students, instructors), and a division of labor (see Figure 1). Yet, the main subject of the system is the student, and the expected outcome is learning (Dennen, 2019). Activity theory allows researchers to comprehensively account for online learning elements (Dennen, 2019). It gives researchers conceptual tools to understand the interconnections among components of the complex system (e.g., learners, instructors, administrators) and their networks of interaction (as well as the juxtapositions of their objects (i.e., outcomes). One of the limitations of activity theory is that its methodologies are focused on qualitative research, mainly because it is through qualitative inquiry that researchers can deeply understand the complexity of a learning system. Furthermore, Bedny and Karwowski (2004) argue that researchers' interpretation of the components of activity theory is ambiguous due to translation challenges and "conflicting schools of thought" (p. 135). The diverse interpretations have obscured the use of activity theory challenging researchers to use to explain learning. Yet, we posit that activity theory serves as an analytical framework to better reflect the potential of SLA in online learning interaction. Unlike earlier LA methodologies that rely on quantitative data, new methods that involve SLA (e.g., Social Epistemic Network Signature, Gašević et al., 2019) are not limited to quantitative data.

This framework considers social presence in terms of affective association and instructor investment since it explores

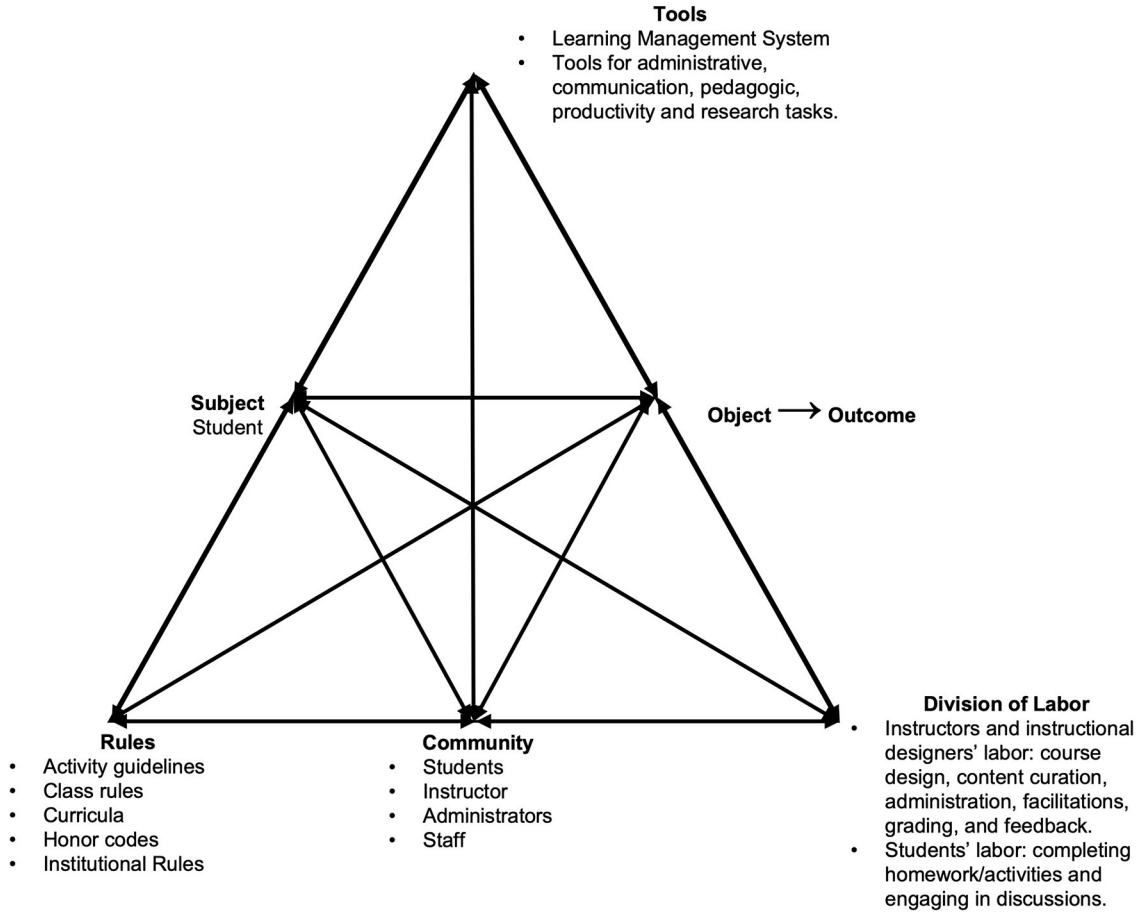

FIGURE 1
Adapted representation of Dennen's (2013) online learning as an activity system.

learners' and instructors' individual and group constructs through interrelationships between tools, the subject, rules, community, and division of labor. However, the main gap exists in exploring the interface's functionality and how social presence is enabled in online environments through interaction intensity, cohesion within the community, and how affective outcomes are achieved. As such, exploration is needed to consider how the individual, and by extension, communities of learners interact with the interface to achieve the outcomes.

2.2.4. Limitations across interaction theories

The theory of transactional distance (Moore, 1993) is a valuable framework for examining interactions among online learners, their instructors, and the content, while activity theory (Engeström, 1987) is much broader and explores a systematic interplay of "tools, rules, people, and work" (p. 254) that comprise the online learning ecosystem. Within the traditional conceptualization of online learning (Stewart et al., 2023), the way people interact via text-based communication leads to an exchange of cultural insights, which in turn ignite knowledge as a collective social construction (Gunawardena et al., 1997; Gunawardena, 2013).

We propose that existing interaction theories do not fully reflect the complexity of online learning. On the one hand, transactional theory (Moore, 1989, 1993) focuses on interpersonal interaction and interaction with content. However, it does not include the interaction and tensions between other members of the online learning community (i.e., administrators and staff) and the available tools for online learning (i.e., learning management systems, external technology). On the other hand, the Interaction Analysis Model (Gunawardena et al., 1997) does not consider the interaction between the learner and the interface, as well as the learner and content. Furthermore, it relies on text-based interaction a as means of knowledge construction in online education. Yet, the adoption of Emergency Remote Teaching (ERT) (Hodges et al., 2020), leveraged synchronous communication as part of the response to the COVID-19 pandemic and the sustained and generalized use after (Stewart et al., 2023) showed the need to include other forms of delivery and interaction beyond text-based communication as central elements of online education. Finally, activity theory in online learning (Engeström, 1987; Yamagata-Lynch, 2010) presents a holistic, rich, qualitative approach to understanding interaction as a complex interrelation among learners, communities, tools, objects, and subjects. Still,

there is a need to integrate facets of the online environment and how it affords interaction by including the online learning interface and other online interaction elements (i.e., network, rules, community) using SLA concepts. Therefore, the focus here is to share a conceptual framework that comprehensively reflects the interactions in online learning at (1) an interpersonal level and (2) the larger learning environment, while accounting for the potential of SLA and network analysis supported by the social presence construct.

2.3. Social learning analytics for online learning

Ifenthaler (2015, p. 447) defines LA as "the use, assessment, elicitation and analysis of static and dynamic information about learners and learning environments, for the real-time modeling, prediction and optimisation of learning processes, and learning environments, as well as for educational decision making." LA in higher education has primarily focused on supporting student success (Sclater et al., 2016; Ifenthaler and Yau, 2020). For example, LA has been used to predict performance (Xing et al., 2015; Aulck et al., 2017), identify at-risk students (e.g., students who may dropout) (Aguiar et al., 2014; Cohen, 2017), analyze student dropout to support retention (Aguiar et al., 2014), or improve course design, and student engagement (Lockyer and Dawson, 2012). LA for online learning environments primarily uses learners' data (e.g., frequency of LMS logons, course resources downloads, or module accesses) to account for their navigation patterns, preferences, and behaviors (Ifenthaler and Widanapathirana, 2014). However, LA's potential has yet to be realized, as research commonly focuses on aggregated quantitative representations and does not fully consider the social dynamics necessary for meaningful learning in online environments. Furthermore, LA has been described as part of an "algorithmically pervaded society" (p. 17) in which theory has been discarded in place of data analysis (Knight and Buckingham Shum, 2017). Relying only on data analysis results in the under-exploration of the relationship between LA and its application and a lack of understanding of LA among educators and researchers (Drachsler and Greller, 2012). Viberg et al. (2018) found in a literature review on LA in higher education that despite the potential for LA to improve learning practice, very little LA application is realized in higher education practice.

Given that learning is inherently a social activity that requires external support (i.e., scaffolding) and interaction from instructors, peers, or the learning environment; a subfield of LA emerged —Social Learning Analytics (SLA). SLA offers educators and researchers new opportunities to overcome challenges in online teaching and learning like feelings of isolation and community building (Hart, 2012; Richardson et al., 2015) under the assumption that social learning contributes to the "quality of learning and student experiences" (Poquet and Joksimovic, 2022, p. 38). SLA focuses on understanding the interdependency of social relationships and how this can be used to promote learning through social interaction. SLA takes a socio-constructivist approach to learning, in which learning occurs through interaction and collaboration. As a part of SLA, researchers use network analysis to understand learners' interactions (Aviv et al., 2005) in online learning environments (Jan et al., 2019). Network analysis uses statistics and graph theory to study the relationships of entities (e.g., learners), assuming dependency on those with whom they connect and those within the same group (Monge and Contractor, 2003).

2.4. Conceptual frameworks for social learning analytics and their limitations

Next, we analyzed three main conceptual frameworks of SLA. To guide this process, we used the social presence construct to examine SLA frameworks from a perspective relevant to online learning. First, we begin with Ferguson and Shum's (2012) framework that defines the main elements of SLA. We use Buckingham and Shum's SLA framework, which pioneered the identification of the main elements of SLA, because (a) they propose an analytical approach that takes a social learning theory approach, (b) it includes the use of social networks incorporating the network element that Dennen (2019) adds to the transactional distance theory, and (c) it takes a community-centered approach which agrees with the social presence perspective of perceiving and projecting each other as real (Lang et al., 2022). Then, we analyzed Jan and Vlachopoulos's (2019) exploration of the concept of communities based on online discussion boards. Given the historical roots of text-based communication in distance learning, we included Jan and Vlachopoulos's (2019) framework that focuses on discussion boards and capitalizes on the socio-constructivist lens of social presence to apply network analysis to understand learning. Finally, we discuss interaction per Kent and Rechavi's (2020) framework as it pertains to usage in online environments because they account for students who are less active in discussion boards. Kent and Rechavi's (2020) perspective is essential to account for those unobserved interactions in online learning that still foster social presence perceptions. Table 2 synthesizes this section.

2.4.1. Ferguson and Shum (2012)

Ferguson and Shum (2012) recognized the importance of LA in improving learner outcomes, noting great potential arising from an "unprecedented" volume of data about learner activities and interests. Within a learning design space, the authors propose that SLA should be implemented to distinguish the concept and unique features of a social learning environment. Ferguson and Shum (2012) also suggested the need for defining the possibilities of SLA; as being inherently social (as a behavior and discourse analysis) or socialized (as an application to a broader setting; content, disposition, and context). Finally, the applications of SLA demand an ethical perspective by considering its limitations and abuses.

The underlying socio-cultural philosophy of Buckingham Shum and Ferguson draws on the distinction that SLA is a unique subset of LA that rests on the premise that novel skills and ideas

TABLE 2 Conceptual frameworks for social learning analytics and their limitations.

Conceptual framework	Constructs	Type of interaction	Social network statistics*	Limitations based on social presence
Ferguson and Shum (2012)	Social analytics and socialized analytics Five conditions influence learning	Social engagement direct interaction (dialogue) (learner-learner interaction) and indirect interaction (ratings, recommendations, reactions) (learner-interface, learner-content)	Actors: People/resources. (Actors are also known as nodes). Ties: Relations among actors. Weak ties: Accessing new knowledge and informal learning. Strong ties: Deepen knowledge. Egocentric: Individual perspective/Individuals who support the online learner. Whole network: Group of online learners/Individuals who hold the network together.	Affective communication and cohesive responses are not considered from a network analysis perspective.
Integrated Methodological Framework (Jan and Vlachopoulos, 2019)	SNA Parameters Application Adaptation Interpretation	Community focus CoI/CoP. learner-learner interaction	Cohesion: Group of network analysis measures to understand whole networks of learners. The measures included are: density, average degree, centralization, components, and core-periphery structure. Sub-groups: To investigate groups of students using the *cliques* measure. Cliques represent a subgroup of actors (e.g., learners or messages) in which all are related among themselves. Power Dynamics: Group of network analysis measures focused at the individual (i.e., actor) level. The measures included are: Reciprocity, redundancy, transitivity, and centrality (degree/indegree/outdegree).	Researchers might find it challenging to apply the IMF because it integrates multiple concepts of both Community of Inquiry and Community of Practice. Yet, it does not go into detail on the subconstructs of either of them.
Kent and Rechavi (2020)	Creative interaction network Consumption interaction network Organizational interaction network	Community, content, and meta-cognitive	Distance: It focuses on how tightly connected are the interactions among participants. They use the statistics *diameter* to account for the shortest path that connects the farthest members of a community. Reciprocal: If focuses on peer-learning, collaboration, and collective construction of meaning using the *reciprocity* (i.e., mutual interaction) and *transitivity* (i.e., how two interacting actors influence the third one) network statistics. Influence: The extent to which an actor is central in the community using the out-degree (i.e., outgoing interactions) and betweenness statistics (i.e., interactions with essential nodes in the network).	Lack of indicators to account for affective communication.

*This table portrays the authors' definitions of SNA measures. These are dependent on each framework as network analysis allows for great flexibility to account for individual contexts.

are a result of interaction and collaboration. The authors maintain that five conditions or phenomena influence the learning context: (1) technology, (2) open access, (3) knowledge age skills, (4) social learning as a catalyst for innovation, and (5) challenges to educational institutions.

Social learning is characterized by "changing affordances" in which social activity occurs "at a distance, in mediated forms" (Ferguson and Shum, 2012, p. 8). Social learning occurs when intentions are clarified, learning is grounded, and learners are engaged in conversations to increase their understanding. Ferguson and Shum (2012) refined the conceptualization of SLA by specifying a five levels taxonomy: social network analytics, discourse analytics, content analytics, disposition analytics, and context analytics. From the social presence perspective, Buckingham Shum and Ferguson account only for the open communication element when addressing network analysis in SLA to investigate learners' interactions and relationship development, without considering affective communication or cohesive responses.

2.4.2. Jan and Vlachopoulos (2019)–Integrated methodological framework

Jan and Vlachopoulos (2019) proposed an Integrated Methodological Framework (IMF) that combines Community of Inquiry (CoI) and Community of Practice (CoP) frameworks through the lenses of SLA. The CoI is a constructivist process-model for collaborative discourse that integrates three "presences" that constitute a successful online learning experience (Garrison et al., 2000; Swan, 2021)–among those presences is *social presence*. A CoP includes a group of people with shared interests and different levels of expertise and interest in a shared domain (Wenger, 1998, 2004; Farnsworth et al., 2016) that relates closely to informal and professional learning experiences (Dennen, 2019). Although CoI and CoP differ in participants' expected level of commitment and participation–in which the former expects higher commitment and the latter encourages more autonomy–both are forms of collaborative and interdependent online learning (Dennen, 2019). After conducting a systematic review of research that investigated CoI/CoP through social network analysis, Jan

et al. (2019) found the need to provide a conceptual framework to guide the identification of online learning communities. They argue that all communities are networks, and therefore, an SLA approach is appropriate. Their purpose is to build a framework to identify learning communities in higher education online learning. Jan and Vlachopoulos (2019) argue that there is a lack of quantitative research using both CoP and CoI frameworks, which are widely used in online learning (Castellanos-Reyes, 2020). Despite the potential of SLA to identify online communities, little research exists considering CoP and CoI through SLA. Although, to our knowledge, Jan and Vlachopoulos (2019) are the pioneers of proposing a conceptual framework that integrates online learning theory and SLA, their SLA approach is still descriptive, limiting researchers' possibilities. For instance, they focus on descriptive aggregated network analysis, leaving behind inferential analysis (e.g., exponential random graph models). Narrowing down Jan and Vlachopoulos's (2019) approach from all the constructs of CoI and CoP to social presence would better serve researchers investigating interactions in online learning using SLA given the potential complexity of network analysis.

2.4.3. Kent and Rechavi (2020)–Deconstructing online social learning

Like Jan and Vlachopoulos (2019) and Kent and Rechavi (2020) also focused on the potential of SLA to support online discussions from a community perspective. Kent and Rechavi advocate for more types of interactions apart from "speaking" interactions (e.g., direct communication via discussion board posts). They explain that a majority of participants in online learning are considered *inactive* or *passive*. Therefore, suggesting speaking interactions as the most valid type of interaction is a misconception because learners also engage in other behaviors like interacting with content. Furthermore, discussion boards elicit anxious feelings in learners who doubt the significance of their contributions (Koehler and Meech, 2022). Guided by a collaborative learning paradigm, Kent and Rechavi (2020) describe the learners' interaction networks in online communities based on three types of interactions: (1) creational, (2) consumption, and (3) organizational. Kent and Rechavi (2020) allegorize creational interactions as "digitally speaking," implying proactive interactions from learners (e.g., posting, editing posts). "Digitally listening" exemplifies consumption interactions like following peers, watching videos, or reading. The authors argue that learners' consuming interactions are usually overlooked due to the complexity of data extraction and an over-emphasis on individual assessment rather than collaborative work. Kent and Rechavi argue that consumption interactions serve to consider passive learners, also known as lurkers. Finally, stemming from Ausubel's advance organizers (1968), learners' activities with content organizational interactions refer to organizing their content through tags and bookmarks. While Kent and Rechavi (2020) include student-content interaction, a more apparent distinction between consuming interaction (i.e., interaction with content) and organization interaction (i.e., sorting content) is needed to better reflect the types of networks that researchers can study through SLA. Furthermore, despite Kent and Rechavi's work addressing learners that are usually overlooked (i.e., lurkers), they fall short on how to analyze the creational content that learners make in their interactions. Furthermore, as social presence is a precursor of a trustworthy environment for knowledge construction, understanding how "digitally listening" (student-content) interactions contribute to this foundation by supporting knowledge construction is necessary. As Richardson and Swan (2003) asserted "social presence permeates not only the activities generally designated as social activities but also those activities usually designated as individual activities" (p. 80). Furthermore, the SNA measures they examined, like transitivity and betweenness, can be related to the social presence construct "group cohesion" because they estimate how a network of learners is well connected. Such are summary statistics that describe the interactions within the network. Still, they do not account for students' perceptions of the social presence or their ability to display themselves as real. We ask, what aspects of the creational interactions that Kent and Rechavi propose make learners feel part of an online community to learn socially? Specifically, we suggest that adding the perspective of affective communication from the social presence construct is much needed to understand online learning interaction deeply. For example, include indicators that account for students' feelings during discussion boards or when interacting with the content.

3. Defining the i-SUN conceptual framework

The above models and frameworks demonstrate that interaction is a critical aspect of collaborative online learning and, consequently, of social presence to sustain online learning. Aside from learning occurring individually (Anderson, 2003), accounting for social presence enhances online learners' experiences and interactions by positively influencing their perceived learning and satisfaction (Richardson et al., 2017). As such, interaction can be among learners, instructors, content (Moore, 1989); learner and the interface (Hillman et al., 1994); and even between learner and the network (Dennen, 2013). We also underscore the need to account for the interaction of online learners who do not interact directly with peers or instructors (Kent and Rechavi, 2020)-in other words, who prefer to interact with the interface, the content, or the network only. Previous work described the unique role of discourse as essential to examining the quality of the interactions within the online learning experience (Gunawardena et al., 1997). As explained by Dennen (2019), Engeström captures the complexity of online ecosystems by describing tensions among elements. Taking all these perspectives together, we propose using a network analysis lens to help researchers explain the complexity of interactions in online learning on what is called SLA (e.g., Ferguson and Shum, 2012; Jan and Vlachopoulos, 2019). We posit an integration of social presence, SLA, and network analysis to research online learning interaction. To that end, we first offer a visualization of the proposed steps to research online learning interaction using SLA through the i-SUN process (see Figure 1). Then, we address the indicators of SLA measures for researchers to investigate online learning interaction through SLA and the social presence construct lens (Table 3).

TABLE 3 Social learning analytics indicators to research interaction from a social presence perspective.

Social presence category	Activity system component involved[a]	Interaction type	Examples of network analysis indicators[b]
Affective communication	Subject, community, tools	L-L, L-I, L-C	*Degree measures*: Incoming (i.e., indegree) and outgoing (i.e., outdegree) interactions among learners, between learner and instructor, and learner and content: • Reacting to peers through system buttons (e.g., like, dislike) (e.g., Castellanos-Reyes, 2021)
	Subject, community,	L-L, L-I	*Reciprocity*: The extent to which affective communication is mutual. • Reacting back to peers through system buttons (e.g., like, dislike) (e.g., Castellanos-Reyes, 2021)
	Subject, community, tools	L-L, L-I, L-C	*Isolate:* Learners with no affective interaction received or sent in the network
Open communication	Subject, community	L-I	*Betweenness*: The extent to which the instructor mediates between learners to connect them. • Tagging/Mentioning students as part of a follow-up comment in the discussion board
	Subject, community, tools, division of labor	L-L, L-I	*Isolate:* Learners with no links to peers or the instructor. No reports of opening content, downloading content or sharing content via networks. Serves to spot inactive members of a conversation (e.g., Satar and Akcan, 2018).
	Subject, community	L-L, L-I	*Degree measures*: Incoming (i.e., indegree) and outgoing (i.e., outdegree) interactions among learners and between learner and instructor: • Sending/receiving messages replies in discussion boards. • Identifying degree measures ensures that all parties involved contribute to a collaborative learning experience.
	Subject, community,	L-L, L-I	*Reciprocity*: The extent to which replies in discussion boards are mutual.
	Subject, community	L-L, L-I	*Diameter:* The shortest distance that connects "the farthest users in the community" (Kent and Rechavi, 2020). It serves to identify members of the community that may not share the same ideas.
	Subject, tools, rules	L-Int, L-N	*Transition networks:* Learners' paths and interactions within the system (e.g., Zhu et al., 2016) indicated by clickstream data. • The same network measures apply (reciprocity, degree, isolate, diameter, betweenness, isolate) but steps taken within the system (clicks) rather than individuals or the content. • Clickstream data may help verify learners required access to the platform to complete course requirements.
Cohesive responses	Subject, community, tools, rules	L-L, L-I, L-C	*Epistemic Network Analysis*: Discourse components become units of analysis and nodes of a network. Connections among components are based on co-occurrence (Gašević et al., 2019). • The same network measures apply (reciprocity, degree, isolate, diameter, betweenness, isolate) but among ideas (discourse components) rather than individuals or the interface. • The Integrated Methodological (Gunawardena et al., 1997) framework serves to categorize discourse components.
	Community	L-L, L-I	*Cliques:* Subset of learners that reach each other through interaction. It means that all members of a click have connections among themselves. Cliques can help us identify subgroups in a class in which cohesive responses take place (e.g., Jimoyiannis et al., 2013; Gašević et al., 2019)

L-L, Learner-learner interaction; L-I, Learner-Instructor; L-N, Learner-Network; L-Int, Learner-Interface.

[a] As per activity theory, interaction is the object of the online learning system environment. Given that we account for types of interaction, we are not adding it in the column "Activity System Component."

[b] Definitions of basic network analysis indicators were contextualized to the online learning field.

3.1. The i-SUN process

We propose a four-step process using social learning analytics for researching online learning interaction supported by social presence (Figure 2) with the purpose of fostering rigorous application of online learning theory when using complex data and methods. The first step focuses on choosing the interaction of interest. Second, researchers are suggested to align the social presence subconstruct with the selected interaction to guide their inquiry. Third, based on the previous selections, researchers are prompted to choose the units of analysis, as well as the type of network they would like to research. Finally, a set of descriptive network statistics can be selected to understand the interaction and, if necessary, inferential network analysis tests.

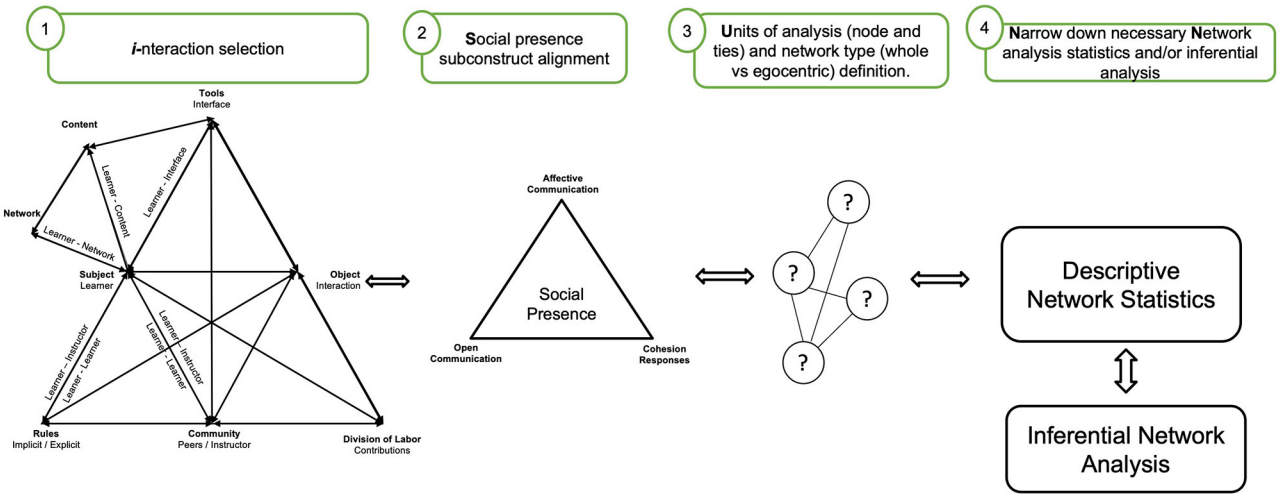

FIGURE 2
The i-SUN process to use social learning analytics to research online learning interaction guided by social presence.

3.1.1. Step 1: i-nteraction selection

The main triangle in Figure 2 depicts the tension between the online learner (i.e., subject) and the complex environment (i.e., tools, object, division of labor, community, and rules) as captured by Engeström's (2001) Activity Theory adapted to online learning (Dennen, 2013). This structure includes the subject who is the student engaged in activities within the online learning system resulting in interaction. Students are the actors or nodes initiating the interaction toward instructors, other learners, content, the interface, and the network (i.e., social media). It is worth noting that the learner-network and the learner-community are not interchangeable, as learner-network interaction refers to interactions with "outsider" individuals (Dennen, 2013) whereas learner-community refers to interactions with those who are a part of the institutional academic community (i.e., instructor and peers). The rules are "Implicit and explicit guidelines that constraint the activity" (Xing et al., 2015). The interface or the instructor could impose these rules. For example, instructors usually enforce implicit rules like netiquette in discussion boards. Explicit rules might include interface affordances to include (or not) liking buttons to acknowledge announcements and comments. Furthermore, ethical considerations about the data gathered for SLA fall within this category. Community involves the interaction between learners and peers and learners and instructors that create a sense of community. Given that direct exchange of information may not be necessary for all learners to establish a sound sense of community. Therefore, the tension between the learner and tools is also relevant. Tools are the instruments that mediate the learning environment (e.g., learning management systems, institutional email).

The two smaller triangles adjacent to the main structure add the components of the network and the content that refer to the interaction between the subject (learner) and the content and the network as proposed by Hillman et al. (1994) and Dennen (2013). The three components (tools, content, and network) are aligned as non-human elements from which SLA gathers data to support online learning interactions. Finally, the object is learning interaction itself with the components of the online learning activity system.

3.1.2. Step 2: social presence subconstructs alignment

After choosing the object of the system, which is the interaction itself, researchers need to align such interaction with at least one of the social presence elements to guide their inquiry. This interaction is supported by the three elements of social presence: open communication, affective communication, and cohesive discourse. Researchers can either use the three components of social presence separately like Tirado-Morueta et al. (2016) did or use the social presence construct as a whole, following the example of Shea et al. (2014). Although researchers are encouraged to use the social presence construct holistically, sometimes, the available interaction data are not comparable to all the elements of social presence, for example, in the case of Castellanos-Reyes (2021), who faced the limitation of using clickstream data to investigate the interaction and consequently focused only on affective communication and open communication.

3.1.3. Step 3: units of analysis and network type definition

This step focuses on defining who are the nodes or actors in the interaction of interest and which type of network better suits that interaction. Most research using SLA so far has focused on learner-learner interaction. Therefore, the nodes in the analysis are the learners themselves. If researchers focus on single online courses, their analysis can use whole networks. In other words, they can study the interactions of the entire system. Researchers can also focus on longitudinal analysis of learners' networks. For

example, the work of Saqr and López-Pernas (2021b) who follow the interactions of online students over an entire program.

3.1.4. Step 4: narrow down network analysis statistics and inferential analysis

Although network analysis provides a plethora of network statistics to choose from, researchers would benefit from keeping an efficient rather than extensive attitude toward using network analysis measures. For example, Castellanos-Reyes (2021) used the indegree measure (i.e., the number of incoming interactions received by an actor) to estimate affective and open communication. On the one hand, the number of likes received on a comment on a discussion board was equivalent to affective communication. On the other hand, the number of comments that a student received was operationalized as open communication (Castellanos-Reyes, 2021).

Table 3 integrates the different elements of the proposed framework with specific measures to guide researchers when using SLA to examine online learning interactions. The first column refers to the categories of social presence, while second column refers to the components of the complex activity system that play a role in each social presence element. The third column refers to the type of interaction. Given that SLA uses network analysis measures to explain learners' interactions (Aviv et al., 2005), a central component of the i-SUN framework is to contextualize the definition of basic network statistics frequently used in SLA for online learning. As such, the fourth column refers to the specific SLA measures adapted. The network analysis indicators described stems from theories of communication networks (Monge and Contractor, 2003) and foundational work on social network analysis (Marin and Wellman, 2011). Furthermore, in the fourth column specific examples of each SLA indicators are provided for guidance. Some network analysis measures repeat given that researchers may use one measure to explore different aspects of interaction and social presence. Readers interested in a more detailed description of network analysis measures, please refer to Monge and Contractor (2003) and to Carolan (2014) for contextualization in broader educational research.

4. Discussion and applications

The conceptual framework and indicators presented in this paper will serve researchers who want to understand online learning interactions through SLA. Currently, SLA is dominated by a small group of researchers, and this framework can help create an opportunity for others to join that conversation. Perhaps, one reason for this might be the perceived complexity of the methods used. Therefore, we believe that a conceptual framework may allow other researchers to join this conversation by elaborating on the meaning of standard SLA measures in online learning. This conceptual framework adds value to the field by connecting online learning constructs to network analysis measures used in SLA. Previous researchers have conceptualized network analysis for educational research (Ferguson and Shum, 2012; Jan and Vlachopoulos, 2019; Kent and Rechavi, 2020). However, existing frameworks are still too obscure for researchers unfamiliar with network analysis to follow. Yet, the proposed framework merits consideration, given its focus on a step-by-step basis and its integration of inferential network analysis. Furthermore, we have expanded upon the pioneering work of Jan and Vlachopoulos (2019) by including interactions among members of the community within discussion forums and other elements of the activity system (i.e., content, network, interface).

The presented conceptual framework offers practical guidelines to researchers who foster interaction through social presence. Therefore, the proposed framework may support future endeavors that conceptualize other elements of online learning communities apart from social presence, like cognitive and teaching presence. Future work could expand the proposed framework using the exemplary work of Sadaf and Olesova (2020) who used SLA to explore the Practical Inquiry Model in relation to social presence. Given that the Practical Inquiry Model is used to operationalize cognitive presence, we foresee that future work on SLA and interaction will take upon the challenge of addressing these other constructs. Therefore, the i-SUN model could potentially be applied to other online learning constructs such as cognitive interactions.

4.1. Applications of the i-SUN conceptual framework

We argue that through SLA, network analytic methods are a coherent approach to online learning because they can illuminate the interdependencies of the learning ecosystem. However, the complexity of network measures and their indiscriminate use in educational research poses interpretative challenges for researchers leading to a "cacophony of networks" (Poquet and Joksimovic, 2022). Therefore, this framework does not focus on further analyzing empirical data but rather on "integrating existing perspectives into a more holistic view" (McGregor, 2019, p. 7) that connects the bodies of literature of online learning interaction, SLA, and network analysis. As conceptual frameworks do not generally include empirical data (McGregor, 2019), this framework provides a list of potential applications of the i-SUN Conceptual Framework that merit empirical validation. These examples serve the online learning field as guidelines for rigorous SLA implementation.

4.1.1. Fostering community using task-centered approaches

When learners interact with each other through the interface, active participation is facilitated by achieving common goals through division of labor and open communication. Yet, we recommend studying the specific mechanism and instructional methods that drive such facilitation. A good example is Tirado-Morueta, Maraver-López, Pérez-Rodríguez and Hernando-Gómez (2020) work in which facilitation tasks are explored using network analysis measures (i.e., density and centralization) in the light of social presence. Researchers could integrate instructional elements using Molenda and Subramony's (2021) update of the elements of instruction framework which provides a set of communication configurations that can be explored through SLA and social presence.

4.1.2. Use of learner-network interaction to foster knowledge transfer through egocentric approaches

The addition of learner-network interaction proposed by Dennen (2013) allows researchers to add authentic learning experiences to online learning interactions. For instance, registering learners' interactions with individuals outside the formal online learning community, such as experts on Twitter (Castellanos-Reyes et al., 2021). Suppose researchers are looking to investigate learner-network interaction. In that case, they might not have access to all learners available in the network. So, although the unit of analysis is still learners, they might want to focus on an egocentric approach to online learning. An analysis of egocentric networks, learners are asked for information about those with whom they interact. However, those at the other end of the interaction are not part of the research. A potential application is to ask learners who are the top three Twitter users who make them feel affectively connected to the community.

4.1.3. Go beyond threaded discussion data

Most research using network analysis to examine social presence centers on text-based communication. However, focusing only on discussion boards leaves behind those vicarious learners who benefit from reading without engaging in conversation, the so-called *lurkers* (Sun et al., 2014; Bozkurt et al., 2020). Koehler and Meech (2022) found that discussion boards can overwhelm learners, producing anxiety about what to post and the merit of their thoughts compared to peers' contributions. Furthermore, social presence behaviors might occur in other aspects of the course, like communications via email as part of group work. Again, the vast amount of data collected through learning management systems can enrich researchers' conclusions about students' social presence. For example, researchers might also integrate the Community of Inquiry instrument (Arbaugh et al., 2008), specifically the SP subscale, as covariates of their SLA research. Combining the self-reported measures of SP as covariate measures would shed light on how the network configuration of online learning communities reflects students' internal psychological states. Furthermore, ERT (Hodges et al., 2020) employed widely during the COVID-19 pandemic highlighted other formats of distance education delivery, (e.g., synchronous interaction via videoconference) that should be examined. Although mandatory viewing of pre-recorded lectures and videoconferencing are uncommon in formal distance education (Stewart et al., 2023), they became the heart of ERT, eventually taking an essential role in online learning post-pandemic. Future research could explore the relationship between synchronous communication via videoconferencing and constructs like connectedness and community building (Belt and Lowenthal, 2023), and eventually social presence interactions as the object of the learning experience.

4.1.4. Being intentional with network analysis indicators

Network analysis offers a plethora of network statistics to understand and explain the structure of a network. Furthermore, network analysis allows researchers to define what each statistic means in their contexts. Yet, it does not imply the unsystematic use of statistics for the sake of reporting. Saqr and López-Pernas's (2021a) meta-analysis of network analysis centrality measures used to investigate collaborative learning argue that previous work shoes inconclusive and contradictory results. Their analysis recommends using degree and eigenvector centrality measures as performance indicators but discourage the use of closeness and betweenness centrality. We invite researchers to be intentional about the statistics used in SLA measures, and above all, guide their definitions with a theory like the social presence construct. For example, previous work by Shea et al. (2010, 2013) have suggested that measures like centrality are significantly related to social presence.

4.1.5. Explore correlational and inferential network analysis

The merit of descriptive work is indisputable. It is descriptive analysis and observations what drive researchers to formulate hypotheses to explain the educational phenomenon. Yet, we encourage researchers to make the leap from descriptive SLA to inferential SLA to better understand online interaction and social presence. Inferential SLA does not need to involve complex longitudinal (Castellanos-Reyes, 2021) or epistemic (Gašević et al., 2019) research designs. For instance, parallel to traditional *t*-tests, researchers could compare two different relations of the same set of learners. For example, researchers could explore if a social presence network obtained from online learners' collaboration shows patterns that deviate from a comparable random network (Borgatti et al., 2018).

4.1.6. Question the boundaries of an online community and who belongs to it

Social presence in online learning is conceptualized in this manuscript from the CoI lens. Although ERT has driven researchers various delivery forms of online learning like synchronous communication through the CoI lens (Shea et al., 2022), the CoI was conceptualized to address text-based computer-mediated communication in formal higher education, which assumes that all students enrolled in a course are members of the community. Nevertheless, issues like passive students or lurkers (Sun et al., 2014; Bozkurt et al., 2020) and the inclusion of intelligent tutoring via artificial intelligence (Ebadi and Amini, 2022; Huang et al., 2022) make us push the question of the boundaries of an online community. Related to the suggested application of going beyond discussion boards, we invite the community to apply the i-SUN process to identify who belongs to an online community by comparing observed data from discussion boards with students' reports on who they consider being in their communities. Taking such an approach might shift the focus to individual students' connections without assuming that the community includes everyone enrolled in a course.

5. Conclusions

There is a need for a SLA taxonomy to analyze online learning interaction that fosters a rigorous application of online learning

interaction theory combined with network analysis methods. As such, the expansion of the i-SUN conceptual framework into specific measures used in SLA is a concrete tool for researchers. Future work on SLA should have an intersection and consideration of cultural contexts and nuances. Examples include exploring the relationships between culture and learning through measures such as collective quantitative proficiency. For example, process data collected from computer assessment environments are analyzed through transition networks. Conceptual frameworks require an application to explore how the offered operationalizations stand in a real-world setting. Therefore, future work should focus on how the provided SLA measures reflect online learning interaction. We hope to apply the proposed measures in a prospective case study.

Author contributions

DCR contributed to conceptualization, writing of initial draft, creation of visualization, and reviewing and editing. AK and JR contributed with critical review, and commentary or revision. All authors contributed to the article, manuscript revision, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Challenges and instructor strategies for transitioning to online learning during and after the COVID-19 pandemic: a review of literature

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The COVID-19 pandemic triggered an unprecedented shift to online learning, significantly impacting the higher education landscape. This paper examines the challenges faced by faculty and students during the rapid transition to online instruction and explores best practices for delivering effective online courses. The increased adoption of online learning created stress for faculty and resulted in academic setbacks for students. Although challenges are present strategies exist to help faculty create rich online learning environments. One important element is engagement, which looks at both student engagement with the material and with their classmates and faculty. In addition to working on student engagement the faculty were now in a position that required a new type of expertise to manage online interactions, which can be much different from their experiences in traditional classrooms. Insufficient time for proper course adaptation and limited knowledge of online teaching methods added to these challenges. Effective online delivery requires careful planning, utilization of advanced instructional technologies, and creating an immersive and interactive learning environment. Faculty must also adapt their teaching strategies to accommodate the unique challenges of online instruction. This review highlights the significance of a quality learning management system (LMS) as the backbone of online courses. An effective LMS facilitates course management, content delivery, and student interaction. Future considerations include providing comprehensive faculty support and training, promoting effective communication and collaboration among students, and incorporating interactive elements into online lessons. The following will provide lessons learned from the COVID-19 pandemic which will help faculty to improve their instructional competence and social presence in the online classroom.

KEYWORDS

COVID-19, online teaching, student engagement, course development, online learning

Introduction

The COVID-19 pandemic accelerated the shift to online learning in a way that no one could have predicted with nearly 44% of all US undergraduate students being enrolled in an online class by Fall of 2020 (National Center for Educational Statistics, 2023). Before the pandemic, 15.4% of all students pursuing a degree at a university or college were enrolled in distance education courses (Ginder et al., 2018; Kozimor, 2020); the pandemic and resulting pivot to online learning resulted in that percentage more than doubling. This hasty transition

created stress for faculty and caused students to suffer academically (Chou and Chou, 2021; Islam et al., 2023). This changed the academic landscape as faculty and their students were not allowed onto their campuses and into their traditional classrooms (Moore et al., 2021). This unexpected change allowed little time for proper transition of in-class material to online learning with many faculty making few changes to their content as they scrambled to get online (Moore et al., 2021). Faculty reported a lack of institutional infrastructure and a lack of knowledge on the technical aspects of teaching online (Caliskan et al., 2020; El-Soussi, 2022; Salarvand et al., 2023) as well as elevated work demands and a prevailing state of fatigue (Tang et al., 2023). Some lost their professional identity as they had to adjust their beliefs related to online teaching and change their practices to adapt to this new learning environment (El-Soussi, 2022).

This rapid transition had students concerned about how the course would be delivered and this uncertainty created additional stress (Dennen et al., 2022; Tang et al., 2023). This was understandable as many were not experts in online course content creation and delivery (Bailey and Lee, 2020; Moore et al., 2021). In addition to the technical aspects of moving to an online environment, there are concerns with instructor and student engagement as universities were faced with trying to create an online environment which mimicked the same type of community that is fostered on their physical campuses (Tang et al., 2023). Part of the culture of an in-person program is that there are important social aspects that take place in and around the classroom setting. These might be conversations before or after class or seeing a classmate around campus. The transition to online learning eliminated this important aspect that helps students to feel a sense of belonging (Salarvand et al., 2023; Tang et al., 2023).

The transition to distance education has created a scenario where universities must have a greater focus toward online learning (Dziubaniuk et al., 2023; Imran et al., 2023). The following review of literature will investigate how to engage with students, manage the online interactions, how to best deliver online education, as well as the importance of the learning management system and the challenges experienced as schools quickly transitioned to an online learning environment during the initial phases of the COVID-19 pandemic.

Engaging online students

Student engagement is a concept that has been discussed, debated, and researched for more than 75 years. Tyler (1948) explored ways of improving teaching and suggested that students needed to put in time with course material for desired outcomes (Kuh, 2009; Groccia, 2018). Since then, theories and strategies have been conceptualized like Astin's (1984) student involvement theory which focused on and expanded the idea of student involvement in course material. Astin (1984) theorized that student success and satisfaction in their studies is directly related to the psychological and physical energy that is dedicated to their studies (Kuh, 2009).

Scholars like Chickering and Gamson (1987) compiled guiding principles outlining the best practices in higher education settings. Several principles contribute to the enhancement of meaningful interaction among faculty and students, as well as fostering interactions between students themselves. Emphasizing the significance of students' "time on task" as part of the learning process, integrating active learning methods into courses, and delivering timely and valuable feedback on student work are among these principles (Chickering and Gamson, 1987; Kahu, 2013; Martin and Bolliger, 2018). These principles, especially time on task, aim to increase student engagement with the course material.

Student engagement refers to the amount of "time and effort" a student applies to their course material (Kuh, 2009; Martin and Bolliger, 2018). One option for increasing the amount of time a student engages with the material is to ensure there is a clear connection between the learning outcomes for the course and their professional goals (Rioch and Tharp, 2022). For students in a business and professional communication course this could be conducting online presentations to help prepare them for their career. These presentations could be collaborative which helps foster peer engagement. Each member could provide feedback to one another and the assignment could include an element where they reflect on the process, all of which help students engage with the material and one another (Bolliger and Martin, 2021). Online learning environments necessarily create scenarios where students can take greater responsibility for their learning and engagement with the material, their faculty, and peers (Huang et al., 2023).

Student engagement can be attributed to class size, instructor technology gaps, instructor competency, student satisfaction, student motivation to learn in an online environment, and teacher availability (Page et al., 2020; Kordrostami and Seitz, 2022; Yan et al., 2022). Increased student engagement and satisfaction are linked with higher academic success (Subramainan and Mahmoud, 2020). One of the characteristics of successful online faculty is high self-efficacy which has been linked with willingness to continue teaching online (Chou and Chou, 2021). Students must view their faculty as competent which includes elements such as field knowledge, technical savvy, course organization, and their ability to engage with the class (Chou and Chou, 2021; Kordrostami and Seitz, 2022).

Students shared that in an online course they would prefer increased communication in the form of emails and announcements with information regarding their upcoming assignments which helps students to view their faculty as being proactive (Sood et al., 2021; Dennen et al., 2022). Although students preferred more communication the faculty reported that student communication significantly decreased in the online classroom (Salarvand et al., 2023). They found students had lower motivation to learn and were less likely to participate in cooperative learning opportunities (Salarvand et al., 2023) which increases the pressure on faculty to engage these students. Outside of communicating with their faculty, students are more likely to be engaged when they have collaborative opportunities with other students which helps to increase their motivation in online learning (Gopinathan et al., 2022).

An additional factor that increases engagement is when the lessons have an interactive element (Kortemeyer et al., 2023). Discussion boards are one of the most effective ways to foster interaction and engagement between faculty and the students as they help to fill the gap as it relates to in class discussions (Moore and Shelton, 2013). These boards can be a place for general connections or more specific ones designed so that

students can ask each other questions about a current assignment. As with all elements of teaching there are certain ways that faculty can engage in the discussions which are more effective at enhancing the learning process, increasing critical thinking, and motivation to engage with the course material (Kwon et al., 2019). Kwon et al. (2019) categorized instructor comments into distinct types. Perspective-widening comments serve to motivate students to evaluate viewpoints expressed by their peers in discussion posts and to integrate novel ideas or solutions. These comments not only facilitate engagement among students, but also foster interaction between the instructor and students. On the other hand, elaboration-oriented comments encourage students to further develop the ideas that they have shared on discussion boards (Kwon et al., 2019). Elaboration-oriented comments are a great example of how instructors provide feedback which helps students improve and this style of feedback should be used at the individual, group, and classroom levels (Kwon et al., 2019; Kordrostami and Seitz, 2022). Instructors should be mindful of the types of comments used in order to have stronger student engagement while also promoting critical thinking and increased knowledge construction. Some aspects of quality online teaching are related to the faculty and the student, and other elements relate to the structure and organization of the course.

Transitioning any course from a traditional classroom to an online environment requires careful planning. Many faculty who are teaching online classes have little training in the best practices and are not aware of the time and work needed to (re)develop their class(es) (Dennen et al., 2022). Teaching synchronously through software such as Zoom is not the equivalent to an in-person lecture as there are fewer chances to monitor the students social and emotional cues and provide one-to-one feedback (Dennen et al., 2022; El-Soussi, 2022; Imran et al., 2023). The inability to see students' non-verbal displays of confusion or doubt increase the difficulty in ensuring students are progressing in an online course (Caliskan et al., 2020; Chou and Chou, 2021). Lecture classes present one set of challenges while others come with skills-based classes where the professor conducts demonstrations for the class while students follow along with the steps on their own computer (Dennen et al., 2022). If the faculty member is virtually sharing their screen for the demonstration, then students are unable to use their computer to follow the steps as they would during an in-person class (Dennen et al., 2022).

Simply having students present during class time is often more challenging in an online course. Faculty must be aware of varied student needs such as access to technology, time commitments such as work or childcare which may make synchronous activities (lectures, group projects) more challenging (O'Shea et al., 2015; Collins et al., 2019; Muir et al., 2019; Dennen et al., 2022; Salarvand et al., 2023). Collins et al. (2019) found that students who felt isolated and disconnected from the course had greater challenges learning and engaging in the online environment. Tang et al. (2023) found that those who had not taken courses prior to the transition to online learning were more likely to contemplate leaving the university. These results underscore the importance of directing attention toward student engagement within online courses, as active involvement plays a crucial role in fostering a sense of connection among students, the instructor, peers, and the course content.

Managing online interactions

Well-organized courses that include pedagogically-sound material delivery and assessments (or assignments) are rooted in the types of interactions present in the online course setting (Kim et al., 2022). Moore (1989) first wrote about three distinct interactions present in distance education courses and his work has since been cited more than 1,200 times. Moore (1989) identified three types of interaction inherent in effective courses that are still relevant today: (1) learner-to-learner interaction, (2) learner-to-instructor interaction, and (3) learner-to-content interaction.

Learner-to-content interactions

Learner-to-content interactions are at the center of all education and refers to the student's interaction with the course material (Moore, 1989; Cho and Cho, 2017). For students to grasp and internalize the content presented in their courses, it is essential that they dedicate sufficient time to the assigned tasks. In order to fully engage with the given materials, students should involve themselves in activities such as reading and watching the provided resources, dedicating sufficient time to completing assignments, taking comprehensive notes during the review process, and seeking clarification or assistance whenever necessary (Moore, 1989). There are a variety of learner-to-content delivery methods including readings, video lectures, lecture notes and/or presentations, multi-media content, and application assignments (Cho and Cho, 2017). When considering learner-to-content interactions, Van den Berg (2020) noted that students often find these interactions intellectually stimulating which helps increase student engagement.

Learner-to-instructor interactions

Learner-to-instructor interactions facilitate learner-to-content interactions and involve the "interaction between the learner and the expert who prepared the subject material" (Moore, 1989, p. 2; Cho and Cho, 2017). Learner-to-instructor interactions are a traditional connection that is essential to the learning process (Kim et al., 2022). This interaction is two-way with invested instructors that provide material and feedback to learners and active learners who engage with the material and instructor (Cho and Cho, 2017). For student-to-instructor interactions, Kim et al. (2022) recommend starting online courses off with asynchronous introduction videos and synchronous informal meetings to help build rapport between the instructor and the students as well as between students. Garrels and Zemliansky (2022) recommended establishing set times instructors are available to connect with students, which is similar to what is recommended for face-to-face classes. Instructors must strike a balance in terms of their digital presence within online courses, aiming to avoid excessive communication and overwhelming content. Instead, they should establish scheduled periods for online interaction, ensuring authenticity when engaging with students and making a meaningful impact without overpowering the comment section (Garrels and Zemliansky, 2022; Kim et al., 2022). Clear

organization and structure of course material in the online learning platform can help students more easily engage with the material (Kim et al., 2022). Learner-to-instructor interactions are vital to student satisfaction, success, and engagement in the course; instructors need to be responsive and engaged with the course and students (Cho and Cho, 2017; Van den Berg, 2020).

Learner-to-learner interactions

Learner-to-learner interactions exist between a learner and another learner, or with a group of learners and can include providing feedback, sharing information, and collaborating on work for courses through a variety of channels such as video chats, recorded videos, emails, and discussion boards (Moore, 1989; Cho and Cho, 2017). Cho and Cho (2017) examined the link between the types of interactions and student efficacy and regulation. Student self-efficacy in online learning environments is positively correlated with learner-to-content and learner-to-teacher interactions (Cho and Cho, 2017). Self-regulation and self-efficacy are indictors for positive interactions in online courses and student engagement (Cho and Cho, 2017; Kara et al., 2021; Kayaduman et al., 2022).

Garrels and Zemliansky (2022) suggest developing relevant yet meaningful social interactions such as group assignments focused on building group cohesion between students and completing tasks. These opportunities can help recreate the feeling of being in the same physical space a classroom gives to a course (Kim et al., 2022). Van den Berg (2020) noted student feedback on learner-to-learner interactions ranged from appreciation to more negative experiences. The study identified student context and individual learning styles as key factors related to receptivity of learner-to-learner interactions (Van den Berg, 2020) and helps to highlight that not all interactions are viewed positively.

Delivering instruction effectively online

High online student engagement is considered to be "instructor facilitated and student owned" (Schroeder-Moreno, 2010; Buelow et al., 2018, p. 330). The implications of this statement for the instructor are designing a well-organized online course, having a strong presence in the course, understanding the challenges online students face, and developing student interaction points within the course (Buelow et al., 2018; Martin and Bolliger, 2018; Page et al., 2020). Using effective multi-media delivery methods, introducing high impact assignments such as collaborative projects and gamified activities, clear communication, creative activities, and being mindful of student life commitments outside of school are common themes to use to increase online student engagement (Fredrickson, 2015; Muir et al., 2019; Dichev et al., 2020; Lange and Costley, 2020; El-Soussi, 2022; Martin and Borup, 2022).

Faculty should strive to create customized, immersive, interactive learning environments (Imran et al., 2023) which foster "deep thinking, understanding, reflecting, creating, and expressing one's own arguments" (Huang et al., 2023, p. 13). This might be achieved through open-book exams where students are required to search for the answers and conduct their own research (El-Soussi, 2022). Faculty must also strive to provide increased feedback to their students (El-Soussi, 2022). Kordrostami and Seitz (2022) note instructors can help facilitate student's retention of learning goals by implementing metacognition activities to maintain the student-content interactions in an online course. Examples of metacognition activities include course progress surveys for students and "what did you learn activities" (Kordrostami and Seitz, 2022, p. 248). Students should have multiple opportunities to practice self-reflection and self-assessment so that they can better understand what they have learned and what they need to focus on moving forward (Huang et al., 2023).

These skills are valuable as there are fewer opportunities to engage with their faculty informally for assistance compared to an in-person course. If faculty can instill these skills, the students will be better prepared to succeed in and out of the classroom whether it be in-person or online. Faculty must utilize the technological advances at their disposal to connect students to the material and to one another (Dziubaniuk et al., 2023). By allowing students to interact with the material they are able to organize it in such a way that is most beneficial to their learning style (Clay et al., 2023). Having students connect with one another allows for greater collaboration in the learning process (Bailey and Lee, 2020). Delivering impactful and engaging online instruction requires institutional support and instructor commitment to achieve increased online student learning outcomes through a willingness to get creative and try new ways to overcome the challenges of online teaching (Tang et al., 2023).

Understanding learning management systems

A quality learning management system (LMS) is a crucial element to having a successful online course (Veluvali and Surisetti, 2022). Jarvie-Eggart et al. (2023) found that the most important characteristic for successfully using an LMS was simply faculty familiarity with the system. This is a requirement because the courses taught today rely almost completely on an LMS to manage all aspects of the course (Veluvali and Surisetti, 2022). It allows the faculty member to interact with students, monitor their participation, deliver lectures, provide space for discussion boards, allow for submission of assignments, and delivery of exams (Veluvali and Surisetti, 2022). A significant benefit to online courses is that material can be accessed at any point in the day through the LMS which allows students to utilize the materials on their own schedule and even during synchronous lectures (Veluvali and Surisetti, 2022; Dziubaniuk et al., 2023). Many online courses allow students to self-pace and the LMS gives students the freedom and responsibility to progress through the course in a way that works best for them all while having the ability to interact with their classmates (Veluvali and Surisetti, 2022). LMS provide instructors with an observable behavioral engagement by documenting how long students log in to a course or watch videos (Mohammed et al., 2022). These online interactions and the ability to do so day or night is a significant change from the traditional classroom setting.

Thoughtful attention to the design, accessibility, organization, and presentation of course material in the LMS has an impact on student engagement. Making sure that courses in the LMS have straightforward navigation and clear organization of material is a proactive step for increasing student engagement (Sadaf et al., 2019; Kordrostami and Seitz, 2022). Maximizing the benefits of a course requires the strategic incorporation of a diverse range of advanced instructional technologies which can facilitate three crucial types of interactions: student-content, student-student, and student-instructor interactions. Some of these technologies include "glass boards", word bubble creation, real-time quizzes, polling, breakout grouping, virtual collaborative workspaces, and virtual communication tools (Kordrostami and Seitz, 2022). Developing high quality re-usable material such as recorded lectures and student (self)-guided exercises can save time so that instructor energy is focused on more customizable student-instructor interactions like discussion board comments (Kordrostami and Seitz, 2022). Instructors can create emotional engagement opportunities in online classes to foster a warm learning community for students by including introduction videos and responses, tips to succeed in class, and ice-breaker activities (Sadaf et al., 2019; Kordrostami and Seitz, 2022). As stated earlier the need for interactive and gamified environments is key to engaging students and without a robust LMS these elements would not be part of the class (Veluvali and Surisetti, 2022).

Looking to the future of online education

The COVID-19 pandemic accelerated the adoption of online learning in ways that were previously unforeseen. With a significant increase in undergraduate students enrolled in online classes, it is evident that online education has become an integral part of the academic landscape. This trend is expected to continue and necessitates a greater focus on online learning in the future. The transition to online instruction during the pandemic created challenges for both faculty and students. Faculty members faced difficulties related to a lack of institutional infrastructure, limited technical knowledge, increased work demands, and fatigue. Students, on the other hand, experienced uncertainties regarding course delivery and the unfamiliar environment of taking classes online which added to the complexity of the situation. Although there was considerable uncertainty many faculty reported that what they learned during these challenging times helped them to inform both their future online and face to face courses (Bailey and Lee, 2020; Bajaj et al., 2021). These faculty are open to additional training which should focus on increasing their knowledge of online teaching, the best techniques for effective delivery of their content, which can vary by field, and greater knowledge of how an online student might be different from a traditional on-campus student (Pai, 2022). Areas for future research to consider are related to online interactions, barriers to using technology, and the level of training faculty members have as it relates to teaching. Additional research needs to be conducted evaluating the impact of the different types of interactions in online courses to understand how they relate to student engagement as interactions are one of the best indicators for student engagement in online courses (Daher et al., 2021). This research would provide greater insight into the types of interactions instructors should focus on in online classes to increase engagement. To get the most from these interactions students need to have a strong technological foundation and an understanding of what online learning entails to truly benefit from these courses. Research into development and offering of student training or course embedded training are suggestions that can be enacted at the university, unit, or instructor level to ensure students are comfortable in online courses (Van den Berg, 2020). Future inquiries focused on university instructor barriers to using technology and lack of pedagogical training in university instruction are needed to fill in gaps in knowledge about the instructor's role in student engagement and online education (Polly et al., 2021; Heinonen et al., 2023). In addition to these areas of focus faculty may need encouragement to move away from the traditional style of lecture to a more interactive approach (Zemliansky, 2021).

Looking ahead, it is crucial for institutions to prioritize student engagement in online learning. Student engagement encompasses various factors such as class size, instructor competency, student satisfaction, motivation, and teacher availability. Institutions should aim to enhance student engagement as it is directly linked to academic success. This can be achieved by providing faculty with the necessary support and training in online teaching best practices, promoting effective communication and collaboration among students, and incorporating interactive elements into online lessons. When it comes to creating training for faculty teaching online it should occur in a short time frame, involve peer mentoring, as well as experienced faculty who have had success in developing and teaching online courses, and there needs to be enough support staff to help those who are completely new to this teaching environment (Báez et al., 2019). Those with little experience will benefit from detailed step-by-step instruction that helps them to integrate these new digital tools into their teaching (Richardson et al., 2020). It should also include faculty from across the university as often instructors do not interact with those outside of their department and seeing how faculty at their university are using the available technology can be helpful (Richardson et al., 2020). Once the initial training has been completed another best practice is to create learning communities where small groups of faculty from across campus remain in touch to support each other while continually working on their online teaching skills (Richardson et al., 2020). By educating their faculty and embracing the opportunities presented by online learning, institutions can create an effective and engaging learning environment where they are improving their communication competence which will allow them to foster stronger connections with their students. We might not see another situation where campuses are closed, but the transition to online learning has helped inexperienced faculty gain the confidence to use these tools in all of their classes which will benefit future students.

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Low-income transfer engineering undergraduates' benefits and costs of online learning during COVID-19

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Online courses were a common and growing format for higher education even before the COVID-19 pandemic, but selection effects made it difficult to understand and generalize about low-income transfer engineering students' perceptions regarding online course experiences. However, the forced transition from face-to-face courses to online courses as a result of COVID-19 provided researchers and educators the opportunity to examine low-income transfer engineering students' online learning experiences without selection effects. Using a naturalistic method, the present study examined low-income transfer engineering students' ($N = 7$) communicated perceived benefits and costs of online learning during the pandemic. Analysis using inductive coding found three overarching themes of benefits and costs: *benefits and costs related to the learning environment*, *benefits and costs related to the format of instruction*, and *benefits and costs related to external factors*. Students named studying at their own pace as the most frequently occurring benefit of online learning. On the other hand, difficulty self-regulating was the most frequently named cost of online learning. Implications for theory, practice, and future work are discussed.

KEYWORDS

online learning, benefits, costs, videos, higher education, situated expectancy–value theory

Introduction

As a consequence of the COVID-19 pandemic, many college campuses around the world had to close and quickly move from face-to-face courses to online learning formats; furthermore students were required to move off-campus (Times Higher Education, 2020). This transition to online learning formats provided researchers the opportunity to better understand the average students' online learning experiences (Moore and Kearsley, 2005; Price, 2006; Escueta et al., 2017; McPartlan et al., 2021). Prior to the pandemic, certain groups such as women (Price, 2006), older individuals (Moore and Kearsley, 2005), fully employed, and single parents (Escueta et al., 2017) were more inclined to opt for online courses as it allowed them the flexibility to balance family care, work commitments, and other responsibilities. However, with the onset of COVID-19, the self-selection process into online courses declined substantially, because most students had to take their courses in an online format, giving us the opportunity to investigate the reaction of a set of engineering undergraduates who would not typically take their regular courses online.

Furthermore, given the more general stress of all aspects of the pandemic's impact on higher education on minoritized students, we focused our study on minoritized low-income transfer engineering students. Although there has been some prior research on students' online learning experiences during COVID-19, most of the studies have focused generally on college students as a whole (e.g., Young and Norgard, 2006; Paechter and Maier, 2010; Otter et al., 2013); this may overlook specific challenges of students at particular institutions, who study particular subjects, or who are from minoritized groups. Engineering students, for example, might have faced different benefits and challenges than students in other majors, as their curriculums focus on helping students learn critical thinking and problem-solving skills by practical operations (Bourne et al., 2005). An engineering student might talk more about the challenges of not being able to fully grasp abstract concepts because of the lack of opportunity to gain hands-on experience than would an English student. Further, previous research has shown that students from minority groups, such as those from low socioeconomic status backgrounds, have higher withdrawal rates (Blackner, 2000; Jaggars, 2011) and lower grades (Mead et al., 2020). But not many studies have exclusively examined low-income students' perceptions of online learning. Such information can improve the quality of online learning for minoritized students, which is important for improving their academic success and progression through school (Jaggars, 2011). Finally, transfer students' perceptions of online learning during COVID-19 have mostly been neglected in the literature despite the growing number of transfer students in higher education (Lester, 2006; Tobolowsky and Cox, 2012; Greenfield et al., 2013). First-year transfer students might face more challenges in online learning environments compared to non-transfer students, because they have to navigate two new environments—a new school and the online space. Therefore, to address these gaps, we examined low-income transfer engineering undergraduates' perceived benefits and costs of online learning as they provide advice to peers via YouTube videos. The results of this study may aid educators in making pedagogical and policy decisions toward improving online education for low-income transfer engineering students.

Literature review

Situated expectancy–value theory as the framework

We frame our work under Eccles and Wigfield's Situated Expectancy–Value Theory (SEVT; 2020). Most of the prior studies have focused on categorizing students' perceptions of online learning as either a benefit or cost, but not as both a benefit and a cost (Almahasees et al., 2021; Bączek et al., 2021; Hou et al., 2021). In SEVT, different facets of subjective task values can be conceptualized as benefits and costs (Eccles et al., 1983; Eccles and Wigfield, 2020). Subjective task values are defined as an individual's desire to engage in a task, such as their work for a particular course or their schoolwork overall; there are currently four facets of subjective task values: intrinsic value (i.e., enjoyment gained from a task), attainment value (i.e., how central a task is related to one's identity), utility value (i.e., usefulness of a task), and cost (i.e., what one has to give up by engaging in a task). Intrinsic, attainment, and utility value are seen as benefits, whereas the subjective task value of cost is seen as costs. Individuals consider the ratio of perceived benefits to perceived costs for the specific task being considered in light of their other available options to determine whether or not they want to ultimately engage in the task (Eccles et al., 1983; Eccles and Wigfield, 2020).

To fully comprehend the costs associated with online learning, it is essential to consider the corresponding benefits. According to Eccles and Wigfield (2020), both costs and benefits contribute to a student's persistence and are difficult to parse apart. It is possible to view reduced costs as a form of benefit, such as when a student chooses online courses and appreciates the convenience of studying from home instead of commuting. This reduction in cost becomes a benefit that enhances their perceived value of the courses. Furthermore, the same aspect of online learning that is seen as a benefit can also be perceived as a cost. For instance, even though an online course offers the advantage of developing self-regulation skills, it can also present challenges in terms of distractions that hinder self-regulation. Consequently, in our present study, we anticipated that what is perceived as a benefit in online learning could also be seen as a cost (and vice versa), both within individual students and across students as a whole.

SEVT offers a comprehensive framework for gaining insight into the costs and benefits associated with online learning, particularly in relation to the presence of instructors. Research has consistently shown that students highly value an instructor's presence in online courses, encompassing aspects such as clear communication of course requirements, timely feedback, and the utilization of diverse mediums to facilitate course discourse (Sheridan and Kelly, 2010; Martin and Bolliger, 2018; Wang, 2022). Nevertheless, students do not perceive all components of an instructor's online presence as beneficial. For instance, although timely responses to questions and engagement with student reflections were deemed helpful for fostering connections with professors, synchronous lecture sessions and interactive syllabi were not seen as effective for forming interpersonal connections (Martin et al., 2018). These findings highlight the nuanced nature of instructor presence within online learning, where certain components are perceived as valuable whereas others may be considered costly or ineffective. Therefore, SEVT serves as a practical and theoretical framework that aids in understanding the crucial role played by socializers, such as instructors' presence, in shaping the perceived benefits and costs of online learning for students.

Instructors' presence in online learning

As college students increasingly enroll in online courses, instructors have raised concerns over the quality of online education, and its impact on academic outcomes, including course performance (Figlio et al., 2013; Alpert et al., 2016), engagement (Kamble et al., 2021), and retention (Bettinger et al., 2017). One important aspect related to how content should be delivered in online courses is instructor presence (Regan et al., 2012; Richardson et al., 2016; Li et al., 2021). Given that students' perceptions of instructor presence in online courses is associated with their engagement and performance in the course (Ma et al., 2015; Park and Kim, 2020), we focused on students' perspectives on the benefits and costs of online learning as opposed to instructors' perspectives.

Students' perceptions of benefits and costs of online learning

Empirical evidence has shown that students express perceiving both benefits and costs of online learning. One of the most widely reported benefits of online learning is the flexibility and convenience it offers (Song et al., 2004; Mukhtar et al., 2020; Almahasees et al., 2021). In addition to the flexibility of where and when students can do their coursework, students highlight the benefit of convenient access to learning materials, including recorded lectures, at any given time (Song et al., 2004; Mukhtar et al., 2020; Almahasees et al., 2021). On the other hand, the most widely reported cost of online learning focuses on technical issues (Adnan and Anwar, 2020; Aguilera-Hermida, 2020; Blizak et al., 2020; Octaberlina and Muslimin, 2020; Hou et al., 2021). For example, students often report finding themselves having a difficult time connecting to the Internet (Hou et al., 2021). Furthermore, students report facing challenges with self-regulating their learning, especially because instructors are not actively monitoring them (Lee and Choi, 2011; Yan et al., 2021). Self-regulated learning refers to the process through which students actively control, monitor, and regulate their own learning through various cognitive, metacognitive, and motivational strategies (Zimmerman, 1990, 2002; Pintrich, 2004). Yet, in an online learning context, students are faced with many distractions in their immediate environment, such as family members or others in the same household (Gonzalez-Ramirez et al., 2021; Hou et al., 2021), video games, and social media (Octaberlina and Muslimin, 2020), which can be costly to sustaining their self-regulation.

Even though previous research primarily concentrated on the benefits and costs of online education for students in general, there is a growing body of work that explores these benefits and costs of online education specifically for students, such as those from low-income backgrounds (Mead et al., 2020), transfer students (Metzgar, 2021), and within specific domains like engineering (Manea et al., 2021). For example, Manea et al. (2021) showed that engineering students, like other students, appreciated the ability to review recorded lectures at any time and the possibility to participate in class from anywhere. Going further, Usher and Barak (2018) looked at the quality of peer feedback and the quantity and accuracy of peer grading among project-based engineering courses in three different learning environments: on-campus courses, small private online courses, and massive open online courses. They found that students in massive open online courses benefited from more peer feedback and were more open to evaluating projects than students in the other two learning environments. With regard to cost, Baltà-Salvador et al. (2021) found that engineering students perceived the quality of online courses to be negative, with over half of the students reporting that their academic development suffered more and they felt less connected to their professors and peers during online classes.

To a lesser extent, there has been some research on the costs associated with online for low-income and transfer students. For example, Mead et al. (2020) found that even though low-income students tend to receive lower course grades than non-low-income students in both online and in-person biology courses, the grade disparity was larger in courses using an online format. Likewise, Metzgar (2021) found that transfer students in an online economics course had lower final course grades than transfer students who completed the same course in-person.

Although previous studies have documented students' perceptions of the benefits and costs of online learning, there are contradictory findings regarding whether something is a benefit or a cost across different studies. One contradiction is whether online learning offers financial benefits or induces financial hardships. Almahasees et al. (2021) and Bączek et al. (2021) found that students benefited from saving money because they did not have to travel to and from school. Whereas Hou et al. (2021) found that students faced the costs of having to pay for better Internet service and equipment, such as a good desk set-up. In addition to whether online learning is seen as a financial benefit or cost, various studies have viewed the development of self-discipline as a benefit or a cost when learning online. For example, Almahasees et al. (2021) pointed out that students were able to develop self-discipline skills through online learning. In contrast, Bączek et al. (2021) discussed how students did not benefit from online learning, because they lacked self-discipline and presumably did not develop these skills by the end of the course. Thus, we particularly probed possible discrepancies in students' perceptions of benefits and costs of online learning across studies.

An alternative way to understand students' perceptions

The most common methodology used to investigate students' perceptions of benefits and costs of online learning is surveys (Young and Norgard, 2006; Gonzalez-Ramirez et al., 2021; Safura, 2021). Even though surveys allow researchers to gather large datasets relatively quickly, they are limited in detecting participants' deeper interpretations and explanations (Denzin and Lincoln, 1998). Participants often do not have the option to explain their choices or are limited in their options for choice (e.g., Paechter and Maier, 2010). Open-ended survey questions, for example, can offer some insights into participants' experiences and unique viewpoints, but can still be limited in understanding the full complexity of their experiences and interpretations as they tend to have either low or not thorough responses (Reja et al., 2003). In order to alleviate this concern, a few studies have utilized interviews to gain a deeper understanding of students' perceived benefits and costs of online learning (Kim et al., 2005; Mukhtar et al., 2020). However, interviews can be prone to response bias, in which participants answer in a way that seems to be the most desirable to the interviewer (Williams, 1964). Moreover, leading questions from investigators might lead participants to answer a certain way to fulfill the investigator's expectations (Berkowitz and Donnerstein, 1982). New methods are needed that can allow students to present their perceptions unhindered by survey constraints and reduce researcher expectations. For example, pragmatic measurement, where participants are free to express themselves with few situational constraints, would minimize the resources required for data collection while maximizing the quality of the data (Kosovich et al., 2017). We suggest peer advice as one of these methods and analyze student-created YouTube videos in order to understand students' perceived benefits and costs of online learning in a more naturalistic way. Students are in a situation where they are not guided by specific questions or in the presence of an interviewer because they are self-filming, which can reduce researcher expectations.

TABLE 1 Demographic characteristics of students.

Participant pseudonym name	Age	Gender	Race/ ethnicity	Year
Ali	20	Male	White	Junior
Adam	22	Male	White, Hispanic/ Latino	Senior
Michael	20	Male	White	Junior
Hillary	23	Female	White	Junior
Nancy	23	Female	Asian	Senior
Kristin	20	Female	Asian	Junior
Eduardo	23	Male	Hispanic/ Latino	Junior

All students transferred from community college to a four-year university. Year refers to their current year standing at the four-year university.

Current study

Building upon previous literature, we aim to contribute to the online learning literature by examining low-income transfer engineering students' perceived benefits and costs of online learning during COVID-19 using YouTube videos. Our context and method allow us to avoid selection effects inherent in much pre-pandemic research on online learning and to provide insight into students' perceptions without limitations of traditional survey or interview methods. We investigated the following research questions (RQs):

> *RQ1:* What benefits of online learning were perceived by low-income transfer engineering students after the shift to online learning due to COVID-19?
>
> *RQ2:* What costs of online learning were perceived by low-income transfer engineering students after the shift to online learning due to COVID-19?

Method

Participants

Seven transfer engineering students from community college (20–23 years of age; 43% women) at a large research-intensive university in California filmed a YouTube video about online learning during COVID-19 in the 2019–2020 academic year to promote engineering community college students' persistence; student-created videos will be later used for a psychological intervention (see Table 1). All of the students from our sample were from low socio-economic backgrounds in that they either qualified for the Pell Grant or the Stafford Loan in their Free Application for Federal Student Aid (FAFSA). Three students were White, two identified as Asian, one identified as Hispanic/Latino, and one identified as mixed races/ethnicities. At this particular university, all students transferred fully online from in-person learning in late March 2020 in a quarter system. The YouTube videos were filmed right after their last quarter of the academic year from June to July 2020, in which they experienced their first full quarter of online learning.

Procedure

Successfully transferred low-income engineering students filmed four 5- to-10-min YouTube videos to current engineering students at community college as part of a larger study (see Lee et al., 2023 for more information). These participants were recruited because we believed that they had the ability to serve as role models with their success in transferring and how far they came to where they are now in their engineering pathway. All participants received a scholarship to continue on with obtaining their bachelor's degree in engineering. The intent of the scholarship was to reduce the financial burden for low-income transfer students so that they can focus on their academics. As part of the scholarship agreement, 17 students filmed YouTube videos to current engineering students at community college.[1] Transfer engineering students were informed that the purpose of the study was for them to serve as role models and promote persistence for other engineering students like them. Students were prompted to create videos containing information that they thought was important for community engineering college students to know, but the exact topic was up to them. The YouTube video-making process involved students creating an outline for each video that was then followed by filming, editing, and uploading the videos. For the purposes of this study, we focused on video topics that revolved around students' experiences of online learning during COVID-19. Therefore, seven students were included in the final sample for the present study. The study was approved by the college's Institutional Review Board. Pseudonyms were used for confidentiality purposes.

Coding and analyses

We used an inductive or bottom-up approach, characterized by creating codes based on the data itself, to identify thematic patterns in the data (Saldaña, 2016). All seven YouTube videos related to online learning during COVID-19 were transcribed in their entirety before starting data analysis. First, coders (i.e., the first and second authors) read through all the transcripts to begin to understand the patterns in the data. Then they re-read each transcript and identified statements that explained how students perceived the benefits and costs of online learning relative to their perceptions of in-person courses. Items were coded as a benefit if they referred to anything gained from or that was positively related to learning online compared to learning in-person. Items were coded as a cost if they referred to anything lost from or negatively related to learning online compared to learning in-person. Using *in-vivo* techniques, coders used the actual words of the students within the transcripts to define our codes (Saldaña, 2016). For our first round of coding, these codes were assigned to each benefit and cost

1 Students had the option to talk with the research team for an alternative task if they had a concern about participating in this project.

statement related to online learning. A second round of coding consolidated related codes into broader categories.

Once these codes were established, the first and second authors independently coded each transcript for benefit and cost statements related to online courses. Then coders met four times during a two-week period to discuss issues, such as code distinction and discrepancies in codes amongst coders. There was 91% inter-rater reliability (i.e., percent agreement) amongst the coders.[2] The created codes were shared with the larger author team for consensus. Codes were further modified to distinguish between categories and recorded down in Word documents before finalizing the data analyses.

Results

Transfer engineering undergraduates ($N = 7$) discussed more costs than benefits of online learning in their YouTube videos to other engineering students. Out of the 63 statements that were categorized as either a cost or benefit of online learning across the students, benefits were mentioned in 37% ($n = 23$) of the statements and costs were mentioned in 63% ($n = 40$) of the statements. From these, we identified three overarching themes that emerged across all of the students' YouTube videos: *benefits and costs related to the learning environment*, *benefits and costs related to the format of the instruction*, and *benefits and costs related to external factors*. Each overarching theme consisted of at least one benefit and one cost of learning online relative to learning in-person.

Benefits and costs related to the learning environment

Benefits and costs related to the learning environment were identified as anything gained (or positively related) or lost (or negatively related) from changing one's learning environment to an off-campus online space (e.g., home living room) from an on-campus face-to-face space (e.g., classroom). Five sub-themes were classified as *benefits related to the learning environment*: learning self-regulation skills, saving time, saving money, closer to family, and working in the comfort of home (see Table 2). Three sub-themes were classified as *costs related to the learning environment*: hard to self-regulate, lack of feeling connected, and rough on body (see Table 2).

Out of the 27 statements in which *benefits and costs related to the learning environment* were addressed, hard to self-regulate sub-themes were mentioned the most–41% ($n = 11/27$) in the statements among four students. This sub-theme was characterized by students' remarks of their difficulties staying focused and concentrating on their academic work when learning online. For example, Michael noted, "It's very hard to study in the same room that you watch TV and normally play games."

On the other hand, some students described how challenges in self-regulation could have benefits toward learning self-regulation. This sub-theme was characterized by students' remarks regarding learning how to self-regulate as a consequence of being in an online learning environment and was mentioned in 7% ($n = 2/27$) of the statements among one student. For example, Ali expressed the benefits of learning these self-regulation skills by saying, "I felt like some things that I learned–some habits that I gained would have been the fact that anything I was doing online, I had to be on it."

Although more statements were made about the *costs* ($n = 18/27$) compared to the *benefits related to the learning environment* ($n = 9/27$), students still felt the benefits of online learning, such as saving time and saving money. Out of the 27 statements in which *benefits and costs related to the learning environment* were addressed, saving time sub-themes were mentioned in 11% ($n = 3/27$) of the statements among three students and saving money sub-themes were mentioned in 7% ($n = 2/27$) of the statements among one student. Students noted saving time because they did not have to travel between home and school. For example, Eduardo simply said, "you do not have to travel." Similarly, students saved money because they did not have to pay expenses related to traveling, such as gas, on-campus parking, and housing. This was alluded to by Nancy when she described how much money was saved, "The $40 gas per week was also saved since I did not have to drive to school. This means that I can save up to $670."

The second most mentioned *cost related to the learning environment* was lack of feeling connected. Out of the 27 statements in which *benefits and costs related to the learning environment* were addressed, lack of feeling connected was mentioned in 19% ($n = 5/27$) of the statements among four students. Students expressed how they felt less motivated to work online because there was a lack of physical social presence. For instance, Kristin said, "Being around motivated people just keeps you motivated as well. Although I could not be around these people much due to social distancing." On the contrary, Hillary mentioned that others can feel closer to family, especially international students who are far away from home. She discussed how "some people were back with their families." This benefit sub-theme was mentioned 4% ($n = 1/27$) in the statements related to the *learning environment* among one student.

Finally, students described both the physical benefits and costs of working from home when learning online. Adam, for example, spoke about "the comfort of working from your own home" as a *benefit of the learning environment*. This sub-theme of working in the comfort of home was mentioned in 4% ($n = 1/27$) in the statements related to the *learning environment* among one student. Yet, Adam also talked about how working from home "can be a little rough on your body" as a *cost of the learning environment*. This sub-theme of rough on body was mentioned 7% ($n = 2/27$) in the statements related to the *learning environment* among one student.

Benefits and costs related to the format of instruction

Benefits and costs related to the format of instruction were identified as anything gained (or positively related) or lost (or negatively related) from how information was presented and taught on the online learning platform. Two sub-themes were classified as *benefits related to the format of instruction*: studying at own pace and easier to obtain a better grade (see Table 2). Four sub-themes were classified as *costs*

2 Reliability was calculated by first dividing the number of discrepancies with the total number of benefit and cost statements related to online learning and then averaging the number of coders.

TABLE 2 Themes of benefits and costs.

Themes	Benefits/ costs	Sub-themes	Example quotes	Number of occurrences by videos	Number of occurrences by participants
Benefits and costs related to the learning environment	Benefits	Learning self-regulation skills[a]	"I felt like some things that I learned - some habits that I gained would have been the fact that anything I was doing online, I had to be on it." (Ali)	2	1
		Saving time	"I can save up to two hours per day since I used to have to spend two hours for a round trip from home to school and school to home." (Nancy)	3	3
			"I feel like online classes are getting more and more popular because you know, you do not have to travel. You do not have to wait" (Eduardo)		
		Saving money	"The $40 gas per week was also saved since I did not have to drive to school. This means that I can save up to $670." (Nancy)	2	1
		Closer to family[b]	"Some people were back with their families." (Hillary)	1	1
		Working in the comfort of home[c]	"Another pro about working from home is that you get to work from the comfort of your own home." (Adam)	1	1
				Total: 9	Total: 7
	Costs	Hard to self-regulate[a]	"I have to find a way to get rid of all the distractions and focus on my studies." (Ali)	11	4
			"It's very hard to study in the same room that you watch TV, and normally, play games." (Michael)		
		Lack of feeling connected[b]	"Being around motivated people just keeps you motivated as well. Although I could not be around these people much due to social distancing." (Kristin)	5	4
			"It's not you are living together to do work with your friends." (Hillary)		
		Rough on body [c]	"Another con that I think is coupled with work from home is that it can be a little rough on your body." (Adam)	2	1
				Total: 18	Total: 9
Benefits and costs related to the format of instruction	Benefits	Studying at own pace	"All the lectures for all the classes I've been in have been recorded. So you could watch them at any time." (Michael)	10	6
			"One thing I really did like about having online classes was that the videos were recorded. For me, I would watch the videos twice. Once live where I was actively listening and then secondly, I would rewatch it and rewrite down notes." (Kristin)		
		Easier to obtain a better grade	"A lot of teachers are really understanding of the situation, and I feel like they are happier to hand out better grades. You might get a better grade online than you would in-person." (Michael)	3	2
			"One of my professors gave us a bonus quiz to help boost our overall grade. Another professor altered the curve based on what he saw." (Kristin)		
				Total: 13	Total: 8

(Continued)

TABLE 2 (Continued)

Themes	Benefits/ costs	Sub-themes	Example quotes	Number of occurrences by videos	Number of occurrences by participants
	Costs	Making learning harder	"The contents [*sic*] very heavy. It's difficult. You know, there's a lot of math, physics formulas involved. Just think about you are doing all that in a series where you need to see it in front of your desk for like one hour - just watching a video." (Eduardo)	9	5
			"One of my professors had a hard time creating and organizing lecture slides to give the most information to students. And this class called the most confusing I ever had since the material was hard to understand." (Nancy)		
		Hard to monitor exams	"Most professors are keep kind of changing the plans for the exams, because to be honest, I do not think that there is a way that it's a hundred percent fair in like all aspects to have an exam online. It's really hard to manage that." (Hillary)	2	2
			"Harder to monitor the time during the quiz and exam because I, and all the students, work on them at home - the open notes and textbook were allowed; the tests given were longer and harder than usual." (Nancy)		
		Technical issues	"But professors had to figure out how to use Zoom, how to share the material all through Zoom, which took a quite time to get to know. Some of my professors are able to use [it] fluently for two weeks but some others took a lot more time to be able to use it." (Nancy)	4	2
			"Some students cannot reach out to the Google Doc because it says that it's already having too many students at the same time." (Hillary)		
		Little interactive media	"It will be better to improve engineering online education quality if we had more like interactive media." (Eduardo)	1	1
				Total: 16	Total: 10
Benefits and costs related to external factors	Benefits	Learning about risk management for housing[d]	"It's really good for you as a professional to start learning about risk management and taking." (Eduardo)	1	1
				Total: 1	Total: 1
	Costs	Housing concerns[d]	"I wasn't sure if I was able to like break my lease. I wasn't sure if I will [*sic*] be able to get housing." (Eduardo)	4	2
			"I have to figure out about the lease breaking or what I'm going to do with my furniture." (Hillary)		
		Facing financial issues	"I faced a hard time in finance, seeing my both parents get laid off due to the COVID-19." (Nancy)	2	2
				Total: 6	Total: 4

Pseudonym names were used for all participants. Superscripts refer to a sub-theme that is directly opposite of the other sub-theme.

related to the format of instruction: making learning harder, hard to monitor exams, technical issues, and little interactive media (see Table 2).

Out of the 29 statements in which *benefits and costs related to the format of instruction* were addressed, studying at own pace sub-themes were mentioned the most, in 34% ($n = 10/29$) of the statements among

six students. This sub-theme was characterized by students' remarks of how online learning affords them the ability to watch and rewatch lectures at their own pace because they were recorded. For example, Kristin said:

> One thing I really did like about having online classes was that the videos were recorded. For me, I would watch the videos twice. Once live where I was actively listening and then secondly, I would rewatch it and rewrite down notes.

Another *benefit related to the format of instruction* was that learning online made it easier to obtain a better grade. This benefit of online learning was described by Michael who said:

> A lot of teachers are really understanding of the situation, and I feel like they're happier to hand out better grades. You might get a better grade online than you would in-person.

Because students had to rapidly transition from in-person learning to online learning due to the pandemic, they felt that professors were more accommodating. This sub-theme of easier to obtain a better grade was more context-specific to COVID-19 and mentioned in 10% ($n = 3/29$) of the statements related to the *format of instruction* among two students.

After the sub-theme of studying at own pace, the sub-theme of making learning harder occurred the most frequently related to the *format of instruction* theme. Out of the 29 statements in which *benefits and costs related to the format of instruction* were addressed, making learning harder sub-themes were mentioned in 31% ($n = 9/29$) of the statements among five students. Eduardo, for example, expressed how hard it is to learn online:

> The contents [sic] very heavy. It's difficult. You know, there's a lot of math, physics formulas involved. Just think about you're doing all that in a series where you need to see it in front of your desk for like one hour–just watching a video.

Students also mentioned the costs of "monitoring the time during quizz[es] and exam[s]" as well as managing "the fair aspects" of having an exam online. The lack of having someone physically present during an exam made it hard to monitor. This sub-theme was mentioned in 7% ($n = 2/29$) of the statements related to the *format of instruction* among two students.

Moreover, students described the costs of technical issues, when the instructors had a difficult time using certain platforms to teach, or the students, themselves, had a difficult time connecting to their spotty Wi-Fi. Instructors, for example, had a hard time using Zoom as discussed by Nancy:

> But professors had to figure out how to use Zoom, how to share the material all through Zoom, which took a quite time to get to know. Some of my professors are able to use [it] fluently for two weeks but some others took a lot more time to be able to use it.

This sub-theme of technical issues was mentioned in 14% ($n = 4/29$) of the statements related to the *format of instruction* among two students. Related to technology, one student, Eduardo, talked about the little interactive media engineering online courses have, which he believes is an area for improvement to get people more engaged.

Benefits and costs related to external factors

Benefits and costs related to external factors were identified as anything gained (or positively related) or lost (or negatively related) from the impact of the pandemic on students' lives, which may in turn, impact their school performance, but was not as direct an impact on schooling like the above two themes. One sub-theme was classified as a *benefit related to external factors*: learning about risk management for housing (see Table 2). Two sub-themes were classified as *costs related to external factors*: housing concerns and facing financial issues (see Table 2).

Most students went back home and left either their on-campus or near-campus off-campus housing. This situation left them with the responsibility of having to figure out how to "break their lease" for those that lived near but off-campus and where to store their furniture and other items for both those who lived either on- or off-campus. This sub-theme of housing concerns was mentioned in 57% ($n = 4/7$) of the statements among two students related to *external factors*. At the same time, a student also mentioned the benefit of "learning about risk management" for housing, because he had to break his lease.

As these transfer engineering students came from lower socio-economic backgrounds, they also described the challenges their family faced financially due to COVID-19. This sub-theme was referenced by Nancy who said:

> I faced a hard time in finance, seeing my both parents get laid off due to the COVID-19.

Out of the seven statements on *benefits and costs related to external factors*, facing financial issues sub-themes were mentioned in 29% ($n = 2/7$) of the statements among two students.

Discussion

Summary and implication of the findings

Past research has suggested that students in online courses have difficulties self-regulating in an online environment (Broadbent, 2017; AlJarrah et al., 2018; Chuang et al., 2018). However, the results of most of these studies could not be discussed without selection effects, because students who took online courses pre-pandemic were often associated with certain demographic characteristics (McPartlan et al., 2021). In this study, we find evidence that hard to self-regulate, a sub-theme related to the online learning environment, was the most frequently occurring cost for students. This finding also aligns with prior studies that investigated students' perceptions of online learning in the COVID-19 context where they had difficulties concentrating due to how easily accessible things like video games, social media, and talking with friends or family are in an online environment (Octaberlina and Muslimin, 2020; Hou et al., 2021). Prior work has found that students had a difficult time adapting to online learning because of the distractions and overall lack of structure and routine

they faced learning from home (Hensley et al., 2022). Hard to self-regulate might be the most recurring perceived cost of online learning, particularly because our students are from a low socioeconomic background. Low-income students might not have access to an appropriate studying space compared to non-low-income students, and may therefore lack a structured learning environment, which can be detrimental for their self-regulated learning. Therefore, educators should think of ways in which they can help students focus during class considering the vast number of distractions surrounding their environment. For instance, instructors of the class might want to increase their presence more in the course activities to help keep students accountable for their learning and promote greater engagement (Lynch and Dembo, 2004; Wandler and Imbriale, 2017). Instructors can also focus on keeping students engaged by providing pacing support (e.g., guides for assignment due dates), and utilizing instructional materials, such as interactive dashboards, that allow instructors to monitor student engagement (Rice and Carter, 2016; Carter et al., 2020). Course instructors might also want to consider gamifying parts of their lessons to bolster students' interest so that they are not distracted by other competing tasks at home (see Nah et al., 2014 for a review). Prior research has shown that both instructors and students perceive instructor-student interactions as one component of online learning that promotes engagement and persistence with online learning (Li et al., 2021). Therefore, instructors can work on increasing their presence in online learning through different strategies, including sending out regular reminders and announcements, facilitating discourse between students, and providing timely feedback to students, thereby promoting students' motivation and engagement with online courses (Martin and Bolliger, 2018; Wang, 2022).

Although students identified some costs that prior research on online learners has identified (e.g., financial hardships), students also discussed the engineering-specific costs associated with the format of online instruction. Specifically, students discussed how online courses made learning of STEM courses like engineering more challenging. Research has shown that challenges in subjects like math, an important role in developing engineering students' conceptual understanding, can lead to increased stress and anxiety in the subject, thereby decreasing achievement and persistence (Harris et al., 2015; Jamieson et al., 2021). These challenges may be made worse by the online nature of the course. Therefore, it may be especially useful to have engineering students discuss their specific challenges in those courses in order to understand what challenges they face, as well as how they perceive those challenges to impact their academic experience. Understanding the course-specific challenges that engineering undergraduates face during online learning may be particularly useful for instructors designing online courses. By knowing what challenges engineering undergraduates face in online STEM courses, instructors can better promote a learning environment that promotes students' motivation and success.

On the other hand, results showed that the most frequently perceived benefit of students learning online was the ability to study at one's own pace, a sub-theme related to the format of instruction. Consistent with previous studies, students valued the opportunity to manage their own study time and not have to be forced to follow a certain schedule (Bali and Liu, 2018). In particular, students liked that they had the option to watch or rewatch lectures at their disposal (Almahasees et al., 2021; Hou et al., 2021). Implications for online learning include continuing to provide students the flexibility and convenience that online courses afford as well as the autonomy to go back to lectures to refresh the topics discussed. Supported by attribution theory (Weiner, 1985) and self-determination theory (Deci and Ryan, 1985; Ryan and Deci, 2020), students benefit from feeling like they are in control and have the freedom of choice. In addition, students also described the benefits related to the learning environment of saving time and money. As the cost of higher education has increased, low-income students have found that college has become less affordable to them (Perna and Li, 2006). To offset these costs, low-income students often have to work in order to afford the cost of their courses, leading to decreased academic performance (Soria et al., 2014). Therefore, understanding the benefits that low-income students discuss about online learning may be particularly salient for promoting their success.

Our findings also provide important theoretical implications. We found that a perceived benefit of online learning for one student could be seen as a perceived cost of online learning for another student and/or that a reduced cost can be seen as a benefit. For instance, a student reported that they learned self-regulation skills, but also had a hard time self-regulating during class. Similarly, a student enjoyed working from the comfort of home, but also felt this environment was rough on the body. Additionally, results showed that being closer to family was a perceived benefit of online learning, but the lack of feeling connected was a perceived cost of online learning. Some students liked that they were able to go back home, in order to be closer with their family members, especially if they came from a distant place. Yet, some students felt a lack of connection with others, especially because they were no longer physically surrounded by their peers. This tight interconnection between benefits and costs shows that positively-valanced values (i.e., benefits: intrinsic, attainment, and utility) and costs (i.e., cost) from SEVT work together to influence students' motivation. In other words, these findings speak to the cost "debate" within SEVT in that cost should be considered part of the positively-valanced subjective task values (i.e., benefits) rather than being a separate component of the model (Barron and Hulleman, 2014; Eccles and Wigfield, 2020).

Not only does a reduced cost being seen as a benefit have theoretical implications for SEVT, but it also has implications for practitioners. Instructors can ask students in their online courses to write down their perceived costs of online learning and then present examples of the same topics around costs as benefits. For example, if a student wrote that they are having a difficult time keeping up with the lectures before an exam due to procrastination, then the instructor could ask the student to watch another student talk about the benefits of being able to rewatch the lectures to study for exams. This video of another student can further elaborate that the costs of online learning will start to outweigh the benefits of online learning if students misuse the benefits of online learning, such as using the flexibility and convenience benefits of online learning as a way to not effectively use one's time for the course.

Methodological implications

The present investigation was the first known empirical study to understand students' perceived benefits and costs of online learning using student-created videos. The videos allowed us to collect data about students' personal experiences with few limitations because

students are able to freely discuss their experiences (Kosovich et al., 2017). Low-income transfer engineering students were able to openly talk about their perceptions of online learning in the context of advising a peer. The advantages of using video data are that students were not constrained by forced choice options like in many surveys (e.g., Paechter and Maier, 2010) and did not have to be in the presence of an interviewer, which can increase socially desirable responses (e.g., Williams, 1964). Our method allowed students to openly discuss both the benefits and costs of online learning, in which we were able to find further support for the following statement: "the relative value of various options must be looked at to understand choice" (Wigfield and Eccles, 1992, p. 279). Students' benefits and costs of a task, in this case, online courses, are highly interconnected. The pragmatic free-form measure of our data collection permitted students to discuss these interconnected concepts as they appeared salient to them, without the constraints of surveys forcing benefits and costs into distinct positive task value or negative cost frameworks.

Limitations and future directions

Although our study provides useful insights for researchers and practitioners on students' perceived benefits and costs of online learning without selection effects, it is not without limitations. The current study was a case study of seven low-income transfer engineering students in a scholarship program at a large research-intensive university in California. We do not expect that the students in our sample represent all low-income transfer engineering students. However, results were still able to provide important insights on how instructors can improve students' online learning experiences based on students' perceived benefits and costs. More work should be done to gain a deeper understanding regarding whether certain benefit and cost themes of online learning are specific to low-income transfer engineering students or can be applied to other students.

Students also filmed these YouTube videos after their first term experiencing the pandemic. The timing of the study allowed us the opportunity to learn about students' online learning experiences when they first encountered this shift from a face-to-face to an online learning environment, allowing both their online and immediately prior face-to-face experiences to be fresh in mind. As students get more accustomed to their environment, their perceptions about the learning environment might change over time. Therefore, we recommend that future studies investigate students' perceived benefits and costs of online learning over time, in order to understand which beliefs might be more (un)stable. One possibility is that students might experience more benefits than costs over time because they have learned what self-regulation skills and methods work best for them when learning online.

Finally, although video data offer us the advantage of not being constrained to limited response choices or can reduce researcher expectations, they do not allow for follow-up questions to further clarify students' experiences in online courses. Future studies can combine different sources of data, such as survey, video, and interview data to triangulate evidence. Moreover, the survey data can be used to supplement the video and interview data. For example, surveys can ask students about their prior online learning experiences, which can then inform interpretation of the themes discussed in the videos and interviews. Students who had prior online learning experiences might have more positive attitudes toward online learning than students who never had any online learning experiences (Lee et al., 2001; Young and Norgard, 2006).

Conclusion

With a greater number of students taking online courses, researchers and practitioners should focus on improving the quality of online education by increasing the benefits and reducing the costs of online learning. Given that low-income engineering transfer students face unique challenges in online learning, such as facing more distractions at home that negatively affects their self-regulation, researchers and instructors should focus on teaching these students relevant strategies that enable them to overcome those challenges. In assessing students' perceived benefits and costs of online learning during COVID-19 using peer advice-related YouTube videos, this current investigation added to the growing body of literature by using an alternative method of examining students' perceptions and addressing many of the selection effects of prior studies on online learning in higher education. The results of this study suggest that difficulty self-regulating was the most frequently occurring perceived cost of online learning, whereas the ability to study at their own pace was the most frequently occurring perceived benefit of online learning. Also, findings showed that benefits and costs of online learning were greatly interconnected, where benefit themes were directly the opposite of cost themes. Instructors can provide various materials to help students reduce the cost of online learning and create activities in which students reframe costs as benefits, leading to greater positive motivation toward their online courses.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the college's Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

HL: conceptualization, methodology, formal analysis, investigation, resources, data curation, writing—original draft, writing—review and editing, visualization, project administration, and funding acquisition. KY: formal analysis, investigation, and writing—original draft. TR: conceptualization, writing—original draft, and writing—review and editing. KR: data curation and writing—review and editing. JE: conceptualization, writing—original

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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"Wait, I can't do that anymore!": pandemic teacher immediacy in college communication classes

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Introduction: The stress and strain due to various aspects of the pandemic affected teaching and learning. Relating between instructors and students, and between students, may never be the same. Adjustments to teaching and learning may still need to be made due to the lingering effects of the pandemic, especially as zoom classrooms continue to be used within communication and other disciplines.

Methods: In this study, the researchers interviewed 15 communication instructors, using indepth semi-structured zoom interviews, about their experiences in the pandemic classroom and how they attempted to build relationships and connections with students during the COVID-19 pandemic.

Results: The researchers found specific immediacy strategies used by instructors, with participants indicating they attempted to use the more traditional teacher nonverbal immediacy behaviors such as eye contact, facial expressions, physical distance, and touch, but were hampered by the wearing of masks, practicing social distancing, and moving to online teaching modalities where student engagement was limited at best. Instructors also adapted verbal immediacy behaviors, as they used various strategies for inviting participation, providing feedback, and being real to develop connections with students, as well as building in specific teaching structures into their pandemic classrooms. In addition, participants indicated they used a variety of additional immediacy-related strategies and behaviors to build relationships once moving to blended HyFlex or online teaching. These strategies were used consistently, as instructors seamlessly moved between the online synchronous classroom, the blended classroom, and the face-to-face classroom with masking and physical distancing required.

Discussion: Our research revealed that there were unique ways relationships were built, typically using different types of media to enact teacher immediacy in nuanced ways. We argue that looking at such teaching using both media multiplexity and embodied pedagogy perspectives can enhance the teacher immediacy literature by demonstrating how teacher immediacy was changed during the pandemic, as media richness increased the likelihood of developing relationships between teachers and students through an embodied pedagogy of caring using technological tools.

KEYWORDS

pandemic, teacher immediacy, embodied pedagogy, media multiplexity, communication

1. Introduction

Online learning has a history that began with mini-courses, and a complete undergraduate online course in 1984, in which Harasim (2000) reported "students would not participate, and long virtual silences ensued" (p. 45). When the World Wide Web was launched in 1992, it provided a broader reach and expanded opportunities for online learning (Picciano, 1998) and eventually opened up higher education to populations who might not have access to higher education (Baum and McPherson, 2019).

The most recent demand for online learning was caused by the COVID-19 pandemic (Johnson et al., 2020). Whether or not instructors were experienced in online teaching, the pandemic required them to rapidly adapt to teaching in different modalities, challenging the normal ways of building connections in the classroom (Tackie, 2022), and consider new modalities such as blended hybrid flexible (HyFlex) classroom, where students and instructors are crossing between the online and synchronous and/or face-to-face environments, for the same class (Beatty, 2019; Imran et al., 2023).

It is important to understand pandemic pedagogy from the perspective of best practices of instructional communication (Beebe and Mottet, 2009; Chatham-Carpenter, 2017; Morreale et al., 2021), especially as we work to increase access in ethical ways to our classrooms in a post-pandemic society (Rudick and Dannels, 2020; Fassett and Atay, 2022) by examining the challenges faced by instructors as they migrated to online delivery modalities. Looking at this from the perspective of instructor competence considered earlier by scholars such as Beebe and Mottet (2009) is important. The purpose of this study is to explore how communication instructors employed one of these practices – teacher immediacy behaviors and strategies – across various modalities, when they transitioned from traditional face-to-face classrooms during the pandemic to alternative modalities.

1.1. Pandemic pedagogy

Scholars report on the difficulties caused by the sudden pivot in education to online environments due to the COVID-19 pandemic, with opportunities for growth found for post-pandemic education (Bidwell et al., 2020; Blume, 2020; Schwartzman, 2020; Westwick and Morreale, 2021; Kordrostami and Seitz, 2022). Even though the rapid transfer to the online environment was far from ideal, positive outcomes for instructors, and higher education in general, included being better prepared in the future for moving education to a virtual platform when needed, and understanding how we can build learning environments that are inclusive for all learners (Fassett and Atay, 2022), such as HyFlex and blended classrooms (Beatty, 2019; Imran et al., 2023).

Positive outcomes related to student motivation and learning have been found in studies of remote learning during the pandemic. For example, in a study conducted weeks after the transition to remote learning due to the COVID-19 virus, Unger and Meiran (2020) sent out surveys to undergraduate students in an animal behavior psychology course, and asked those students to forward the survey to those they knew. Of the 82 responses from students, Unger and Meiran reported that there were 59.8% who believed that going online "would negatively affect their learning, grades, and also be very different than in-class learning" (p. 260). After 3 weeks, a follow-up survey was sent out, which 74 of 82 students completed, finding that 51.4% felt less anxious about online classes (Unger and Meiran, 2020, p. 279). Rahiem (2021) also found that through the change in learning environment due to the COVID-19 pandemic, university students in Indonesia continued to be motivated. Alqurshi (2020) noted after having moved from a brick and mortar environment to an online platform due to the pandemic, that the lack of interactions between students and teachers affected the ability to learn, yet "analysis of student grades, during the lockdown, … revealed a significant increase (in grades) when compared to the past 2 years" (Alqurshi, 2020, p. 1081).

Some researchers suggest that students taking online classes due to an emergency have different preferences and needs than students who typically enroll in online classes (Brophy et al., 2021). Regardless of student type, students need to experience an atmosphere of caring and support in the online environment (Tang et al., 2022) and be offered opportunities for engaging with others in the content (Gopinathan et al., 2022; Kordrostami and Seitz, 2022). Beattie et al. (2021) conducted a study of 22 graduate students' experiences as they transitioned to the online environment, noting the importance of recognizing the challenges in adapting to differing teaching and learning environments, and the importance of providing support structures for them. Similarly, Speiser et al. (2022) collected feedback from students who took a social science course that was online due to a pandemic, and noted the "importance of socio-emotional support and genuine connection among our students and with our students" (p. 11). They also explained how important it is to know aspects of a student's situation to choose the best ways to assist them in remote learning. A study conducted by Ramkissoon et al. (2020) examined learning platforms at three different institutions of higher education in Mauritius during the pandemic, finding that of the 433 who completed the surveys, 68.4% students preferred platforms such as Whatsapp, for reasons including being able to easily communicate and interact with others, as well as privacy. In a study of 142 undergraduate and graduate students from Malaysia, Gopinathan et al. (2022) found that students who used digital collaboration tools used in their online classrooms, such as padlet, whiteboards, and Kahoot, were more engaged and motivated to learn. It is becoming clear that the environment that students found themselves in during the pandemic, and the resources provided to them to learn during that time, were key to keeping students engaged in their learning.

Pandemic pedagogy modalities, and the rapid transitions required, raised questions about if and how connections with students were being made in these classrooms (Sobaih et al., 2020; Westwick and Morreale, 2021; Gimpel, 2022; Parsloe and Smith, 2022; Clughen, 2023; Nieuwenhuis and Strausz, 2023; Salarvand et al., 2023). Tecce DeCarlo et al. (2022) found that overall faculty and students were able to adapt, and that through the use of technology, connections, engagement, effective teaching and learning was possible. Schwartzman (2020) explained, in his autoethnographic reflection on the Facebook group Pandemic Pedagogy, that during the first year of the pandemic, several themes emerged, including questions and concerns about students learning from "home," the benefits of synchronous and asynchronous online education, and concerns about "access, equity and inclusion" (p. 508).

Experiences of faculty moving into and around the pandemic pedagogy space has been more limited, with research focusing on more autoethnographic, ethnographic, and interpretive perspectives (e.g., El-Soussi, 2022; Parsloe and Smith, 2022; Nieuwenhuis and Strausz, 2023; Wiant Cummins, 2023), and little research on how instructional communication practices were adapted to create high-presence classrooms during a time when transitions had to happen quickly. Some are now studying how faculty are modifying their teaching practices as they move back into on-campus classrooms (e.g., Reyes-Velázquez and Pacheco-Sepûlveda, 2022), and others are advocating for a more critical lens in looking at "business as usual" in classrooms (e.g., Fassett and Atay, 2022), lest we continue to privilege the "'higher quality' of in-person learning" (Wright, 2022, p. 161) and forget to "build meaningful bonds with students having diverse

experiences living and learning during the pandemics" (Wright, 2022, p. 161).

This critical lens is consistent with the notion of "embodied pedagogy," which scholars have used to make a renewed commitment to creating inclusive and engaged spaces in classrooms for all students in a post-pandemic world (McElroy and Jackson, 2021; Clughen, 2023; Nieuwenhuis and Strausz, 2023), similar to Hooks (1994) notion of engaged pedagogy, which requires teachers and students be "wholly present in mind, body, and spirit" (p. 21). During the pandemic, Wiant Cummins (2023) noted that "Teaching through a computer screen necessarily changed how I interact and engage with students, how our bodies can enact wholeness together" (p. 1), which was true of all instructors who worked on bringing their whole selves to their pandemic classrooms.

Consistent with "embodied pedagogy," researchers have looked at the importance of building a community of care in the pandemic classroom (Clemens and Robinson, 2021; Tang et al., 2022; Carte, 2023), focusing on how teachers demonstrated care to students as they transitioned into different modalities. Clemens and Robinson (2021) provided four best practices to create such an environment during the pandemic, including employing "supportive communication practices" (p. 136), practicing "collective sensemaking" (p. 137), fostering "inclusive pedagogical practices" (p. 138), and engaging in mindfulness. They advocated that these practices continue in the post-pandemic classroom environment. However, it is less clear how instructors did this in the pandemic environment, which is one of the goals of this study.

1.2. Social presence and teacher immediacy

Due to the increased prevalence of online learning and the likelihood of it continuing as one of the new normals of teaching in a post-pandemic higher education space, instructors must focus on innovating these spaces to reach all students within the college population. One of the ways to do this is by increasing the likelihood that students experience the presence of both faculty members and students, a concept often called "social presence" (Weidlich and Bastiaens, 2017). Dixson et al. (2017) assert that "learning occurs best when students are involved with the content, other students, and the instructor" (p. 37). Employing strategies which lead to this type of engagement, during the remote learning required by a pandemic, became especially important in a time of physical distancing, when social isolation became threatening to students' mental health (Bono et al., 2020; Borkoski and Roos, 2020).

Multiple scholars have explored the role of social presence for the online classroom, determining that it is an important "sub-presence" of teacher presence (Kreijns et al., 2014; Swan and Richardson, 2017; Rapanta et al., 2020), and includes the "social communication channels" used by teachers to "maintain and possibly enhance the lost spontaneous student–student and student-teacher interaction" (Rapanta et al., 2020, p. 938). As noted by Dixson et al. (2017), this aspect of teacher presence is similar to the practice of teacher immediacy (Morreale et al., 2021), which has been studied in the past by instructional communication scholars, as well as the concept of teacher rapport studied by other researchers (*cf.* Glazier, 2021).

The concept of immediacy was originally conceptualized by Mehabian (1971), with a focus on both physical and verbal behaviors which could be used to reduce distance between people. This was expanded by researchers interested in how it played out in instructional settings, with the definition of immediacy becoming understood as "nonverbal and verbal behaviors which reduce physical and/or psychological distance between teachers and their students" (Christophel and Gorham, 1995, p. 292). Others noted that the perception of such closeness enhanced the quality of interactions in the classroom (Beebe and Mottet, 2009; Morreale, 2015). When combined with interaction opportunities, Gimpel (2022) considers immediacy – whether verbal or nonverbal – to be "an antecedent of social presence" (Gimpel, 2022, p. 34), in which a person feels connected within an online environment to others both socially and emotionally (Dixson et al., 2017).

Immediacy between students and instructors has been researched from multiple perspectives, with the effects of teacher immediacy found to increase learning, as well as a willingness to communicate in class (Fallah, 2014; Sheybani, 2019; Amirian et al., 2021; Foutz et al., 2021; Liu, 2021; Tormey, 2021; Zheng, 2021; DeraBethshan et al., 2022). Zheng (2021) advised that "teachers can establish an approachable classroom rapport that stimulates academic success, alters behavior of students, and provides a conducive learning environment" (p. 6) by using teacher immediacy behaviors. So what are these behaviors?

Nonverbal immediacy includes communication behaviors such as eye contact, decreased physical distance, smiling, touching, vocal expressiveness, and relaxed body positions, which tend to signal liking and positive affect (Richmond and McCroskey, 2000; Frymier et al., 2019), while verbal immediacy is created by "verbal messages that show empathy, openness, kindness, praise, feelings of inclusiveness, and willingness to engage students in communication" (Ballester, 2015, p.10). Examples of verbal immediacy behaviors are the use of humor, praise, informal dialogue, self-disclosure, asking questions, and providing feedback (Gorham, 1988), all which help decrease psychological distance between the teacher and student. Some scholars have recognized that it is easier to control verbal immediacy behaviors than nonverbal ones in the online classroom context (Baker, 2010). However, Gimpel (2022) notes that with the use of interactive technology tools in a "media rich" environment, even online environments can provide a context rich for this type of interaction with both nonverbal and verbal communication.

Dixson et al. (2017) looked at past research from a traditional classroom setting, which studied interaction "as involving four factors: skills engagement, emotional engagement, participation/interaction engagement and performance engagement" (p. 39). They found that online immediacy strategies, such as social media, were being used by instructors, but more traditional forms of teacher immediacy were not used. It is unclear whether this is true of other online teaching environments, such as synchronous online classes used during the pandemic. More research needs to be done to understand how the pandemic impacted instructor immediacy choices, as they adapted to new learning environments using technology.

The theory of media multiplexity has been used to examine how the greater use of various forms of media can create closeness. The concept emerged through research pairing online interactions with human connections. Haythornthwaite (2001) observed the need for researching technical and social interaction and how

exchanges through computer media could create ties with students in a distance learning class, concluding that "the more restricted but stronger ties associated with teamwork support more sustained, task-focused, and product-oriented … interactions" (p. 223). This study led to other studies conducted by Haythornthwaite (2005), leading to the "media multiplexity" term being created, which looks at both strong and weak ties between people, depending on the available media used within the relationship to sustain the relationship. The overall findings demonstrated that "organizationally established means of communication can lay the groundwork for latent and weak tie connectivity, and a base on which strong ties can grow" (Haythornthwaite, 2005, p. 142).

More recently, research was conducted using the media multiplexity theory to understand how students and instructors interact out-of-class. Clark-Gordon (2019) explored the way undergraduate students and graduate students interacted with their professors using various types of media. Clark-Gordon (2019) found that "the number of media used to communicate with one's instructor indirectly impacted their communication satisfaction, affective and cognitive learning, and motivation, through their feelings of closeness with their instructor" (p. ii), with stronger results for those undergraduate students who liked online communication. More research is needed on how media was used during the pandemic by instructors to create both strong and weak ties with their students, in a time where in-person face-to-face channels of communication were limited by pandemic restrictions.

In the wake of the COVID-19 pandemic, a gap in literature has been found regarding how instructors adapted face-to-face pedagogy tools, which they had used in the past but were difficult to translate to a virtual classroom, as well as how the pandemic challenged them in building relationships with their students and the accompanying strategies and behaviors they used to reduce the physical and psychological distance between them and their students in a virtual classroom. Based on this need, our research sought to address the following research question: "How did college instructors adapt their use of teacher immediacy to create connections with students in their communication classes during a pandemic?"

2. Methods

Using indepth semi-structured interviews, the researchers interviewed college and university communication instructors who taught during the pandemic. Participants were recruited, using an approved IRB protocol recruitment strategy, from across the United States. The 15 faculty members (11 female, 4 male), ranged in age from 25 to 63. Eleven of the interviewees had PhD degrees ($n = 11$), three were pursuing their PhD degree after their MA degree, and one participant had only a MA degree. Ten of them taught at the undergraduate level, while five taught both undergraduate and graduate-level courses. All but one of the participants were Caucasian, and the other one was Asian. Most of the faculty members taught in interpersonal, organizational, and critical communication areas, with three of them teaching public relations and media-related classes. All of the faculty taught over zoom during the pandemic, as well as asynchronously, and some taught their classes in a hybrid or HyFlex format, when allowed.

Each of the participants participated in a 30–60 min recorded zoom-based interview, in which they were asked questions related to (a) aspects of their face-to-face pedagogy used in the past that were difficult to translate to a virtual classroom, (b) how the pandemic challenged them in building relationships with their students, and (c) communication strategies they used to reduce the physical and psychological distance between them and their students in a virtual classroom.

The transcripts were initially analyzed by coding for specific teacher immediacy behaviors and strategies, and then analyzed inductively, looking for frequently mentioned items to create additional coding categories, following abductive coding principles (Tracy, 2020). To do this, we followed several steps for our data analysis. First, we read through the interview transcripts holistically to gain familiarity with the data. Second, we created an initial codebook of themes or codes pertaining to teacher immediacy, based on literature reviewed. We then used the initial codebook to code two of the 15 interviews to validate initial codes, comparing our codes to determine if our initial codes needed amending.

Additional codes emerged during this process, which did not fit into previous teacher immediacy categories. Using Glaser's (1965) constant-comparison method, we then compared emerging codes to those in the initial codebook, reaching convergence on amended codes. Using the amended codebook, we then individually coded the remaining interview transcripts of the data by splitting the rest of the transcripts in half with each researcher coding half of the remaining transcripts. When additional new codes emerged, we held data conferences (Braithwaite et al., 2017) to discuss the need for additional codes to be added to the codebook.

We noted theoretical saturation had been achieved when no new codes emerged. After finishing our coding, we discussed findings and identified the most frequently identified immediacy behaviors and overall strategies used by the instructors to decrease distance with students. We then selected exemplars of each of the themes, exploring potential implications for teacher immediacy for multiple teaching modalities.

3. Results

In this section, we first look at the challenges the participants faced while teaching during a pandemic. We then explore the instructors' use of specific strategies to decrease the psychological and physical distance in their classrooms, as they attempted to create a community of care for their students during a pandemic. As seen in Table 1, these strategies did not just include the more traditional nonverbal and verbal immediacy behaviors, but were part of a larger toolbox the instructors used to create immediacy in their classrooms; thus, we use the term strategies to refer to the multitude of behaviors they employed to increase immediacy within their classrooms.

3.1. Pandemic pedagogy challenges

The pandemic provided unique challenges for the instructors in this study, as they worked to build connections in various ways in classrooms that were anything but normal. To begin with, in spring 2020, some professors either did not have a spring break, or had to use

TABLE 1 Instructor immediacy strategies.

Nonverbal immediacy strategies	Verbal immediacy strategies	Care strategies	Technology strategies
Maintaining eye contact (e.g., cameras on/off; masks required)	*Inviting participation* (i.e., informal dialogue, calling students by names, asking & answering of questions, class sharing of jokes)	*Being accessible* (i.e., being approachable and available outside of class).	*Building on teaching platform capabilities* (e.g., polls, chat, breakout rooms, spotlighting)
Adapting to lack of physical distance and touch (i.e., social distance requirements; words vs. touch)	*Employing feedback mechanisms* (e.g., peer reviews; midterm surveys; intentional use of praise)	*Being adaptable* (e.g., changing policies such as having flexible deadlines and "offering grace")	*Using google tech options* (e.g., google docs, forms, & jamboards)
Being more nonverbally expressive (i.e., gestures, facial expressions)	*Being real* (i.e., vulnerability & self-disclosure; having a sense of humor about mistakes)	*Showing empathy & care* (e.g., focusing on their students' well being, making sure the students knew they would help them succeed)	*Employing external applications* (e.g., annotate, eli review, & hypothes.is)
Using other participation cues (e.g., hand-raise & chat functions)	*Providing additional teaching resources* (e.g., video announcements, explicit instructions, reminders)		*Playing music* (e.g., using students' favorites to connect with students)
Enacting embodied performances differently (e.g., dress; people in background; body challenges)			*Providing alternate ways to get in touch* (e.g., google phone numbers, discord, slack, instant messenger)

their spring break to work on transferring their face-to-face classes to online modalities. From the start of the pandemic, this caused anxiety and a new type of stress. As the semester continued, instructors were faced with challenges of learning new online platforms, having to create and manage activities using new tools with their students, as well as attempting to create connections with their students in environments where they had to adapt their nonverbal and verbal communication. For instructors tasked with teaching communication concepts, including nonverbal and verbal communication, this was especially taxing. Communication concepts are often taught by various demonstrations in a room filled with energy, which is difficult, if not impossible, to replicate in an online classroom. The need to be online also affected social opportunities to connect outside class in person.

The instructors in this study mentioned trying to set up their classroom structures in such a way that students potentially had more opportunities to engage with them and each other, using techniques such as flipped classrooms and hybrid course modalities. In some cases, the class would meet in person 1 day, and over zoom the next day. Or to maintain physical distancing, half of the students would come 1 day and the other half the next day. Some instructors offered their classes in a HyFlex manner, with some students attending class online synchronously and some in-person at the same time.

Although the available classroom structural changes allowed instructors to still teach during a pandemic, as will be seen in subsequent sections, such changes in the modality of the class brought unintended consequences related to the building of relationships and teacher immediacy. When allowed to interact with smaller groups of students, the instructors were able to get to know some of their students better, but the experience of the online students was not the same as those who were face-to-face, nor did either group get to experience the full range of activities typically done in a face-to-face classroom. In addition, the wearing of masks when face-to-face cut off certain channels of communication, hurting the immediacy between students and the instructor, as well as between students. If it was a HyFlex class, where the instructor still had to wear a mask, this cut out even more of the possible immediacy for instructors with their students who were in the zoom environment. At other times, most of the students preferred attending the synchronous online class, but did not keep their cameras on, while only a few showed up in class.

Some instructors mentioned that their departments allowed them to cap enrollments in their zoom classrooms, to allow for more personal interactions. Once coming back to campus for classes, when there were still physical distancing and masking requirements, some of these caps remained in place, in order to allow for physical distancing between students. In presentation-based classes, there were creative ways incorporated to get students to present by presenting in small groups on certain days, presenting virtually, finding their own audiences, etc.

Managing adaptations to courses, due to the need to rapidly move to online environments, was challenging for many instructors, yet most were able to embrace adaptability or "pivoting." Sarah (pseudonyms used throughout) mentioned that the transition "definitely took a toll on me and…I think it … made me much more willing to challenge the norms and be comfortable stepping outside of the box." When asked about the transition, Rosa stated," I think I've learned a lot about myself… I'm capable of these things, like, should I need to be able to pivot? I can. (With)… that ability to pivot, I think I learned a lot." Rosa initially had questioned, "how can I try to figure out how to do it the best I possibly can?" She answered her own question, pointing out how she learned that "this does not need to be an exact…replication of my face-to-face classroom … So how can I make this online classroom space the best it can be without in some ways pining for what I'm not going to have?"

Not only did instructors struggle with teaching concepts and connecting, there were also challenges personally as they navigated anxiety due to topics regarding life situations the pandemic caused, such as being in quarantine, worrying about getting or spreading COVID-19, and managing new living situations as children and spouses were all using the internet at home and needing care and

attention while the instructors were teaching or working with students. As they were acknowledging and navigating these extra concerns, instructors realized that their students were also having to figure out how to balance similar concerns, with some dealing with the death of a loved one due to COVID-19, losing jobs, and/or putting extra time into jobs. These issues directly and indirectly affected the learning environment, requiring instructors to adapt their pandemic pedagogy strategies in non-traditional ways, as seen in the next sections.

3.2. Nonverbal immediacy strategies

In particular, nonverbal behaviors had to be adapted because of the loss of available channels due to having to practice social distancing, being in quarantine, or moving to a synchronous online classroom. As seen in Table 1, instructors changed the typical nonverbal immediacy behaviors of eye contact, physical distance, touch, gestures, and facial expressions. In doing so, they built in alternative participation cues and embodied pedagogical strategies for their pandemic classrooms.

Eye contact in a synchronous class was different from being face-to-face, and advice on how to create it through a camera varied. Many suggested looking straight at the camera, while other advice was to look at the box that represented a person. Putting extra effort and energy into attempting to look alert and energized through eye contact, as well as through expressions and gestures through a camera were mentioned. Eye contact was lost if the cameras were off or if the class was asynchronous. If the cameras were on during a class, there were reports of students cleaning, lying in bed, driving, etc., which put a different spin on what was being communicated nonverbally. Facial expressions were also spoken about as being challenging when classes were face-to-face with masks required. Eyes had to be extra expressive, and even then, using non-verbal facial communication was hard to translate.

The need to keep a distance from students, and to keep students at a distance from each other when classes transitioned back to face-to-face, due to pandemic restrictions, created challenges regarding activities and group discussions. Instructors who had previously walked up to students in a class were keeping their distance. Also, one instructor, Jen, who had a practice of hugging, had to find other ways of communicating care, commenting that she started saying, "I love your faces and then blowing kisses," due to the need to social distance by keeping six feet away or holding classes online.

Some instructors mentioned how in a face-to-face class they used gestures and spoke with their hands, which they adapted in various ways, including being overly animated in front of the camera in hopes of recreating energy like there was in a face-to-face class. And yet this was not always possible, as Hannah mentioned: "I wasn't able to use as many gestures online since I was a small little square." For students, who often had their cameras off, gesturing in the synchronous online class was adjusted by students using "hand raise" features, or by entering comments in the chat.

Other participation cues had to be adapted in the online class, since nonverbal information was difficult to gain. For example, when the breakout room tool was used, a professor was not able to simply walk near the group to hear how the discussion was going, as they would in the face-to-face classroom. Instead, the instructor could "pop" into the room, which was not as subtle as walking near the group would have been. It was also hard to know if a student was "ghosting" or had left their square "on" as if they were participating, but may not be available or interacting at all. In a face-to-face classroom, an instructor could look and see if a student was engaged and tracking with the class, but in the online classroom, especially if a student's camera was off, the instructor could not tell if a student was paying attention or confused about something. In order to know what was going on with a student, the student would need to be asked, and either speak about how they were, or share their response in the chat.

Instructors also talked about the power of the virtual environment for both them and their students, as their pedagogy became embodied in different ways during the pandemic. Jorge commented that he thought "the challenge (was) to see people as whole people, because we only see like a window, and if, especially if students rarely turn on their cameras, it's just challenging…(to) just see people as whole people in general." However, students who might not have normally spoken up now had new ways to communicate in class using chat features and non-face-to-face ways of communicating. Even with cameras off, they were able to participate.

When cameras were on, students sometimes were enacting their performances in ways they normally would not have, with family members popping in and out of videos, students showing up in their pajamas or half-dressed, and sometimes even doing things like using drugs in the background. When giving virtual presentations, they might read their speeches off of the screen in front of them, "faking" eye contact with their virtual audience.

These body performances also affected instructors, with a different type of "embodied pedagogy," as instructors tried to make connections with their students. The instructors recognized this, as Haley noted that teaching became "a bigger performance behind the screen" and felt somewhat manufactured in its engagement with students. Haley went on to state that she was always "thinking about how do we engage" and "how do we be more present," as she tried to "model behavior for students who have to do this, knowing their jobs."

While the online modality was often mentioned to be strange and not always comfortable, Madeline shared how she was grateful her large body was not the focus any more for her students. Being in the virtual space was freeing and allowed her to be innovative. "They look at me differently. … It's been glorious." As she has been allowed to continue teaching over zoom, she explained: "I do not have to be cognizant of how I move through the space, and I get to be more authentically me, and students seem authentic." This is similar to the potential freedom for someone who has a visible disability, when that disability does not become so obvious to others.

It was clear from our interviews that instructors experienced the online environment, and its accompanying nonverbal context, differently than they did the face-to-face classroom, and adaptations had to be made around the presentation of self in these environments, which affected the enacting of teacher immediacy. Sometimes that was more freeing, and at other times it created challenges. Whatever the instructors did, as Jorge stated, they tried to "make the students feel like they are still in person." Nonverbal immediacy strategies helped the instructors do that, but the use of nonverbal immediacy had to be broadened beyond traditional nonverbal immediacy behaviors to include other types of participation cues and embodied pedagogical strategies for the pandemic teaching context.

3.3. Verbal immediacy strategies

Instructors often enacted teacher immediacy by incorporating more typical verbal immediacy behaviors used in the face-to-face setting, such as calling students by name, self-disclosing, using humor, asking questions, and encouraging class participation. However, these behaviors looked differently in the pandemic classroom, as instructors used various strategies to invite participation, provide feedback, and be real, as well as incorporating specific teaching resources, as seen in Table 1.

3.3.1. Inviting participation

To invite participation from students, instructors encouraged informal dialogue, called students by names, and created a student-centered classroom culture in which the asking and answering of questions became the norm. They also employed the use of humor to invite more students to participate. These behaviors were each adapted in ways that were unique to the pandemic classroom, as noted below.

Instructors used many strategies to engage in informal dialogue with students. These informal conversations were sometimes intentional, such as when zoom classes were opened early and instructors stayed on afterwards to answer students' questions, or when they brought in specific "questions of the day" to get students to open up about how they were doing or used a Google form as a check-in on students' well-being. Such questions might have to do with the class topic for the day, but more often than not, instructors mentioned asking check-in questions such as "where are you on the roller coaster of this week," "what good things are happening right now," "what have you done for yourself this week," "what are your wins this week," "how are you feeling in this moment," and "tell me what today is – thumbs up, in the middle, or thumbs down." By asking such questions, Madeline explained that they were "making an argument to take care of yourself so you could be a communicator." Several instructors also told students they could email them if they did not feel comfortable conversing about such things in that type of public space, and some students took advantage of that. Sometimes students would come early to the online class because they knew they could have conversations with the instructor about such things, but that was the exception rather than the rule for the instructors in this study. Such opportunities allowed instructors to gauge what the needs were of their students during this time, providing resources as needed.

Instructors recognized the importance of calling students by names in the process of inviting participation, noting the advantage of having students' names on zoom "squares," but also shared the difficulty in learning students' names with cameras being off in zoom-based classrooms, or when masking in the face-to-face classroom. However, something as simple as calling students by name was one way instructors could, as Jorge commented, "create … immediacy from a distance."

Many instructors mentioned that they broke up the classroom time into chunks, moving between information giving, discussion, and applications intentionally, to invite student participation in class sessions. Haley noted, for example: "Since I am relational in my approach, we do stuff in class. I might lecture a little bit, but my lectures are always question-oriented, so it's always involving students." Other instructors mentioned they employed such things as "guided discussions," "talking in small groups about their answers," "think-pair-share," and "creating a conversation with students, not just with me as the instructor." However, even with such tools used, some instructors noted that even with that "conversation-based learning," students were still "missing out on valuable conversations with classmates" in the pandemic classroom, as well as the more traditional "classroom engagement level," with it "not feeling like it was a community."

Whether check-in questions or questions related to the class topic, instructors built in unique mechanisms for participation in the pandemic classroom, using zoom chats, breakout rooms, polls, jamboards, and writing with people on shared documents to encourage students to both ask and answer questions in ways that engaged them and decreased the distance between the instructors and students. When using zoom chats, some of the instructors noted the advantage of the zoom environment, as explained by Gloria: "I like the fact that people can ask questions at any time and put that into the chat – kind of interrupting a class where you could not really do that in a face-to-face class."

In addition, some instructors mentioned they used humor and jokes to encourage student participation. For example, Gloria shared how jokes were not only welcomed, but became a ritual in one of her courses, with one student always checking in with a joke, and others putting jokes or riddles into the chat, as a response to that student sharing. She also used this strategy to break up the monotony of the zoom classroom environment, as a sort of "pressure relief valve" for students, when it was clear that a break was needed.

Regardless of what they chose to do, the instructors in this study adapted the usual verbal immediacy behaviors to invite participation, in their attempts to build relationships and create rapport with students. In short, as Beth noted, "It's really centering the learning space and environment as an area where we are exchanging thoughts, ideas and questions" and creating a collaborative student-centered learning environment.

3.3.2. Providing feedback mechanisms

Instructors noted that they used feedback strategically during the pandemic when providing input to students on their assignments and ideas, and seeking to improve the class during a pandemic. Instructors used multiple mechanisms for getting feedback on how the class was going, in order to make changes which could impact student learning and engagement during the course of a class, as they worked with students to co-create a classroom environment that was open and engaging during the pandemic. This was another way that instructors built connections with their students with verbal immediacy.

Instructors noted that they built in opportunities for students to provide each other feedback through various means during the pandemic. Whatever tools were chosen, these opportunities allowed students to experience each other as actual individuals during a time when they were not able to get to know each other in person as readily as they would in a face-to-face class. For example, instructors used the chat to provide feedback to students, and encouraged their students to do likewise. Jen noted that "I tried to get them to use "like" reactions … in hopes to get more kind of nonverbal feedback happening" during class. Paying attention to the chat while class was going on was another thing the instructor had to keep track of during the class but was seen as important, as Rosa stated: "I just tried to be a part of that conversation, in addition to what was happening verbally in the classroom space." Not all of the instructors agreed on the efficacy of more common tools, such as discussion

boards typically used in online classes, with some noting, for example, that they quit using discussion boards in the virtual COVID-19 space, opting for other strategies, because of the overuse of such tools during the pandemic.

Some instructors talked about the "labor" it took to make sure that the feedback they gave in writing was encouraging, often finding ways to praise students, so as not to create even more distance. Madeline noted: "I'm constantly trying to reduce negative feelings that would create distance" and to "engage with people who might be disengaged." Beth also talked about the importance of giving good feedback and the time it took during the pandemic to get it right.

> I always prided myself on giving good feedback and a lot of feedback … but I multiplied that by what it felt like a billion and spent so much more time with students' writing, giving them tons and tons of comments. … I kind of just wanted to sit with them for some time and just to make them feel like I'm there, that I'm not just there with them in the classroom, but I'm sitting here with their work.

Mary noted that she reached out differently to students who were doing well on assignments than those who were not, being more "intrusive" with those who were not doing assignments, because she "refused to be ghosted," as she sometimes felt she was in the virtual class sessions.

An additional feedback practice that many of the instructors built in during the pandemic to engage their students and decrease distance between them and their students was some version of a "start, stop, keep" feedback cycle, in which they asked students what could be improved during the semester, to help them learn and be more engaged, with Madeline explaining, for example, that "I want to know what they think, and I'm willing to shift if we need to shift" and let them "feel like they have been heard." The instructors in this study saw such strategies as especially important during a time when you could not get to know your students in the same way as you do when your classes are face-to-face. Leigh noted that this allowed the students to see the instructor as "a facilitator of the class, in which everyone can contribute something to the class."

In short, paying attention to feedback opportunities and listening to students was another way that teachers used verbal immediacy to decrease the psychological and physical distance with their students in a pandemic classroom. The types of feedback included encouraging students to provide feedback to each other in multiple ways and spending more time building in intentional feedback for students' work to make up for the lack of face-to-face contact.

3.3.3. Being real

In our interviews, instructors talked about how they more intentionally incorporated vulnerability, self-effacing humor, and disclosure to build relationships during the pandemic. They built upon what they were already comfortable doing, but enhanced that by becoming more "real" in order to create more intentional connections during a pandemic.

Instructors talked about the need to be vulnerable in front of their students, and not worrying about whether students would see them as weak for doing so. Doing so allowed them to make connections in a time when everyone was struggling. Madeline noted that "I think they see me as a very real person. I tell them I make mistakes." In turn, Madeline believes that this kind of vulnerability means that students can "trust that they can tell me things and they'll be safe." In addition, Mary noted that this kind of vulnerability helps to "create a sense of a human being on the other side of the screen."

All of the instructors mentioned the need to adapt their classroom strategies, and how having a sense of humility and humor helped with this. For example, Haley mentioned that having a sense of humor and being willing to laugh at "trying new things on the fly," especially when you realize "this activity is insane," meant that you can "just own that in the middle of the class," with everyone laughing about it together. Beth agreed, noting that recognizing that students could just "laugh along with me" made it easier for everyone to get through the difficult time of adjusting to a new normal in the college classroom, and provided a model for students to recognize that it is okay to fail.

Other instructors would tell their classes about their own experiences, to allow the students to see them as both a resource and a teacher. In doing so, it was important to acknowledge when you were also struggling, as Sarah noted:

> Just so they knew, like we are all just bumping along, and you know what, sometimes bumping along is as good as it's going to get, and we're going to call that a win. I forced myself to be a little bit more open with them, to be a little bit more transparent, because I think that also opened the door for them to feel like it was okay to not be super okay.

Some even talked about their experiences with having COVID-19 and what that was like in their families as members of the class, with one professor noting that students reached out to her personally when she had COVID-19 to make sure she was okay.

Several instructors talked about asking questions that were not related to the class content, since they saw "teaching as relationship," such as what their favorite restaurants were, the name of a musical artist they are embarrassed to listen to, and what their favorite weird animal was. Other instructors used the opportunity to bring in their home environment to make themselves seem more real, with examples including having their cat be the class mascot, taking a walk, and letting the students see their backyard or garden.

Multiple instructors mentioned building in opportunities for students to introduce themselves and self-disclose with each other. Mary noted this helped students "make each other three dimensional and not just names." Some of the quieter students would post things in the zoom chat, responding to each other, rather than speaking up in class. When teachers drew attention to that in the class, Rosa explained that "it helped the students at least feel like they were making some kind of connection during the pandemic," being "a little less alone for 1 hour or 3 hours a week."

In short, another way instructors in this study demonstrated verbal immediacy was by being real with their students through the use of self-disclosure and vulnerability, as well as self-effacing humor. All of these actions illustrate that the instructors in this study went beyond just the use of typical verbal immediacy behaviors to create connections with students in the challenging time of the pandemic.

3.3.4. Providing additional teaching resources

The final verbal immediacy strategy instructors in this study used was to provide students with additional teaching resources, which supported the students' learning in the absence of meeting face-to-face. These are included under verbal immediacy strategies since they involved interactive teaching strategies the instructors used to decrease the distance in their classrooms, consistent with the United States Department of Education's "regular and substantive interaction" (34 CFR § 600.2) guidelines for distance education (National Archives, 2023). Along with the other "substantive contact" strategies mentioned in the results, the instructors in this study created clear lesson plans, incorporated announcements in various forms, and involved students in developing course content and building community.

Over time, the instructors in this study recognized that "spontaneous online teaching does not tend to be effective" and that "you have to be very intentional about what you are going to do if you want it to be effective." They talked about this in terms of lesson planning and thinking ahead about how long activities and breakout rooms will take in a particular class session, as an example. This intentionality also involved building in necessary activities and assignments to help students work towards their final projects or assignments over the course of a semester. These same types of strategies are seen as best practices in asynchronous classrooms (*cf.* Glazier, 2021), but many of the instructors interviewed in this study had not taught in that format previously so had to adjust their more spontaneous teaching style for something more structured, without a lot of instruction on how to do so.

Additionally, several instructors talked about the importance of providing reminders to students at the beginning of each week and/or at the beginning of each class. These included information about upcoming assignment due dates, with time provided in class for questions about such assignments. Sometimes those announcements, if done at the beginning of the week, were video announcements, "to create more of a connection and to make the students feel like they are actually part of a class." Similarly, instructors often provided overviews of what was happening that week, along with going over a specific day's agenda at the beginning of class. All of these extra teaching resources took time to create and implement in the pandemic pedagogy classroom.

As classes quickly transitioned to online platforms, other ways to connect were found. Many instructors recognized that they needed students to provide the pop culture and personal references to be analyzed in the classes and that by doing so the students were "collaborators." Mary noted that "instead of me having to find everything, they find it, and bring it to class and talk about it." She added: "They love that, because they get to find things, songs and comments and things that mean something to them that they care about, instead of me trying to figure out what they care about." For example, Haley mentioned how she invited her class to share a video clip of anything: "news, movies, TV shows, everything…commercials." She added that it "gave us…genres to explore" and that specifically "music…is great at engaging people." She would play the clip and then they would "talk about how that applies to the course content." At other times, they would send out emails when they saw a random article or happening that related to the class, to let the students know they were thinking of them.

Additionally, some instructors intentionally structured their courses to build community. For example, Mary shared how she told students they were responsible for each other, and provided recommendations for how to build teams with a goal of creating communities. She mentioned that her "classes are effective…when my students become friends in class." Jorge assigned his students to groups "to foster community among them (and) also … elevate … classroom discussions, because they get to know each other."

In short, the instructors in this study adapted multiple verbal immediacy strategies and behaviors, such as inviting participation, incorporating feedback, and being real to decrease the physical and psychological distance between them and their students, and to build rapport and connections with their students. They also brought in additional teaching resources to help students feel connected. These behaviors were adapted to the pandemic classroom in creative ways, as instructors found a way around the limitations inherent in the pandemic classrooms to engage their students in learning. Instructors built on what they were already familiar with and used to, enhancing the use of verbal behaviors to make up for loss of relationships and connections caused by not being in-person in traditional ways. All of these teaching structures and resources, used by the instructors to decrease physical and psychological distance in pandemic classrooms, demonstrate the importance of expanding verbal immediacy beyond the typical verbal behaviors used in a face-to-face classroom.

3.4. Care strategies

In addition, the instructors in this study also attempted to create additional virtual opportunities to make up for the missed opportunities in person. As seen in Table 1, they did this by being accessible to students outside the class, being adaptable with policies to provide grace when needed, and working to show more empathy and caring than normal.

For these instructors, being accessible meant being approachable and available outside of class for individual and group meetings. This included offering virtual office hours during the day and at night, as well as employing various platforms for communication (e.g., discord; slack; instant messenger; Google phone numbers). Sometimes they would keep the zoom class open when they were not meeting, in order to encourage students to "stop by" and ask questions. Some instructors required students to meet with them one-on-one virtually early on in the semester to get to know each other better.

Mary explained that these types of connections were done to provide a "sense of connecting us," and "this sense of immediacy created the connection that students were craving." In some of the cases, Madeline noted that "meetings have gotten better with students because they are online," noting that "students select and really dedicate that time, and nobody has to trudge to a weird place and try and find the office." Students tended to turn their cameras on in those one-on-one meetings, which Rosa said "allowed me to see them and make a connection."

Being available to students at hours they would not have normally been at the office also created a sense of relationship. Rosa explained: "If I have 5 minutes, and I'm in a space where I can hop on teams, then that is a huge success between me and my students, building that relationship because I'm available real quick." Doing so means that an

instructor had to be intentional about building relationships, as Sarah noted, "because if you are not going to make an intentional effort, there was not going to be a relationship."

In addition, there were multiple examples of the instructors working to make sure they had adaptable policies, to help the students be successful and feel taken care of during the global pandemic. It came down to "honoring them as people," Madeline stated. The instructors' interviews were filled with words like "grace" and "flexibility," as they worked to meet students' needs. Even the desire to have students keep their cameras on in the virtual classroom, in order to create immediacy, was eventually not required by most of the instructors, because of respect for students' privacy and a desire to maintain a level playing field between students who might not have the same access to technology and reliable internet.

Many of the instructors would often give extended deadlines for students to complete assignments, knowing that many of the students were "essential workers" and working longer hours to help take care of their loved ones. They also recognized that their students might be "competing for the internet with family members" when they were home, even if they had internet access at home. At the same time the instructors were making these types of accommodations, they did recognize that they could not meet the needs of all of their students, as Karrie stated, "it's hard to accommodate everything, to support every possible situation that could be a result of the pandemic." Instructors also recognized the importance of "encouraging professionalism" and that students would need to be open with them about what they needed in a timely manner.

As they gave grace to students, some instructors began to question the "norms" they were used to in teaching, and began to redesign their classroom expectations in ways that made more sense in terms of student learning, as Sarah stated.

> This made me really think about a lot of the practices and norms and question why they are norms. For example, my students have proven to me countless times that they know what I want them to know and that they've met the course objectives, so why am I going to give them a final exam when they've already proven it to me, and I'm just going to add more stress to an already very stressed out population.

Hannah also questioned typical norms, when deciding to not take off points for late assignments: "I've definitely been more understanding and empathetic, and realizing it's not worth it in the grand scheme of things, … as long as they do the assignment and they are learning," recognizing the need for them to be "getting the support that they need at a time of need." Other instructors looked at their attendance policies and thought about changing those, as Jorge said he did with his. After he did so, he was surprised to find that he still had good attendance, which he attributed to the interactivity he was building into the classroom, encouraging conversations between classmates through the use of technology tools.

It was clear that the instructors in this study demonstrated their caring and empathy towards their students by the choices they made to be intentionally accessible and adaptable with them, showing the students were "cared about not only as students, but also as people." As they focused on their students' "emotional and mental health and well-being," they worked to make sure the students knew they wanted them to succeed and were going to help them during a difficult time. In doing so, as Sarah explained, "we were not just feeding them academically, but we were also feeding them as individuals, and giving them coping skills and reminding them that we are all in this together."

This did create challenges for the instructors as they worked to take care of themselves and their families during a global pandemic, with several of the instructors in this study talking about the immense "emotional labor" being spent as they worked to embody their pedagogy in ways that showed they truly cared about their students, in an atmosphere that Beth called "a space of empathy and care rooted in critical theories about power." This "making space" for students showed that the instructors cared for their students, breaking down barriers towards the immediacy that was dislocated because of the pandemic.

3.5. Technology strategies

To show this type of care, the instructors in this study employed multiple technology tools to decrease distance between themselves and their students, as well as to encourage the building of relationships during the pandemic. Most of these were used to enhance their pandemic pedagogy, such as the use of polls, chat, and breakout room features of online synchronous teaching platforms, as well as doing fishbowl exercises and panel discussions using virtual teaching capabilities like spotlighting the people who were speaking. Other technologies used included collaborating in Google docs, and using Google forms and Google jamboards. Some instructors brought in external applications such as (a) annotate and hypothes.is, two separate document annotation platforms, (b) eli review, a peer review platform, and (c) Kaltura interactive lectures, where you can embed questions into recorded lectures for them to answer. In addition, several instructors mentioned using music to set the tone in their classroom and providing a Google phone number which students could use to text/message them. Richard noted that teaching synchronously online "can actually be even more interactive involving of everyone in real-time" by using such tools.

Reasons for bringing in such technologies were primarily to make the classes interactive and to build relationships between the students, as well as increasing teacher immediacy. For example, Jen stated that using collaborative documents allowed the instructors to "figure out how to have everyone working on these things together" in a non-face-to-face setting, and in some cases, instructors stated they could bring in tools such as a Google jamboard in their face-to-face classes once returning to campus.

Rosa noted that using the chat feature brought out the quieter students and became a "really great way to engage," whether it was through using something like a "waterfall chat," where students would wait to submit their answers in chat until the instructor told them to, or whether they were responding with reactions in real-time to other students' comments, allowing there to be "more interaction across the class." Rosa explained: "I had people who, when they would come on camera, would be kind of a little more timid or closed off, but in the chat would just be all about what was happening."

Breakout rooms were another commonly used feature in the pandemic synchronous classroom. It was a way to increase

participation. Some faculty even chose to host their classes in a hybrid way, meeting sometimes over zoom and other times face-to-face. When doing so over zoom, Sarah noted she used the breakout rooms, because "I wanted them to be able to feel a little bit more closely connected to their peers, as opposed to yelling at each other from across the room with your mask on and nobody can hear you." Sometimes she would have them produce something creative to illustrate the group's work as a result of being in the breakout rooms, beyond just working on a collaborative document.

Other tools, such as videos and music, were used to break down the barriers and create immediacy in the classroom, with some instructors creating YouTube playlists of students' favorite songs to "create a culture of shared music" and "to have a natural conversation atmosphere going." Beth noted that the choice to do this "completely changed the atmosphere in my classes." Building in video as a way to meet and interact with each other was also used by some to break down the barriers of not being in the same physical space.

It was clear from our interviews that instructors used technology to build relationships with and between students, not relying just on traditional nonverbal and verbal immediacy behaviors of a face-to-face setting to do so. Such tools allowed them to create interactive classroom environments, in which students' learning and relationships could be enhanced during the difficult times of a global pandemic, as instructors learned to treat the classroom as a space where they could still get to know students and build connections with them.

4. Discussion

As instructors were attempting to recreate immediacy due to pivoting their pedagogy because of the pandemic, they faced multiple challenges. Many spoke of frustrations with the limitations imposed, as they adapted to the synchronous online modality in various ways, including eye contact through camera use, recreating energy with facial expressions and body movement, and using different forms of connecting outside of zoom. The online space also provided freedom for an embodied pedagogy that was innovative.

Participation cues had to be created in different ways, as instructors worked to build community in their classes. Instructors used a variety of ways to invite participation verbally, such as calling students by name, asking questions and having informal dialogues, implementing feedback mechanisms, and crowd-sourcing examples from students, to try and make their classes interactive. They brought in technology tools such as chat, breakout rooms, and Google jamboards to invite more active participation. In addition, they made extra efforts to be accessible and empathetic to students outside of the class sessions, again using technology to do so. They used that technology to demonstrate care for their students and decrease distance and encourage relationship building.

4.1. Implications

In order to build relationships in the pandemic classroom, the instructors in this study recognized that such relationships can be built beyond the face-to-face atmosphere through the use of intentional pedagogical tools, consistent with a community of care framework advocated by other scholars (Clemens and Robinson, 2021; Tang et al., 2022). These strategies and behaviors were not different in type from earlier conceptions of teacher immediacy by Gorham (1988) and others (e.g., Richmond and McCroskey, 2000; Beebe and Mottet, 2009; Dixson, 2010), but they did differ in how they were embodied and enacted in the synchronous online and pandemic-restricted face-to-face or HyFlex environments, being more similar in nature to the work done on "social presence" and rapport in the asynchronous online classroom (*cf.* Baker, 2010; Dixson et al., 2017; Glazier, 2021). "Our challenge as educators is to cultivate a pedagogical space that welcomes multiple forms of participation and presence, including presence via absence" (Nieuwenhuis and Strausz, 2023, p. 614). To do so, we need explanations that are expanded for the synchronous online environment (*cf.* Katz and Kedem-Yemini, 2021; Gimpel, 2022), with embodied pedagogy and media multiplexity approaches, which come alongside the teacher immediacy literature (Ishii et al., 2019; Parsloe and Smith, 2022; Clughen, 2023).

Broadening views of how technology can be used to help build and sustain relationships is consistent with media multiplexity perspectives (Ishii et al., 2019; Bernhold and Rice, 2020; Katz and Kedem-Yemini, 2021; Kramer et al., 2021), which consider the use of multiple media channels in building strong ties between people. When media multiplexity theories were originally proposed, they were seen as potentially one way of explaining how close instructional relationships can be formed through using multiple channels to increase how we communicate with each other without relying on only face-to-face modalities for the relationship (Haythornthwaite, 2001, 2005).

As the instructors in this study were forced into using alternative ways to communicate during the pandemic, they found if they made a concerted effort, they could build relationships with their students, in ways that were high-presence, supportive, and immediate (Amirian et al., 2021; Brophy et al., 2021; Glazier, 2021; Gimpel, 2022), albeit differently than in the traditional face-to-face classroom. They did this by using "many forms of presence" (Nieuwenhuis and Strausz, 2023, p. 619), which included multiple technologies and communication channels. The instructors in this study embodied strategies and behaviors others have called for, such as valuing opportunities for shared vulnerability (McElroy and Jackson, 2021), focusing on the wellbeing of their students (Clughen, 2023; Wiant Cummins, 2023), creating interactive classrooms with opportunities for support (Clughen, 2023; Nieuwenhuis and Strausz, 2023), using digital collaboration tools (Gopinathan et al., 2022), and incorporating empathy and holistic care in policies and interactions (Clemens and Robinson, 2021; Tang et al., 2022). In doing so, they reconceptualized teacher immediacy for the pandemic classroom as embodied pedagogy (Nguyen and Larson, 2015), with the acknowledgement that we bring our bodies into virtual interactions by using a variety of technological tools to build relationships and decrease the physical and psychological distance between teachers and students.

As the instructors in this study used these various technologies, they began to embody their pedagogies in different ways across various teaching modalities. These instructors had to "transgress" the typical online environment to disrupt the atmosphere occurring during a pandemic (Nieuwenhuis and Strausz, 2023). They learned to "inhabit and co-create atmospheres in a creative and affirmative manner" (Nieuwenhuis and Strausz, 2023, p. 600), and embrace the

unknowns in which bodies and teaching practices were "dislocated" from each other (Parsloe and Smith, 2022; Nieuwenhuis and Strausz, 2023). In doing so, as Wiant Cummins (2023) did during the pandemic, they were figuring out how their bodies could "enact wholeness together" (p. 1) and "how to engage students in the material in embodied ways" (p. 2).

As we move into the new post-pandemic normal, adjustments to teaching and learning may still need to be made due to the lingering effects of the pandemic, especially as online and HyFlex classrooms continue to be used within communication and other disciplines (Beatty, 2019; Katz and Kedem-Yemini, 2021; Morreale et al., 2021; Westwick and Morreale, 2021; Wong et al., 2022). These instructors showed us that it is possible to pivot and embody pedagogical practices in unique and critical ways, using technology, and in doing so, to build relationships with students with a high degree of caring.

4.2. Limitations and future research

Although there were multiple strategies found that help to expand the conceptualization of teacher immediacy for the online environment in this study, we only interviewed 15 instructors, all of which were from the communication discipline. Plus, the instructors interviewed were not a very diverse group demographically. Future research should expand into looking at how instructors from other disciplines adapted their pedagogy during the pandemic, in order to better understand the nature of teacher immediacy in disciplines which may be less "embodied" in their curriculum than the communication discipline. In addition, since "embodied pedagogy" comes with a rich history from the field of critical and emancipatory pedagogy (Freire, 2000, 2018; Hooks, 1994), it is important that future research also include instructors from various cultural backgrounds, to see what their experiences were during the pandemic in embodying pedagogy in ways that brought freedom to themselves and their students (Wright, 2022). This could also be explored from the perspective of teacher identity (El-Soussi, 2022).

Future research should also look at how instructors took what they learned during the pandemic to change their face-to-face classrooms as they transitioned back into those classrooms, as the threat of the pandemic and restrictions on physical presence with others became lessened (Imran et al., 2023). Did instructors choose to continue bringing in some of the advanced technological tools they used during the pandemic into their post-pandemic classrooms, and if so, how did that change the relationships and immediacy in those classrooms?

Future research also needs to look at the experience of students as they made their way into and around the pandemic classroom, working to embody themselves in an environment which inherently disembodied portions of how they typically communicated. Hearing their perspectives, and learning more about the role teacher immediacy played in their engagement and experience of "presence" in the classroom, could provide a fuller picture of how teacher immediacy needs to be reconceptualized moving forward for the asynchronous and synchronous online teaching environments.

Looking at pandemic pedagogy from media multiplexity and embodied pedagogy perspectives can enhance the teacher immediacy literature by helping instructors become familiar with and skilled in using multiple forms of technology for interactions to increase immediacy in an online class, such as chat, breakout rooms, Google jamboard, and Google docs, as well as using synchronous platforms such as Zoom. It can also help instructors adapt their concept of using their body in a face-to-face environment to the online modality, as they embrace an embodied pedagogy of caring in online classrooms.

4.3. Conclusion

The communication discipline is inherently a discipline which has historically relied on embodied curriculum (Nguyen and Larson, 2015; Dixson et al., 2017), with its past including elocution and public speaking, and its present emphasizing the building of relationships using communication across various dimensions (Dixson et al., 2017; Hudak et al., 2019; Brophy et al., 2021; Clemens and Robinson, 2021; Foutz et al., 2021; Morreale et al., 2021). The communication instructors in this study worked "to create the classroom as a location of possibility," thus "recentering engaged pedagogy" (Wiant Cummins, 2023, p. 2) during the pandemic. They did this by creating a technologically-rich environment in which they built relationships with their students over multiple media channels and platforms. In doing so, they found freedom to innovate as they experimented with embodying their pedagogies across various modalities. Taking such an approach provides an expansive view of teacher immediacy strategies and behaviors, which can be used to decrease physical and psychological distance between students and instructors, even in the synchronous online classroom.

When we began this study, we did not know what to expect in terms of how communication instructors adapted their teacher immediacy behaviors and strategies for the pandemic classroom. We each had our own experiences as teachers and students, but were not aware of the realm of embodied caring that took place during the pandemic by teachers who worked "towards co-creating atmospheres that foster wellbeing and growth for everyone involved" (Nieuwenhuis and Strausz, 2023, p. 600). These types of communication-based studies are important because they accomplish multiple goals, including providing online pedagogical best practices from the perspective of instructional communication literature and research. Such an approach to scholarship demonstrates the value of studying instructional communication for other disciplines and extends the benefits of the communication discipline to other academic domains across the educational enterprise.

Expanding views of teacher immediacy to better meet the needs of all instructional modalities allows us as scholars and practitioners to "redefine engagement" in ways that resonate for multiple types of learners (Fassett and Atay, 2022, p. 147), and to better "leverage the tools … that can support their learning" (Fassett and Atay, 2022, p. 147). This is especially important as we work to understand "who enters these spaces and for what reasons" (Fassett and Atay, 2022, p. 147) in our post-pandemic reality. As instructional communication scholars, we need to be taking the lead in the conversations related to this reality.

Data availability statement

The datasets presented in this article are not readily available because no permission was given by the participants for anyone to

have the raw data except the principal investigators. Requests to access the datasets should be directed to axchathamca@ualr.edu.

Ethics statement

This study involving humans was approved by the Institutional Review Board of the University of Arkansas at Little Rock. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

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Graduate teaching assistants' challenges, conflicts, and strategies for navigating COVID-19

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COVID-19 imparted unprecedented changes to higher education. Overnight, institutions were required to transition to online instruction, which brought about numerous challenges for instructors. This study examines the experiences of an often-overlooked instructor; graduate student assistants (GTAs). Their challenges and conflicts encountered with online instruction during COVID-19 and conflict management strategies are investigated. Sixteen ($N = 18$) GTAs from six universities in various regions of the United States were interviewed and constant comparative analysis was used to analyze data. Findings revealed that GTAs experienced challenges with (a) online instruction, (b) students, and (c) personal challenges. Also, GTAs encountered conflicts regarding (a) safety concerns and precautions and (b) online-related proficiency, support, and expectations. Lastly, GTAs (a) employed empathy and flexibility, and (b) created boundaries and consulted others as conflict management strategies. Findings are discussed and theoretical and practical implications are advanced.

KEYWORDS

graduate teaching assistants (GTAs), online instruction, COVID-19, challenges, conflict management

Introduction

The coronavirus disease 2019 (COVID-19) outbreak precipitated the disruption of life in various sectors of society globally, especially the education sector (Alberti et al., 2022). The World Health Organization. (2020) advised people to avoid crowded, close-contact, and enclosed spaces, due to the highly transmissible coronavirus, leading to the closure of schools in various countries. In the United States, the rapid transition from in-person to online teaching heavily influenced not only students but instructors, as well (Na and Jung, 2021). Given the unprecedented change in teaching modes, insufficient knowledge, and experience with blended, remote, or online teaching (Gudmundsdottir and Hathaway, 2020; Trust and Whalen, 2021), instructors had to learn various ways to adapt, including learning new technologies, teaching approaches, and communication strategies (Trust and Whalen, 2021).

Research has examined the experiences, responses, and challenges of instructors due to the sudden shift to online instruction during the pandemic (e.g., Sunasee, 2020; Na and Jung, 2021; Trust and Whalen, 2021). Findings indicate that instructors experienced several challenges including technological constraints, lack of student engagement, assessment, evaluation, mental health, support, etc. (e.g., Adedoyin and Soykan, 2020; Openo, 2020; Na and Jung, 2021). However, most studies focused primarily on the experiences of full-time faculty and lecturers, with little attention given to the experiences of graduate teaching assistants (GTAs, hereafter).

In higher education, the position and importance of GTAs is recognized and has increased because of student diversity and a growing emphasis on undergraduate education (Nyquist et al., 1989). Universities depend on GTAs because of their knowledge, because they are invariably cheap to employ, and are more adaptable as employees (Gillon and Hoad, 2001). The specific roles and responsibilities of GTAs vary depending on the institution and teaching modality (Williams, 2012). Generally, GTAs help instructors of large introductory level undergraduate classes with duties like grading, holding labs, tutoring etc. Also, some GTAs are instructors of record, independently teaching their own undergraduate classes, especially within the humanities and social science disciplines. Given the invaluable and unique roles/identities of GTAs (i.e., student, instructor, and researcher), an investigation into the disruption of life caused by the COVID-19 pandemic is pivotal.

Therefore, the purpose of the present study is to examine the unique challenges and conflicts GTAs encountered due to the pandemic and the strategies they used in managing these challenges and conflicts. Few studies have examined the impact of COVID-19 on GTAs (e.g., Houston et al., 2021; Kumar, 2021), but not from a conflict management perspective. These studies have mainly focused on the challenges and experiences of GTAs from STEM programs, who typically assist full-time instructors with duties such as grading, holding labs, tutoring, and so forth, as opposed to GTAs within the fields of humanities and social sciences, who are often instructors of record. Additionally, these studies have often explored first-person reflective evaluations of GTAs (e.g., Sunasee, 2020; Wang et al., 2022), small group sessions, safety measures, and preparation strategies (e.g., Kumar, 2021; Tinnion et al., 2021). Hence, research is scant in investigating not only the challenges GTAs within the humanities and social sciences field experienced but also the conflicts they faced and how GTAs managed these challenges and conflicts resulting from the transition to online instruction.

In this study, we contend that investigating these issues is of particular importance not only because conflict is central to educational relationships (Serrano and de Guzmán Puya, 2011), but also because unique insights can be gained from the experiences of GTAs as they hold multiple identities (Alberti et al., 2022), and are often overlooked. Furthermore, by investigating the challenges and conflicts encountered by GTAs, valuable lessons can be learned on how to provide adequate support and resources for them. Environmental catastrophes can disrupt daily operations in various sectors of society, thus, exploring how GTAs managed the challenges and conflicts resulting from the move to online instruction, can provide educational institutions with insights on how to prepare for unforeseen circumstances. Moreover, as online instruction becomes more instrumental in education, it is important to shed light on the lived experiences of this invaluable group of instructors given their subject positions as instructors, students, and researchers. In the section that follows, we begin with a general discussion on the role of GTAs in higher education.

Graduate teaching assistants in higher education

GTAs are graduate students enrolled in higher education institutions who have knowledge of specific course content, design, teach, and administrate course material (Wadams and Schick-Makaroff, 2022). In the United States, the GTA position is formal, and they are considered (part-time) employees of the institution. The position provides GTAs with teaching support and the experience needed in pursuing their careers in academia, while also being a source of funding for postgraduate research (Park, 2004).

GTAs are not only instructors but hold different subject positions that index their various identities and roles, including university employees, (international) graduate students, researchers, are parents, married and/or in a relationship, have family responsibilities etc. These multiple identities, in addition to others (e.g., gender, age, race, nationality, etc.), impact their experience as instructors and are foregrounded based on relational and situational contexts (Hecht et al., 2005). At times, these identities come into conflict with each other, and when that occurs, one identity takes precedence over the other. For example, studies have found that GTAs fall behind on their research or do not spend enough time studying for their own courses because of the demands of teaching (e.g., lesson preparation; Muzaka, 2009). These identity issues, among others, such as contending with being a female or foreign-born instructor (Weinberg et al., 2009), being an adult learner with various responsibilities beyond that of a traditionally-aged student, add to the multiplicity of identities that impact GTAs instructor experience.

Although the teaching experiences GTAs gain contribute to the development of their careers, past research indicates that GTAs often lack the necessary training needed to complete their responsibilities (Smith et al., 2023). For institutions and/or departments who offer development opportunities for GTAs, the focus is mostly on addressing basic orientation to policies, such as time management and how to conduct oneself in the classroom (Gardner and Jones, 2011; Smith et al., 2023). Rarely do GTAs receive training on nuanced aspects of teaching such as developing teaching philosophies, understanding different approaches to student learning, or feedback on teaching practices. Also, GTAs lack training in handling unanticipated circumstances that may arise in the classroom or society (Smith et al., 2023). Meaning that a lot of what GTAs learn about teaching comes through practice over a period of time. If GTAs learn how to be instructors through years of practice, then what experience/knowledge can they draw from during a global pandemic? Indeed, if their teaching toolkit is empty because of lack of experience during a regular semester, then GTAs have no knowledge to draw from during unexpected societal crises, like COVID-19. In the section that follows, we situate the current study within the context of COVID-19.

COVID-19 and educational institutions

Closing schools due to emergencies is not a new occurrence. Emergencies like school shootings, terrorist attacks, natural

disasters (e.g., wildfires, hurricanes, tsunamis etc.), and other emergencies have closed schools for days to months in the United States (Trust and Whalen, 2021). In March 2020, the World Health Organization officially declared COVID-19 (i.e., a type of virus that causes severe acute respiratory syndrome) as a global pandemic. Consequently, educational institutions were closed abruptly all around the world. According to UNESCO. (2020), about 107 countries implemented school closures, with ~862 million people affected by this closure around the world (Mahmood, 2021). In the United States, most university campuses were forced to close in March 2020. This sudden closure of campuses compelled millions of college students to finish their semesters online, via remote learning modalities (Katz et al., 2021).

Online instruction—a mode of instruction utilizing a virtual teaching platform (Wadams and Schick-Makaroff, 2022), has been traditionally used by students who are unable to physically attend classes (Rouamba, 2020). However, in 2020, the WHO suggested that schools employ online educational strategies, such as podcasts, radio, television, or electronic learning, for teaching during school closures. Hence, university administrators had no option but to have instructors use various applications for online teaching because it seemed like the best teaching method during COVID-19 (Teymori and Fardin, 2020). Instructors were forced to adapt immediately to the rapid changes in course delivery amidst the uncertainty of a widely spreading virus (Veletsianos and Houlden, 2020). Instructors had to learn new technologies, communication strategies, and teaching approaches during the shift to online teaching (Trust and Whalen, 2021). According to Trust and Whalen (2021), 12% of their study's participants reported being exhausted from having to find and learn the right technology to use for their classes because they did not have training and onsite support. Although online education provides access for many students, the abrupt move to online teaching due to COVID-19 caused instructors to face several challenges and conflicts for which they were not prepared (Teymori and Fardin, 2020; Trust and Whalen, 2021). These challenges engendered conflict, which we discuss in the next section.

Instructor challenges, conflict, and management strategies

We define *challenges* as facing an issue or struggle, internally and/or externally, which interferes with one's ability to achieve a goal. Traditionally, instructors face several challenges in the classroom, including student engagement, classroom management, absenteeism, and plagiarism, amongst others. These challenges are heightened when teaching online. Researchers posit that when using an online modality, challenges such as a depersonalized classroom, a "different" instructor presence (Arkorful and Abaidoo, 2015), time management, pedagogy, and assessment occur (Kebritchi et al., 2017). Unlike traditional classes, online classes require greater and continual involvement from instructors (Nambiar, 2020) because several uncontrollable factors like external distractions or unstable network connections can hinder teaching (Na and Jung, 2021) and learning for both instructors and students, respectively. Similarly, online instruction usually requires instructors to invest a significant amount of time in designing and developing their course on the online platform, including creating new materials for instruction, uploading, and making files accessible, etc. (Baran et al., 2013). Apart from the challenges experienced in teaching, instructors also encounter conflict, which is inevitable given that much of our daily communication is rooted in goals.

Conflict is defined as incompatible goals and interests, among interdependent parties (Floyd, 2022). Interdependence signals that conflict can occur at an interpersonal, intergroup, or organizational level. At an organizational level, Burke (2006) posits that conflict can happen at four levels: (1) individual-organization (i.e., personal), (2) individual-individual (i.e., interpersonal), (3) organizational unit-unit (i.e., intergroup), and (4) interorganizational relationships. These levels are not exclusive and can intersect. Factors such as environmental change, technological developments, diversity, and flattening hierarchies contribute to these levels of conflict within organizations. Of significance to this paper is the individual-organization and individual-individual level of conflict because it focuses on the congruence or incongruence between the goals of the individual (e.g., GTA) in relation to the organization (e.g., university) and between individuals (e.g., students and GTAs). Thus, when goals are incongruent and incompatible, conflict arises (Burke, 2006).

When conflict arises, social actors may engage in conflict resolution. Resolution, however, is strongly dependent on whether the conflict is positive or negative. According to Deutsch (1949, 2014) theory of conflict resolution (cooperation and competition), when conflict has positive interdependent goals, social actors engage in constructive conflict resolution using cooperative conflict management strategies that result in win-win outcomes. In the same vein, Blake and Mouton (1984) advance accommodation and compromise as strategies, in addition to cooperation, that can offer mutually beneficial outcomes to parties. Each speaks to concessions actors make to resolve the conflict. Deutsch (2014) offers, though, that when conflict has negative interdependent goals, destructive conflict resolution uses competitive conflict management strategies with win-lose outcomes. These conflict management strategies are dependent on substitutability (i.e., when one person's actions can satisfy another's intentions), attitude (i.e., type of response toward self or the environment), and inducibility (i.e., ability to accept influence). Importantly, constructive-cooperation processes, compared to destructive-competitive processes of conflict management, can lead to healthy interpersonal relationships, increased group productivity, greater psychological health, and improved self-esteem among interdependent parties (Johnson and Johnson, 2011; Deutsch, 2014). Constructive resolution and cooperative strategies are thus desirable for win-win outcomes in conflict.

It is important to note that both challenges and conflict overlap and can be a cause of the other. For instance, an instructor may experience an issue externally, which could lead to conflict with a student, and vice versa. In the next section, we focus specifically on the challenges instructors experienced during the COVID-19 pandemic since research is scant in examining the conflicts arising from the move to online instruction.

Instructor experiences during COVID-19

As discussed, online instruction became a necessity during COVID-19. Thus, given the unprecedented change in teaching modes, and insufficient knowledge and experience with blended, remote, or online teaching (Gudmundsdottir and Hathaway, 2020; Trust and Whalen, 2021), challenges abound. Online learning already had challenges pre-pandemic, but the abrupt transition from in-person to online teaching because of COVID-19 created even more challenges for university instructors. Instructors were now forced to teach classes designed for in-person instruction in online formats. Recent research examining the experiences, responses, and challenges of instructors during COVID-19 found that instructors experienced challenges with technology, lack of student engagement, external distractions, not being in the same physical space with students, assessment and evaluation issues, mental health, support, distractions, etc. (e.g., Adedoyin and Soykan, 2020; Openo, 2020; Na and Jung, 2021). These studies indicate that the abrupt transition to online instruction impacted even seasoned instructors. Although a plethora of studies examine the experiences and challenges of full-time instructors (i.e., lecturers and faculty), the experiences of GTAs during this abrupt move to online teaching is understudied.

In the present study, we argue that GTAs experienced more challenges than those associated with instruction only. As discussed, GTAs are also graduate students who engage in academic research. Thus, GTAs carry a full-course load (six credits or more) and conduct academic research that contributes to a university's research activities. So, GTAs faced similar challenges with adjustment to online learning as any college student during COVID-19. Moreover, GTAs had to contend with challenges, such as halted research activity and funding, "dry" laboratory research, and limited or no access to research participants faced by academic researchers across the United States (Omary et al., 2020). Furthermore, some GTAs are also international students while others are married or in a relationship, and/or have children and other family responsibilities, meaning these GTAs have an added layer of responsibilities and challenges that they face during a normal school year. During COVID-19, these responsibilities were exacerbated as international GTAs had to deal with travel bans, visa policies, inability to visit, take care of, or bury loved ones who contracted the virus, and prejudice and discrimination (e.g., #AsianHate; Mbous et al., 2022). Despite these challenges, GTAs were expected to learn, transition, and excel at online instruction with limited support or training.

Therefore, the present study focuses on the experiences of GTAs because of their unique and invaluable roles within tertiary institutions. Even though some studies have examined the impact of COVID-19 on GTAs (e.g., Houston et al., 2021; Kumar, 2021; McLaughlan, 2021), they have mainly focused on the experiences of GTAs from STEM programs. Thus, this study examines the possible challenges (i.e., issues or struggles) and conflicts (i.e., incompatible goals and interests) GTAs within the fields of humanities and social sciences experienced and ways in which they managed challenges and conflicts. Given the above context of COVID-19 and the transition to online learning, we pose the following research questions:

RQ1: What (a) challenges and (b) conflicts did GTAs encounter in online teaching?

RQ2: In what ways, if any, did GTAs manage these challenges and conflicts?

Methods

Participants

A purposive sample (Creswell, 2014) of GTAs ($N = 18$; *female* $= 14$; *male* $= 4$) in the United States were selected and interviewed based on two inclusion criteria: (a) had taught when classes transitioned to online teaching in March 2020 and (b) were within the field of social sciences and humanities. Participants were from six different universities in four regions of the United States (i.e., Midwest, Northeast, South, Southwest, and West South Central), ranged between the ages of 22–40 years ($M = 28.78$, $SD = 4.41$), and were mostly doctoral students (98%) who taught for an average of 46 months ($SD = 33.05$) in classes in communication, journalism and public relations, drama, theater, and political science. Pseudonyms are used to protect participants' identities.

Procedure and in-depth interviews

Following approval from the Institutional Review Board, a sample of participants from various universities in the United States was solicited via snowball sampling. Participants were recruited via social media, emails, text messages, and personal contacts of the first author. Recruitment messages provided participants with a description of the research and an email address to contact the researcher if they met the eligibility criteria and were willing to participate in the study. Interviews were conducted via Zoom. At the beginning of each interview, oral consent was obtained from participants and then demographic information (i.e., age, gender, program, class rank, and length of teaching experience) was collected. Interviews were audio- and video- recorded and lasted between 21 and 126 min ($M = 50.78$ min, $SD = 26.59$ min); transcriptions yielded 114 pages of single-spaced text.

Participants were asked a series of questions about their experiences teaching during the move to online instruction due to the pandemic. In-depth interviews allowed us to gain more information about participants' stories (Lindlof and Taylor, 2019). The first author began by asking general questions about their teaching experiences and checking presuppositions. Next, questions about the challenges, conflicts, and management strategies due to the abrupt transition to online instruction because of COVID-19 were asked. Sample questions include, "Have you had to deal with any unique challenges with your students due to the move to online instruction as a result of COVID-19? Could you please share with me an experience when this occurred?," "How did you manage this challenge?," and "Have you had discussions with friends or fellow students or supervisors about COVID-19 related issues? Could you please share with me what in particular the discussion was about?" At the end of the interview, participants were thanked for their participation. Participation was voluntary and all materials were in English.

To enhance the credibility of findings, positionality, and member check—two validation strategies recommended by Creswell (2014) were utilized. First, positionality is important within qualitative research because it is a way through which researchers acknowledge that their interests, biases, and experiences can affect the interpretation of data (Tracy, 2019). Thus, like participants, both authors were GTAs during the time of data collection. Given our firsthand experience with the topic, we recognize that data analysis could be infused with our own subjectivity and may nuance the interpretation of data. We acknowledge that this emic, interpretive investigation is not exogenous to our positionality. Second, member checking, a critical tool used for establishing the credibility of authors' interpretation of data and findings (Creswell, 2007), was conducted. Four participants reviewed the final analysis of the findings and affirmed that they were reflective of their personal experiences. Additionally, our findings include the use of rich quotations in participants' (*in vivo*) language to aid in verification. Note that all emphases in quotations were added by the authors.

Data analysis

We used a modified constant comparative analysis (Charmaz, 2000), which is typical for contemporary communication research (Lindlof and Taylor, 2019), to answer the study's research questions. We analyzed data in five stages. First, transcripts were read and reread. Second, data reduction was performed to retain only those portions of the data that pertained to challenges, conflicts, and strategies for managing challenges and conflicts during the pandemic. Third, we engaged in open coding, an inductive, iterative process through which a summative label is assigned a code and then constantly comparing codable data (Charmaz, 2000). Using Owen's (1984) criteria of repetition (i.e., repeated words, terms, or phrases used in responses), recurrence (i.e., use of different words reflecting similar underlying meanings), and forcefulness (i.e., participants' tone of voice reflective of strong emotions), we conducted open coding iteratively via line-by-line coding of participants' responses until all responses were coded and accounted for in an exhaustive and equivalent manner (Charmaz, 2000). Fourth, a constrictive process of focused-coding was conducted whereby categories derived during open-coding were read and reread for similarities and differences. Fifth, we conducted axial coding, a cyclical process in which researchers examine the interrelationships between categories. Through the process of prospective conjecturing, we explored why and how categories related to each other, while synthesizing and theorizing findings with the literature (Tracy, 2019). Thus, at the process's conclusion, all codable data were accounted for comprehensively within the theoretical framework presented in the findings (Tracy, 2019).

Findings

RQ1a: challenges encountered by GTAs

In relation to the challenges GTAs experienced, three main themes emerged from participants' responses, (1) challenges posed from teaching online, (2) challenges with students and (3) personal challenges.

Challenges teaching online

These involve the challenges inherent in online teaching. In other words, the challenges GTAs faced because of the characteristics of online instruction. The three main categories of responses include (a) the neophyte online instructor, (b) technological constraints, and (c) impersonal nature of online learning.

The neophyte online instructor

Most GTAs acknowledged they were novices as they had never taught an online class pre-pandemic. GTAs encountered difficulties with time management, that is, trouble finishing the assigned content for the day. Also, GTAs had to learn new ways of teaching content that was originally designed for in-person learning to an online platform, as Rose described, "*Trying to adapt to the online format* with COVID, the course content had to be *adjusted to* [sic] *direct online format*. Imagine trying to teach public speaking online." Owing to their inexperience with online instruction, GTAs reported that it was harder to teach certain classes and/or online and this, in turn, made it more difficult for students to understand. In an illustrative comment, Marie noted, "Something that I *can easily get students to understand in a classroom*, *will be hard for students to understand over here* [Zoom]… So that's unique challenge of online teaching." Additionally, when some universities returned to in-person classes in the Fall of 2021, GTAs reported difficulty managing hybrid classes (i.e., teaching in-person and online, simultaneously). One of the challenges GTAs experienced was engaging with and managing the questions and concerns of the students attending in-person along with those online, simultaneously. Ellie, explained, "This *hybrid teaching* thing, *trying to teach online and in person at the same time*…so that everybody can hear everything, and…has a chance to do the same activities… it's just chaos."

With limited preparation or training for online instruction, GTAs were left to fend for themselves and their students. This lack of GTA training exposed further the history of limited and lacking pedagogical training that GTAs receive as newcomers tasked with teaching courses independently (as instructors of record). Overnight, most GTAs were transformed into information technology (IT) specialists who had to become learning management systems (LMS) and videoconferencing platform experts. Regardless, despite improving their technology skills, GTAs still experienced challenges with technology.

Technological constraints

Several GTAs encountered technology-related challenges including students', difficulty accessing online portions of the class, inability to use certain software and attend class, resulting in students feeling lost. For instance, Edward noted, "[students are] *not able to access certain components* of the online course. *They can't view the lecture*, *their internet shut off* during a quiz, having *trouble navigating* the interface." In fact, some GTAs discovered that some students were not versed with some (basic) software until classes went online. As Debbie shared, "Not everyone *has a good computer* to do those assignments. And some people need to use

the *software* that they have *never used*. I *realize a lot of undergrad students don't* even *know how to use Microsoft Word*." Similarly, some GTAs had their own issue with technology. They reported being forced to end the class due to technological constraints. Abbie shared, "I tried to share back my PowerPoint and *it just wasn't working*."

There is a general perception that everyone possesses some degree of technological savvy, but COVID-19 illuminated that there is a bigger digital divide than what most assumed. Lack of technological savvy among students and instructors across the United States became starkly apparent, especially, when GTAs realized that online instruction requires much more to simulate student-instructor connection in a virtual classroom.

Impersonal nature of online learning

GTAs shared how impersonal teaching online was for them, making it more difficult to develop connections. GTAs lamented the difficulty in putting a name to a face because they were unable to interact interpersonally with their students. For instance, Ellie noted, "I can't see people's faces. I *can't recognize my students*. I *can't match all my students' faces with their names*, which I hate. I think it negatively impacts teaching." Due to the affordances of online teaching, GTAs encountered difficulties knowing their students personally. Likewise, the impersonal nature of online teaching made it harder for GTAs to assess students' engagement with and understanding of course content. For asynchronous classes, it was more difficult for students to send emails asking for clarification when they did not understand course concepts. Furthermore, GTAs noted the lack of face-to-face interactions with students led to distractions for some students. Susan lamented that during class, she noticed some students "*driving* the car and listening to lecture… *undressing*, *dressing up*, *having breakfast*." Similarly, GTAs expressed how some students pretended to be "present" in class but were not (i.e., students whose cameras were turned off). GTAs noticed that the attention span of students was shorter as students were either distracted or forgetful. Becca described, "Sometimes, they don't *pay attention* to important announcements. That will not happen if that is an in-person class because *they are there*…But they could be in the *bathroom without a laptop* while you're announcing something important."

The differences between in-person vs. online (a) synchronous instruction became apparent and GTAs did not possess necessary skills to remedy the situation given their inexperience with online teaching. Although, scholars have long predicted that online learning will be crucial for the future of higher education (Allen and Seaman, 2014), many universities and colleges fell short of the demands of online instruction imposed by COVID-19. Next, we report on the challenges GTAs experienced with students.

Challenges with students

GTAs encountered two main categories of challenges with their students, namely, (a) health challenges, and (b) student engagement and motivation.

Health challenges

Because of the pandemic, health was another challenge reported by GTAs. GTAs noted that several students contracted the virus and, as a result, could not attend class. For instance, Elenore received emails from students saying, "my *family got sick,* and I had to *take care of them*. And I was not taking care of my classes." As observed, the pandemic impacted students' learning as well as the priorities placed on certain responsibilities. Sadly, while some students had to take care of sick family members, others had to deal with the loss of family members due to COVID, as Lisa shared, "Last week I got my very first student whose grandparents *passed away* from COVID."

Student engagement and motivation

GTAs talked extensively about how difficult it was to engage students in class discussions. Some GTAs felt that students were too comfortable learning from home and/or simply tired from being on Zoom all day and thus, did not want to engage in class discussions. For example, Matt shared:

> Students are *struggling to participate*…get *burned out on Zoom* after 30 min...especially whenever students are *learning from home* and *there's other distractions*.... Whenever we went online, I had four or five students in each section that essentially *disappeared and never talked to me*.

GTAs described attendance as another challenge during the pandemic. Some students stopped attending class and/or turning in assignments, without any explanation. GTAs also discussed their frustrations when students did not read their emails (e.g., "I've noticed is that *they* really *don't check emails,*" Marie). Given that classes were online, (a) synchronous, emails were the main channel of communication with students regarding assignments and other class updates. However, some students did not read their emails and emailed GTAs asking for extensions for late assignments or enquiring about things GTAs already addressed in their email to the class.

Furthermore, lack of motivation from students was another challenge GTAs encountered. Some GTAs noticed that students' energy and enthusiasm seemed to have declined. GTAs observed mental exhaustion and burnout in students, as Matt described, "their *brains are fried*." Relatedly, some GTAs felt that some students did not seem to be taking class seriously as observed from the increase in plagiarism. Debbie stated, "I realized the students in online class do *a lot of cheating*." One reason GTAs thought plagiarism increased was because students may have found it difficult to attend online office hours to ask for help and instead resorted to cheating. Besides, for GTAs who taught freshmen, they noticed these students' lack of experience with taking online classes, self-discipline, and time management skills. As Lisa shared, "T*hey haven't done online classes before* and they haven't realized just how much *self-motivation, time management* that needs to go into it." Thus, due to students' level of education as well as the challenges inherent in online instruction, GTAs were saddled with the responsibility of providing these first-time college (online) students with more guidance than freshmen typically would have needed.

The findings illustrate that much still needs to be done to prepare students for online learning. Past research shows that online learning, in many instances, is self-directed

(Kebritchi et al., 2017). These findings highlight that many students were just as ill-prepared and ill-equipped as instructors to transition to online learning. The personal challenges of GTAs, discussed next, demonstrate this assertion.

GTAs' personal challenges

GTAs shared personal challenges encountered, namely, (a) mental exhaustion, (b) loneliness, and (c) balancing responsibilities.

Mental exhaustion

GTAs reported experiencing fatigue as a result of trying to manage their varied roles as instructors, researchers, and as students themselves. For instance, some GTAs suffered Zoom fatigue and headaches during the transition to online instruction. In a representative comment, Morgan lamented, "COVID *fatigue* and *technology fatigue* has definitely been something that I'm experiencing. I *don't have the energy* or the *endurance* like I used to…I've had *headaches* because of *so much*… screen time." GTAs also discussed their struggle with mental health and how this was elevated during the pandemic. Given the lockdown all around the country, GTAs could not engage in exercises that helped manage and relieve stress such as going to the gym. Abbie shared, "My *mental health* really *tanked*. I felt really *unproductive*…I *wasn't doing research*…I felt *unmotivated*. I was constantly caught up with *anxiety*… I wasn't *getting physical activity* to *release* some of that [stress]." GTAs' mental exhaustion resulted in lack of energy, enthusiasm, and motivation to engage in their own classes and research endeavors, causing them to feel guilty for not being productive.

Psychological, physiological, and emotional health became important factors to consider when assessing personal wellbeing during COVID-19. These issues were brought to the forefront as it challenged GTAs' wellbeing, not only when sickness and loss struck, but when academic progress was at stake. The overwhelming responsibility of ensuring that online instruction is going well; that GTAs are staying on top of their own classes; and conducting research, put GTAs' health and wellbeing at risk. Unfortunately, these findings illuminate that GTAs are not prioritized, and little support is offered by the administration to alleviate the mounting pressure they experience as instructors, students, and researchers.

Loneliness

GTAs reported feeling lonely, isolated, and disconnected from people. For some, they could not travel home to be with their families during the pandemic. For others, feelings of isolation resulted from losing family members to COVID (e.g., "I *lost 8 family members* to COVID since it started in May," Miriam), or not being able to go home to take care of sick family members due to the lockdown (e.g., "My *granddad was sick* too with *COVID*. He was *in the UK*," Abbie). Indeed, the lockdown during the pandemic greatly impacted feelings of loneliness for GTAs. GTAs shared not being able to meet up face-to-face with fellow graduate students, in their shared office, to chat and/or problem-solve. Marie lamented:

> I feel there's *less connection*…less information sharing…we are *very isolated*…It's not too bad for me, at least, because I'm already a second-year TA, but I'm sure it's gonna be harder for whoever is starting this year.

As mentioned, the lockdown mandates forced all schools to close and move to remote work and online learning. Thus, new GTAs did not get the opportunity to form bonds with cohorts in their departments, and many senior GTAs moved home or into silos. This removed the opportunity for GTAs to form bonds and relationships that can provide them with social support with others in their program or who teach similar courses. Most importantly, the lockdown diminished the chances of information sharing about best practices, lesson plans, activities, and so forth.

Balancing responsibilities

As discussed, GTAs have varied identities and roles and reported challenges managing their responsibilities. For GTAs who were parents, they had to homeschool their kids while teaching, and taking their own online graduate classes. For instance, Naomi expressed that she had "a lot especially because my *kid was at home*. My *husband* was at home." Likewise, a few GTAs reported that they struggled with time management due to the extra guidance they provided to students. Hence, GTAs had to figure out ways to prioritize their own education. As Marie described, "When things are moved online...your life is messy. So, you gotta *handle the schedule of your life* and then... *handle, teaching.*" Furthermore, for GTAs whose main responsibility was to assist professors with teaching-related duties, they reported helping these professors move the entire class content online. Because some of these professors were not versed with online features, they heavily relied on GTAs to make all the changes within a short time, which added to GTAs' workload. So, not only did GTAs have to act as a support to students but professors as well. The challenges outlined in the above section, including the balancing act in which GTAs engaged, elucidated the brewing conflict GTAs experienced being an online instructor. These findings are reported next.

RQ1b: conflicts GTAs encountered

Regarding conflicts, GTAs reported they encountered conflict with both the university administration and students. When asked about conflicts, GTAs shared disagreements with these individuals as it pertained to two main issues, namely, (1) safety concerns and precautions, and (2) online-related proficiency, support, and expectations.

Safety concerns and precautions

GTAs talked extensively about their university's poor management of the pandemic by not providing clear guidelines about COVID-19. GTAs shared their frustrations with their university administration's unwillingness to enforce CDC guidelines. For GTAs whose universities returned to in-person classes in the Fall of 2021, they expressed that the university administration seemed to be more concerned with moving back

to in-person instruction than the safety of GTAs and the whole university community. Smith shared his frustrations as such:

> The *university administration* has given general guidelines as a one *size fits all* for how things are going to go...Because teaching public speaking… vocal projection increases the space through which droplets are likely to travel and will significantly *increase the risk* of transmitting the virus… No one *enforces* the [university's health] guideline. There are *no systems of accountability*… They're prioritizing the values of efficiency and profit instead of the *health of the individual people* who *work for them*.

Echoing the same issue, Matt stated:

> We *hate* the way our *university is responding*… The way we're *handling the pandemic*, *it's terrible*. It's out of *pressure for money*… My biggest problem was that we met in person to begin with… the moment they [students] get a slightest bit of freedom, it would be shocking to assume that they continue the *social distancing* policy… I can be mad at the *administration* for caving... I think it shows poor leadership skills.

These GTAs lamented being forced to teach in person when they did not feel safe. GTAs expressed that their university engaged in a customer service mentality, where it was all about the economic benefits of returning to in-person classes, despite a global pandemic. Furthermore, one GTA encountered conflicts with their students, expressing disagreements over taking safety precautions. This GTA shared that some students refused to follow CDC guidelines, perhaps, because of unclear instructions from the university as well as the perceived politicized nature of the effectiveness of these measures in the United States.

Online-related proficiency, support, and expectations

This conflict pertained to university's expectation that GTAs should be proficient in online instruction without formal training. GTAs felt that it was unrealistic for their university to expect them to efficiently teach classes that were originally designed as in-person using an online platform. As Smith shared, "We are now expected to be *proficient in Canvas* to facilitate online learning. But we *haven't had* any *thorough training.*" In fact, one GTA acknowledged they did not have a good laptop to teach the online class they were expected to teach. Ellie explained, "*Graduate students do not have laptops issued to them*... Every time I want to use my video camera, I have to uninstall and re-install the video driver…the biggest logistical challenge has been trying to use my own equipment and it *doesn't always work*.

Additionally, given that online teaching required creating additional course content, some GTAs complained about having to do this additional work with no compensation or incentive, especially when some of them did not feel supported by their department heads. GTAs described frustrations over the limited options they had, compared to full-time faculty members, in terms of choosing not to teach in-person during the Fall of 2021. Since their tuition and means of livelihood are tied to their assistantships, GTAs felt like they had to do what they were told even when their safety concerns conflicted with that of the university and department. Sadly, GTAs expressed that they could not count on their department heads to advocate for them to the university (e.g., "no one at our department level... *is standing up for us,*" Smith).

Furthermore, and in terms of conflicts with students, some GTAs reported that students were frustrated with online classes because they expected an in-person learning experience. GTAs also felt that learning from home caused students to be too relaxed and did not create a good study/work environment. As Debbie explained, "the students are just *so laid back* and they're not ready for study… I try to help them to study but they're like too *comfortable* [at home]." Thus, students stopped seeking clarifications about assessments and were not communicative about class activities, but then complained about these issues in end-of-semester evaluations. Moreover, some GTAs suspected that students took advantage of the pandemic by being dishonest when asking for extensions. For instance, Naomi described an experience with a student and stated, "the student was not being *entirely truthful* there because he really wanted to play on my emotions…" Consequently, GTAs saw an uptick in students requesting exceptions for late work.

The findings demonstrate that GTAs' health and wellbeing were not prioritized, and little support was offered by the administration. Among the ways in which the administration lacked support were the weak implementation of COVID-19 policies that led to reckless behavior among students, limited choice in mode of instruction (online vs. in-person) for GTAs, lack of training for online instruction, and lack of advocacy for GTAs from the administration. These factors made GTAs feel like they were exploited for cheap labor with very little premium placed on their lives or their value to the institution. The following sections address how GTAs managed the challenges and conflicts reported above.

RQ2: strategies for managing challenges and conflicts

GTAs managed challenges and conflicts in two main ways: (1) empathy and flexibility, and (2) creating boundaries and consulting others.

Empathy and flexibility

GTAs talked extensively about how they sought to show empathy and be flexible in dealing with their students, by being understanding and accommodating. Since GTAs were also dealing with the uncertainty caused by the pandemic and new forms of instruction, they endeavored to provide clearer instructions, sometimes often repeating instructions, to keep students updated about classes, COVID-19 policies, and/or any changes to instruction. Additionally, GTAs strived to make LMSs more accessible for students to navigate. As Naomi described, "Our goal is to make it [online class] *easier for the students to understand*…*saves* you some *time* on the back end, you're not fielding questions… *design* a clean, *straightforward* module." Thus, through understanding and perspective-taking, GTAs were able to

better support the needs of their students. Some GTAs described changing some of the ways in which they taught, conducted formative and summative assessments, provided instructions and feedback as well as changed deadline policies in order to be more flexible and accommodating of students. For instance, Ellie noted, "[Teaching online] has required me to *shift* some of my lesson planning… *changed* my *teaching* style… my goal is having them get some *hands-on experience.*"

To be empathic, GTAs described focusing on individuating their own and students' personal experiences. Some GTAs acknowledged sharing personal experiences with students to humanize them. GTAs managed COVID-19-related challenges by being open and sensitive to their students. Some GTAs created weekly check-ins during the online class to see how students were faring. In the same vein, GTAs reached out to students who stopped attending class. Abbie shared, "It is for me to…bring *empathy* to the classroom… just *talking to them*, showing that they're *humans*…and you [GTA] also are *human*…as well makes them feel better."

To be flexible, in relation to student engagement and motivation, GTAs used group activities and discussions to encourage students' participation in online classes. Several GTAs used games, discussion boards, and breakout rooms to spur participation. Becca explained, "I just *divide* it [class] into different *groups* and…give them *more discussion*… more *activity*. [I] don't expect to cover the same amount of content as we did in person." Similarly, some GTAs shared that they recorded and posted their lectures online so students could refer to them while studying. GTAs also shared implementing students' feedback, suggestions, and opinions on how to improve the online learning experience, all in an effort to be empathic and flexible.

Creating boundaries and consulting others

Given their numerous responsibilities, GTAs found ways to create healthy work-life balance. GTAs reported being communicative with students regarding when to expect feedback on assignments since GTAs were also students themselves. Also, some GTAs reported using separate, different, online platforms for work and social/personal life as a way of creating and maintaining healthy work-life boundaries. For instance, Morgan shared, "I am for *boundaries*. I always have an *away message* for Friday at five o'clock… and that's just for my *own peace of mind* and so I can get *my own stuff done*… I had to learn to *separate* my *social platforms* vs. my *work platform.*"

Along the same lines, several GTAs acknowledged that they consulted supervisors, advisors, and their peers regarding how to manage COVID-19-related challenges. In terms of their students, GTAs often consulted their course directors and/or professors about how to handle student problems. For instance, when her efforts to track down students, who consistently missed class, failed, Elenore shared, "if they don't answer…we *report* to…the *advisor of undergrads* in the department and they would figure out what was going on with them." Likewise, some GTAs noted that they asked other GTAs how to engage students and manage attendance-related issues. As Marie described, "I *talked* to another international TA...to get *some idea* about how she designed her class…[I] talk to *my peers* and try to find out whether I'm facing very *specific difficulties or common difficulties*. And we get some inspiration about how they *settle those problems.*"

Regarding challenges stemming from their own research and schoolwork, a few GTAs reported that they consulted their advisors about how to stay motivated to conduct research and combat isolation. Abbie shared, "I *spoke to my professor*. I was really *feeling guilty* about not…following up on some of the *research projects*…we talked about *research strategies*… And so that's one thing about *combating* such social *isolation* and especially *lack of motivation.*" What is observed with the strategies GTAs used is that despite the deficiencies experienced during the turmoiled times of COVID-19, they maintained decorum and resorted to positive-problem solving techniques that benefited the students and the university administration. The downside is that the GTAs did very little to put themselves and their needs first. In the next section, we discuss key findings and what they mean in relation to the literature presented.

Discussion

The findings in this study have provided evidence that online instruction is more challenging than previously assumed. The COVID-19 pandemic necessitated a rapid transition to online learning, which unmasked how ill-prepared, ill-equipped, and technologically challenged instructors were to assume online instruction. Key findings in this study reflect GTAs experienced significant challenges with the transition from the traditional to an online classroom. What became apparent is that instructors and students, alike, lacked the much-needed technological knowledge to engage in online instruction and learning, respectively. The lack of knowledge and skills induced a list of challenges and conflicts that GTAs were necessitated to resolve. GTAs employed various strategies that yielded admirable solutions given the limited resources availed to them. The remainder of the discussion teases apart these various challenges and conflicts and addresses the conflict management strategies GTAs employed.

GTAs' reports of ineffective responses from universities surrounding COVID-19 and the transition to online instruction produced challenges, which engendered conflict. Many of their challenges were rooted in obstacles in effectively enacting their roles, which resulted in conflict with university administration (i.e., individual-organization) and students (i.e., interpersonal). First, the individual-organization level of conflict arises because the individual's needs are incongruent with the organization's goals. This can be categorized as negative interdependent goals (Deutsch, 2014). Based on the findings, the decisions made by the university administration were advantageous to the institution with little to no regard for the interests of GTAs. These decisions came into conflict with GTAs beliefs and values regarding COVID-19. Consequently, GTAs experienced intrapersonal conflict, meaning conflict with themselves. That is, negotiating their beliefs against what the institution is requiring them to do (e.g., returning to in-person instruction prematurely).

The universities' failure to enforce CDC guidelines, provide training for online instruction, and grant GTAs a choice in the mode of instruction after in-person classes resumed were

incongruent with GTAs' needs. Therefore, GTAs experienced loss in attaining their goals reflecting a win-lose outcome. This outcome illuminates the asymmetry in power and interdependency in the GTA-institution (i.e., individual-organization) relationship. Coleman (2006) contends that conflict and power are interrelated and used to seek or maintain balance or imbalance in relationships. Coleman (2006, p. 122) defines power as the ability to "make things happen" or bring about a desired outcome. Asymmetrical power then relates to an imbalance of power within a relationship (i.e., an imbalance in the ability to bring about a desired outcome). Those in power do not pay attention to the less powerful because they hardly affect outcomes (Coleman, 2006). The powerful often do very little to grant concessions or arrive at a mutually satisfying agreement. Based on findings, we observe that the institution did the bare minimum to satisfy GTAs' needs, further drawing attention to the reasons for limited investment in training and developing GTAs into qualified instructors. Instead, what is evident is that GTAs utilized all resources available to them to manage challenges and resolve the conflict resulting from decisions made by the institution.

Another aspect of power is related to roles. According to Coleman (2006), roles are pre-existent with predetermined social rules and norms of behavior that social actors must enact. Organizations establish expectations for these roles, which influence the experiences and responses of those who inhabit these roles. Thus, behavior is rooted in the shared expectations for the roles (Coleman, 2006). For example, GTAs step into a pre-existent role where the organization already has expectations for how these roles are to be executed. These roles, in turn, dictate how the individual responds to the organization and the power it holds. The psychological contract (Burke, 2006) between the individual-organization relationship is rooted in these expectations. That is, the organization ensures that the individual works a certain number of hours at an agreed pay rate, receives certain benefits, and holds certain responsibilities. During COVID-19, GTAs recognized that the psychological contract was broken, and new expectations were dictated that changed the conditions of the contract—asymmetrical power was enacted. This change brought about anxiety, ambiguity, and internal conflict regarding their role.

Similarly, GTAs experienced challenges and conflict with students (i.e., interpersonal conflict) who were struggling with online learning, were not keen on following university policies about COVID-19 (e.g., masking), and were fed up and fatigued with online learning. Students reacted negatively to abiding by the CDC guidelines and accused GTAs of politicizing the pandemic and forcing political ideology onto them. In fact, GTAs just expected students to follow the policies outlined by the university. However, the students' impatience with the situation and longing for the world to return to normal caused conflict to arise. Also, growing responsibilities at home and zoom fatigue led to students slacking and/or falling behind on homework and exams. GTAs reported that students shifted blame to them and refused to take ownership and accountability for their performance. The GTA-student conflict also results from negative interdependent goals, where students rejected GTAs' goals and enacted negative inducibility (Deutsch, 2014), that is, rejecting influence from GTAs in order to achieve their goal. Based on these challenges and conflict, GTAs were necessitated to engage in conflict resolution.

Humans have a natural tendency to restore balance when incongruence exists between their beliefs, values, and actions, also known as cognitive dissonance (Festinger, 1957). To rid oneself of this dissonance, an attempt is made to restore the imbalance usually by reframing the source of dissonance (Festinger, 1957; Deutsch, 2014) to align actions with beliefs and values. Based on the findings, GTAs worked actively to resolve their dissonance. Findings revealed that GTAs approached the conflict with patience, empathy, and perspective-taking, attempting to help students and be tolerant of the university administration's shortcomings. The outcome of these actions was that GTAs actively engaged in negotiating with the administration to get parts of their needs satisfied; accommodating students by simplifying the LMS and granting extensions for late assignments; showing compassion and vulnerability; and being innovative in teaching and research. Thus, GTAs used constructive-cooperation conflict strategies to restore imbalance and resolve their dissonance, despite enduring win-lose outcomes in the individual-organization conflict.

GTAs' actions highlight another important aspect of power asymmetry. According to Deutsch (2014), obvious power asymmetries between groups rarely result in outright expressions or escalation of conflict. Essentially, when one group holds more power and interdependence is skewed, the group with less power will rarely revolt or escalate the conflict. Instead, the group with less power will find ways to satisfy their needs and reduce the impact of the conflict. An opposite action would be an uprising that can destabilize the power and influence the outcome of the conflict (Deutsch, 2014). This assertion can be observed in GTAs' actions where they, instead of revolting, found alternative solutions for their problems. What is more, they engaged in constructive-cooperation conflict resolution in lieu of the expected destructive-competitive strategy. Cooperative conflict management is characterized by friendliness, helpfulness, effective communication, orientation to task achievement, responsiveness to others' needs, enhancing others' talents, and more (Deutsch, 2014), which corresponds with GTAs' actions.

Additionally, by using a constructive-cooperation resolution process, GTAs practiced environmental power, the degree to which an individual can influence their environment (Coleman, 2006). Human behavior and agency can be influenced by personal and behavioral factors, as well as environmental events (Bandura, 1999). Thus, the environment or internal disposition can drive human behavior. GTAs responded adaptively to the challenges and conflicts posed by online instruction and COVID-19. Regardless of what they were up against, they were able to find solutions that benefited them, the students, and administration. This assertion is not surprising given that GTAs have been left to train and teach themselves to be effective traditional instructors. Hence, their ability to adapt to online instruction at an exponential rate with limited resources at their disposal is admirable. By choosing positive strategies, they gained positive psychological health, productivity, and favorable interpersonal relationships with students.

Theoretical and practical implications

This study advances some theoretical contributions to the study of conflict. Deutsch (2014) states that asymmetrical power has the tendency to produce win-lose outcomes which elicit the desire to engage in destructive-competitive resolution processes. The findings in this study demonstrate the opposite, in that GTAs practiced constructive-cooperative strategies to manage and resolve challenges and conflicts. Based on this finding, we contend that attitude and environmental power, in addition to characteristics outlined by Duetsch's theory of cooperation and competition, can significantly impact how individuals manage and resolve conflict.

Additionally, incongruence is a big motivator to engage in constructive-cooperation resolution process, especially for those who possess a positive internal disposition and desire to restore incongruence. The findings revealed that GTAs desperately wanted to resolve the internal conflict and consequently looked for ways in which to still enact their roles, help students, and attend to their own studies. Naturally, the constraints of the role did not provide them with the privilege to revolt. After all, even the universities' actions were constrained by the state mandates and the general politics surrounding COVID-19 in the United States at the time.

Another theoretical contribution pertains to instructional competence (Beebe et al., 2009). Several of the GTAs' responses to the conflicts and challenges were exemplary of the components that make up instructional competence (e.g., immediacy-affinity-seeking, clarity, credibility, relational power). For example, GTAs were empathic, adaptable, and flexible when responding to students' needs, often by sharing their own experiences of COVID-19 with students. They improved clarity in communicating course and assignment information and simplified the use of the LMS so that all students can easily access and navigate the platform. Most importantly, they readily accepted and implemented advice from students, supervisors, and colleagues regarding improving the course. These examples show that components of intercultural competence translate to other instructional contexts, especially online instruction, and should always be central to instructional training.

We also derived the following practical implications. First, course design plays a significant role in the success of online instruction. As Kebritchi et al. (2017) contend and findings confirm, spending time developing, designing, and creating the course prior to its commencement can save a lot of time during the semester. In addition, when developing the course, making sure that it is well-organized with expectations (e.g., policies, rules, assignment due dates, and course activities) clearly outlined can assist in student success with the online course. Doing so will free up time during the semester to focus on student and classroom management.

Second, customizing online learning to ensure student learning, that is, employing various pedagogical strategies to meet student learning styles can have an optimal effect on student success. This is not a novel finding; traditional classrooms require the same degree of consideration. What the findings in this study illuminate is that instructors seem to have forgotten that though teaching has transitioned online, it is still a classroom. Therefore, the same pedagogical strategies can be customized and applied. Furthermore, as much as course organization is important, it can be beneficial to leave room for flexibility and adaptability. Despite a well-planned and organized in-person course, unforeseen circumstances still arise. Thus, exceptions should be made to change the course direction if needed even with online teaching. Also, soliciting students' input can make them feel like a contributor to their learning and can instantiate increased investment and engagement from students to see themselves succeed in the course.

Third, GTAs should employ various tools and strategies for classroom and student management. The one-shoe-fits-all approach will not satisfy all students' needs. As illustrated by the findings, students' needs become even more varied and nuanced where online instruction is concerned. Equipping oneself with a myriad of ways to manage students in an online environment can be beneficial to the instructor and student. Furthermore, exercising vulnerability can humanize an instructor and make students aware that major instances of transition, such as a pandemic, impact instructors as well. A healthy degree of vulnerability with students will afford instructors grace from students when it comes to delays in grading, providing assignment feedback, and so forth.

Fourth, it is important that GTAs understand that they are student-teachers, which means being a student takes precedence over being an instructor. So, GTAs should seek to implement boundaries by prioritizing what is important to them (e.g., graduate studies, research, family) and striking a work-life balance, which is important for mental, emotional, and physical wellbeing. Also, camaraderie is important and crucial to GTA's survival and success. Therefore, we advocate building relationships with fellow GTAs and soliciting help, advice, and information exchange with others to expand teaching tools and strategies for online instruction. But most importantly, to build a social network from whence they can garner social support.

Finally, since conflict is inevitable, GTAs should be aware of their default conflict management style and adopt various conflict management skills that can aid in constructive conflict resolution. This is especially important because of the ubiquity of conflict in academia. GTAs should remain positive when it comes to dealing with GTA-organization conflict, where asymmetrical power and interdependence exist, and with student-instructor conflict in an online environment, where anonymity is assumed, and accountability is taken for granted. In the same vein, we offer some recommendations for higher education institutions.

Recommendations for higher education institutions

- Universities and colleges were ill-equipped to deal with the COVID-19 pandemic. Thus, it will behoove institutions to put a strategic plan in place that outlines response and training for faculty and staff in the event of any future environments of risks, such as those posed by pandemics and climate change.
- Higher education institutions should assess the degree of investment toward GTA training and development as well as sources of social support. We advance two unique types of training that can benefit GTAs. One pertains to the student-teacher identity and role. GTAs often struggle with finding the balance and understanding the relationship between these

dual identities and roles. What is more, students find the complexity of these identities equally troubling. Training on how to negotiate, navigate, manage, and understand these dual identities and roles will be extremely beneficial to GTAs. This dual identity and role also encompass the aspect of being an expert on course material—an issue that often arises when responding to students' questions, providing feedback on assignments, etc. The other pertains to training in pedagogy and classroom management. Not all graduate programs require GTAs to enroll in a pedagogy course. Consequently, GTAs lack the knowledge needed to be effective instructors. We recommend that all GTAs be required to enroll in a 1–2 credit hour pedagogy course that can equip them with handling any conflicts and challenges in addition to those outlined in this study. These university employees are a much-needed resource that is undervalued. GTAs should be afforded more consideration as part-time faculty.

- Given the prediction that online learning will surpass $370 billion by 2026 as expounded in the call for this special issue, universities and colleges should introduce online courses as part of the curriculum and mandate students to enroll in at least 2–4 online courses for their program of study. This recommendation also addresses concerns about student readiness to enroll and succeed in online instruction. Familiarity with online instruction can teach students the necessary technology skills and discipline needed for online employment and remote work, which has become a norm post-COVID-19. Current socio-technological trends show that mediated communication is the future, so it would behoove all parties involved to be proactive in implementing the necessary changes toward online learning. Additionally, this recommendation takes into account that students' readiness for online instruction would allow more time for instructors to develop a well-organized and engaging online course.

Limitations and future research

This study presents several limitations. First, GTAs from this study attended six higher education institutions across various U.S. regions. We acknowledge that much more variation exists in the online teaching experiences of GTAs during COVID-19 than presented in this data. More importantly, universities and colleges in higher education (e.g., public vs. private, research-intensive vs. teaching-intensive, etc.) differ, and thus, their responses may have been different as well. For example, teaching-intensive schools place a higher premium on teaching, so transitioning to online instruction may have been executed more effectively. Also, some institutions receive significant endowments from donors that may have been used to acquire technology and training needed for the transition. Given these factors, future research should consider their impact on the transition to online instruction.

Second, state mandates surrounding COVID-19 significantly impacted how institutions responded to CDC guidelines. Some states enforced strict guidelines for lockdown and remote work and school orders, while others were lenient, and in a rush to return to normal. These guidelines affected how universities and colleges responded and the policies, capital, training, and so forth invested toward online instruction. Future research should examine the impact that state mandates have on the decisions universities make regarding online instruction.

Third, this study only examined the perspectives of GTAs, which provides a one-sided picture of the experience of online instruction and instructors' efficacy during COVID-19. Future studies should use a dyadic approach to examining the challenges, conflicts, and strategies for navigating a major incident with global effects. Hearing students' perspectives of GTAs' ability to manage online instruction during such an incident may provide more insights that can aid in better preparation. Also, the experiences of full-time faculty, adjuncts, and lecturers in comparison to those of GTAs should be examined. The conflicts and challenges experienced by these instructors can be assessed to help delineate the degree to which the conflicts and challenges are unique to GTAs further. Finally, this study found that there is a significant lack of pedagogy for online instruction. Future research should examine pedagogy for online instruction. This is much needed given the predicted increase in online instruction and that online instruction has become a norm post-COVID-19.

Conclusion

The advent of COVID-19 illuminated many shortcomings in higher education. It highlighted the lack of preparation and planning for major sociocultural, climate, or political catastrophes, lack of instructor training for GTAs, and unreadiness of college students to engage in complete and exclusive online learning. Educators and administrators in higher education should learn from this experience and put measures in place that can result in a better outcome when the next major catastrophe arrives.

Data availability statement

The datasets presented in this article are not readily available because participants' identities may be deduced from raw data. Requests to access the datasets should be directed to doris.acheme@uga.edu.

Ethics statement

The studies involving humans were approved by Institutional Review Board; University of Oklahoma, Norman-Oklahoma. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

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Distance learning and face-to-face learning in a pathophysiology problem-based learning course during a pandemic

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Introduction: During the past 2 years of the COVID-19 pandemic, education methods adjusted from conventional in-person classes to distance learning. Most classes were lectures that could go well if the participants were familiar with the online operation and had a stable network connection. However, problem-based learning (PBL) classes, which rely on the ability to engage in discussions, still had communication and group development limitations.

Methods: Here, we surveyed the learning effects of face-to-face (FF) and distance learning (DL) in a medical PBL course for two classes. Tutors and students were requested to give grades for five key areas (participation, communication, preparation, critical thinking, and group skills).

Results and discussions: A questionnaire found reduced participation, communication, and group skills in DL classes in comparison to FF classes. The tutors' perspective regarded participation and communication ability as reduced in DL. Nevertheless, one of the two classes showed no difference in group skills.

Conclusion: Our research shows the experience of a PBL class focusing on discussion and communication. In the post-pandemic era, whether FF or DL, classes should be appropriately adjusted to facilitate effective student communication.

KEYWORDS

problem-based learning, PBL, distance learning, face-to-face, COVID-19

Background and introduction

During the COVID-19 pandemic, education delivery shifted from conventional face-to-face (FF) methods to prevent the spread of COVID-19. Health policy advised that people avoid contact with others and adopt distance communication tools in workspaces, educational institutes, hospitals, and other places where large gatherings would pose a public health risk (Qian and Jiang, 2022). Because of the limitations to FF activity, education systems developed online distance learning (DL) tools to upload pre-recorded courses or conduct synchronous distance instruction.

David Sewart first defined "distance learning" as separating teacher and learner in space and time (Sewart, 1993). In 2002, Ulric Björck first reported information about asynchronous DL in a social economy problem-based learning (PBL) class (Bjorck, 2002). Most communication was conducted via texts delivered to students. In 2004, Brenda Ortiz at Columbia University also discussed DL in a PBL class, noting the importance of readiness, interaction, and group development. At that time, however, asynchronous technological tools were not affordable for

everyone, and the institute usually purchased them for the students. As technology has improved and its adoption become widespread, modern DL more often emphasizes synchronous learning. Synchronous learning means both voice and image can be delivered in real-time, so teachers and students have a similar experience to FF interaction, just over the internet.

Due to global commercial cooperation and the development of mobile internet (4G and 5G), several online distance education tools have been released. Internet communication technologies and services present a feasible solution for DL, especially when offered free of charge; this provides more choices and increases accessibility compared with expensive hardware systems that had previously been the only option (Kotevski and Milenkoski, 2018).

Most lecture-type classes work well online if the participants are familiar with the operation of the online platform and have a stable network connection. Some discussion-based classes have been adapted to the distance environment. This focuses on PBL, a student-centered approach, and learning via peer discussion. PBL was introduced and systematically developed by the Faculty of Health Sciences of McMaster University in Canada in the late 1960s. The University of New Mexico was the first to adopt a medical PBL curriculum in the United States.

PBL is widely promoted in medical courses globally. The learning style is a kind of guided self-learning, training medical students to find answers through group discussion or knowledge searching and filtering. A typical PBL class comprises four participant types: tutor, chair, transcriber, and group member (Wood, 2003). The tutor's primary function is to facilitate the proceedings, often taking on the role of a teacher. Their responsibility is to ensure that group discussions align with the learning objectives prescribed in the curriculum. Before the tutorial commences, a PBL tutor should thoroughly understand the material and establish ground rules, as the quality of student learning before and after the tutorial can impact individual and group dynamics within the tutorial setting (Chan, 2008). During the course, students are assigned the roles of chair and transcriber, which places leadership responsibility on the students themselves.

A global investigation indicated that medical education classes still used PBL during the COVID-19 pandemic (Chang et al., 2021). This demonstrates the importance of PBL courses in medical education; however, the effectiveness of converting the original FF courses into DL also needs to be evaluated. Our research surveyed the educational environment at National Cheng-Kung University (NCKU) during the COVID-19 pandemic. National Cheng-Kung University introduced PBL classes in the medicine department's course, "Introduction to Pathophysiology." Pathophysiology is the study of abnormal physiological symptoms that usually present in multiple syndromes. With the help of PBL, students can identify possible physiological information through group discussion.

The PBL course design encourages student interaction and communication with each other and the teacher. In order to ensure that everyone has the opportunity to speak and discuss, the class is divided into small groups of fewer than eight people each to ensure that everyone has adequate opportunity to participate in discussions (Wood, 2003). The PBL class follows the block course and has corresponding cases with different pathophysiology systems. Each 18-class semester-long course covers three PBL cases, and each case schedule includes two discussions, a group presentation, and a group mini wrap-up. The semester starts and ends with a tutor meeting—a consensus conference at the beginning and a reflection meeting at the end (Figure 1). This is the only PBL class continually conducted in the Department of Medicine at NCKU.

COVID-19 appeared toward the end of 2019, but the outbreak began in Taiwan in March 2021. Even before the WHO officially listed COVID-19 as an international infectious disease, the NCKU "Introduction to Pathophysiology" tutors proposed planning for distance teaching in the February 2020 tutors' meeting, as some tutors were physicians of infectious diseases or emergency medicine. From an epidemiological point of view and considering the medical conditions observed by the hospital, they proposed that DL plans be submitted as early as possible to avoid impacts on PBL learning from the pandemic. In May of the same year, we presented a draft DL guideline and asked Class A students to review the online teaching guide. In September 2020, the incoming Class B students began to use the distance teaching tools developed in the previous semester. Taiwan's government announced a "Level 3 Alert" in May 2021, and Class B students participated in the training through comprehensive online participation. The research team surveyed and collected questionnaires from Class B in June 2021. The global epidemic continued to peak in 2021. Class C began to practice distance teaching tools in September 2021. In May 2022, there was a COVID-19 outbreak on campus, and classes shifted entirely online. In June 2022, the second questionnaire was collected from Class C (Figure 2).

From the beginning to the exponential rise of the epidemic, government regulations and school rules affected the way students attended classes. The purpose of this study is to identify whether there are learning differences between FF learning and DL when medical students use these methods in PBL courses.

Methods

This research was a retrospective cohort study of DL during the COVID-19 pandemic from 2020 to 2022 in the Department of Medicine, National Cheng-Kung University. Participants were fourth-year medical students enrolled in the "Introduction to Pathophysiology" PBL class. This research project was certified for

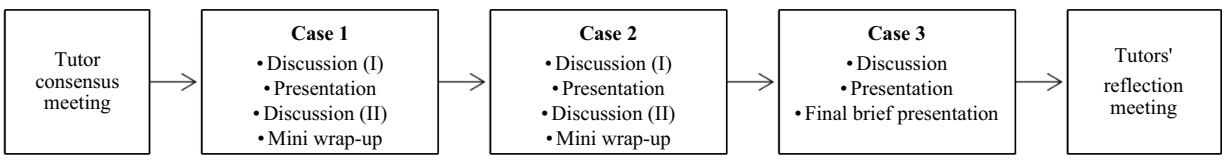

FIGURE 1
Class schedule for PBL teaching in the "Introduction to Pathophysiology" class at NCKU MED (2020–2022).

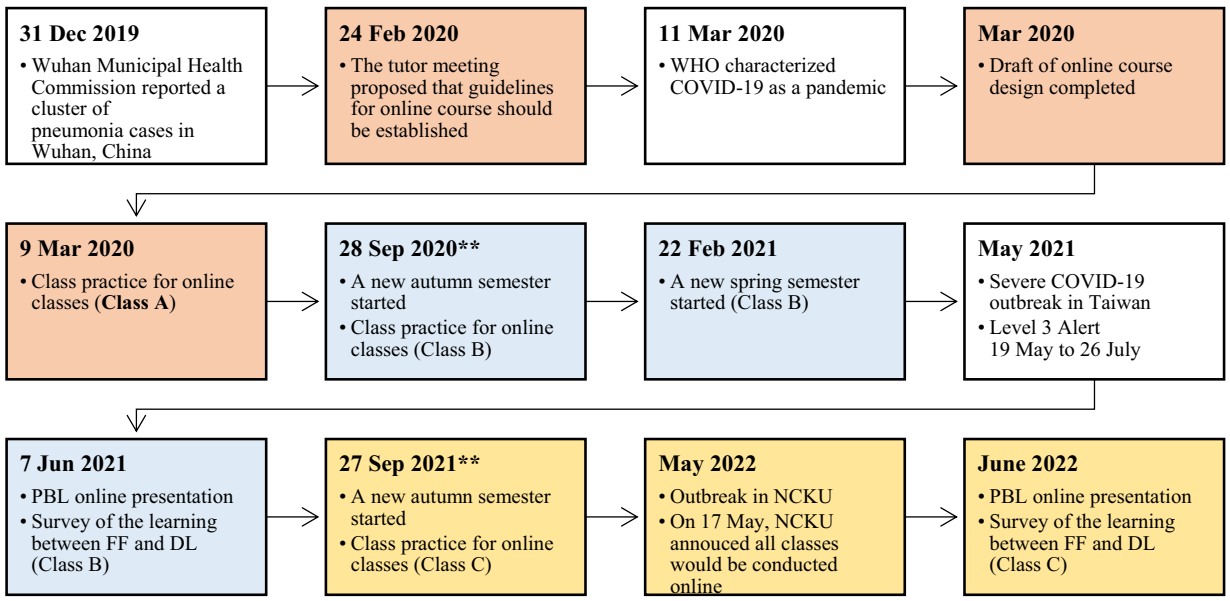

FIGURE 2
Timeline of Taiwan's COVID-19-related education policy and NCKU-MED PBL course. **Denotes a new semester and new students. Different colors represent different semester-long classes—orange boxes: Class A; blue boxes: Class B; gold boxes: Class C.

exemption from the Human Research Ethics Committee at National Cheng Kung University (NCKU HREC-Exempt-No. 111–511).

The research enrolled three discrete cohorts: Classes A, B, and C (Figure 2). Class A started their PBL class in February 2020 before the substantial impact of the COVID-19 pandemic on Taiwan. Class B began its PBL curriculum in September 2020, having accrued prior experience with various digital learning tools and thus demonstrating enhanced proficiency in digital pedagogy. Class C confronted the zenith of the COVID-19 pandemic and subsequently navigated the post-pandemic educational milieu, grappling with a distinctive set of challenges throughout their participation in the PBL course. The same tutors conducted the three consecutive classes, and online teaching experience accumulated through the course of the study. In summary, these cohorts experienced disparate iterations of PBL during a pandemic.

The NCKU PBL teaching group, in drafting the teaching guideline for a DL version of the course, considered many modifications. For example, unlike in conventional lecture classes, PBL courses include a meeting room and a whiteboard to record the discussion. These resources had to be replaced by online options. Most PBL essential equipment could be replaced by alternative approaches for DL (Table 1). However, the choice of online platform required consideration; was it better to choose a more accessible and complimentary platform such as Google Meet, or would a more reliable platform the university had already purchased, such as Microsoft Teams or Cisco WebEx, offer more functionality and security? During our online trials, for small PBL group discussions, participants recommended using the simple version of Google Meet to facilitate easy operation; if the number of participants was greater than 24 or 100, participants recommended using an online conference room with more comprehensive functionality to arrange the order of participant speeches.

TABLE 1 Comparison of traditional FF and DL methods.

Components	Traditional face-to-face	Distance learning
1. Location	Meeting room	Online platform
2. Discussion method	Directly talking	Microphone/webcam
3. Note recording	Whiteboard	Typing texts/iPad writing application/Google Draw*
4. Handouts	Papers	Electronic pdf file/Mobile application
5. Group presentation (<12 people)	Meeting room/ projector	Online-meeting media with easy operation: Google Meet*
6. Mini wrap-up (<24 people)	Meeting room/ projector	Online-meeting media with easy operation: Google Meet or Microsoft Teams*
7. Final presentation (>100 people)	Lecture hall/ projector	Online-meeting media with hosting options: Microsoft Teams or Cisco WebEx*

*Most groups preferred using.

Feedback plays a crucial role in monitoring students' learning experiences. In this research, we designed a questionnaire based on the Nendaz and Tekian Assessment framework (Nendaz and Tekian 1999) to assess the impact of online teaching on learning outcomes during the COVID-19 pandemic on tutors and students. The research of Nendaz and Tekian emphasized that assessment should include working through problems to assess knowledge and problem-solving

skills. The questionnaire format was adapted from research conducted in medical education at Hong Kong University (Foo et al., 2021). In this survey, tutors and students were asked to grade five key areas against previous experience (Chen and Chin, 2014): participation, communication, preparation, critical thinking, and group skills.

Here, participation was used to gauge students' interest and enthusiasm in the class, spontaneity in engaging in discussions, and willingness to provide feedback. Communication, on the other hand, was used to evaluate how students conveyed their thoughts. Lower scores suggested less effective expression with fragment words, while higher scores indicated clear and precise articulation of ideas. Preparation was used to assess students' ability to grasp the learning issue, draw from diverse sources, and demonstrate the capacity to synthesize a range of perspectives. Critical thinking assessed students' ability to question and challenge differing viewpoints, fostering a deeper understanding of the subject matter. Using group skills could evaluate students' capacity to collaborate with their peers to complete class activities, and improved group skills suggested an ability to encourage active participation from others (Supplementary information).

After each class, tutors and students were asked to anonymously complete an online survey. After collection, we collated data on these five factors, including mean scores, standard deviations (SD), and the number of respondents (n). We then conducted a t-test for statistical comparison. For the statistical analysis, GraphPad Prism was employed with the finalized data. This software enabled more in-depth statistical assessments to elucidate the differences in learning outcomes between the two teaching methods.

Results

This research collected data from two classes (Class B and Class C). In Class B, we collected information from 13 tutors and 84 students to conduct the grading survey; for Class C, 15 tutors and 76 students participated in the survey. The final data (Supplementary Tables S1–S4) were analyzed using GraphPad Prism, and the data (mean, SD, n) were imported to t-tests for comparison.

Class B students were about 22 to 23 years old (22.5 ± 1.3), and the class gender composition was 53 men (53/84, 63.1%) and 31 women (31/84, 36.9%). For Class B, data have similar statistical results between tutors (Figure 3A) and students (Figure 3B), and three points have significant differences between FF and DL (including participation, communication, and group skills). Among them, from the perspective of tutors, we can see that the average gap is quite large in terms of participation and communication. During FF teaching, when the discussion is out of focus or students are confused, tutors can give prompts from the side; during online teaching, tutors can only know the students' learning status (participation and communication) from the talking and note recording. In Class B, whether students or tutors, the five scores for FF are higher than DL, but the impact of participation, communication, and group skills is more significant.

The Class C students (Figure 4) were about 22 to 23 years old (22.6 ± 1.6), and the class gender composition was 50 men (50/76, 65.8%) and 26 women (26/76, 34.2%). For Class C, two points significantly differ between FF and DL (including participation and communication) in both students (Figure 4A) and tutors (Figure 4B). The ratings of Class C students show overall rating trends similar to those of Class B. Participation, communication, and group skills significantly impact learning outcomes. The tutor data of Class C show significant differences in participation and communication between FF and DL. However, after the tutors had experienced more online teaching, results showed that compared with Class B, Class C has a significantly smaller error bar in these two items.

Discussions

How can participation, communication, and group skills for PBL learning be improved?

Three parameters in both Class B and Class C students (participation, communication, and group skills) showed lower scores due to participants' unfamiliarity with online tools. Another identified issue was the delay and asynchronous communication due to the limitations of the internet. Online meeting platforms automatically shut down video streaming to prevent freezing and maintain good audio connectivity. In addition, even if the camera works, members sometimes wear masks or fail to look at the camera; thus, online meetings lack eye contact and facial expressions. Eye contact is critical

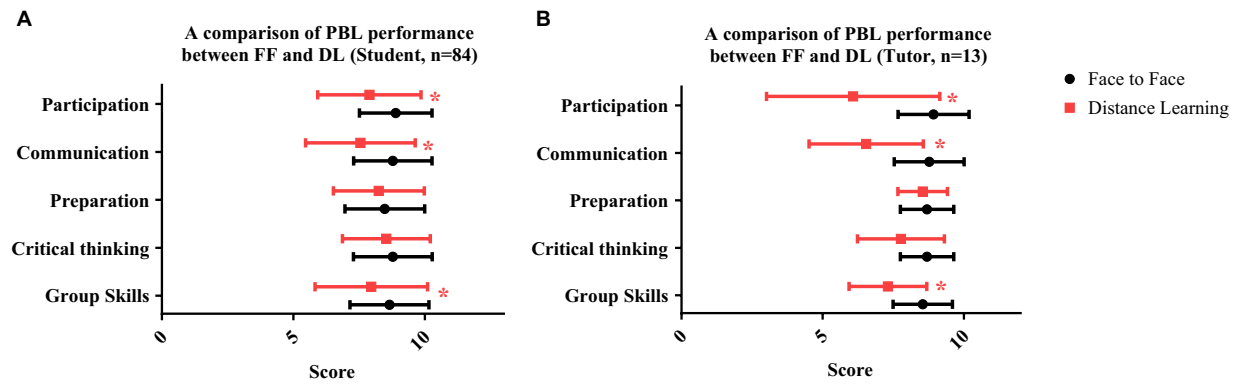

FIGURE 3
Comparison of PBL performance between FF and DL (Class B). *$p < 0.05$.

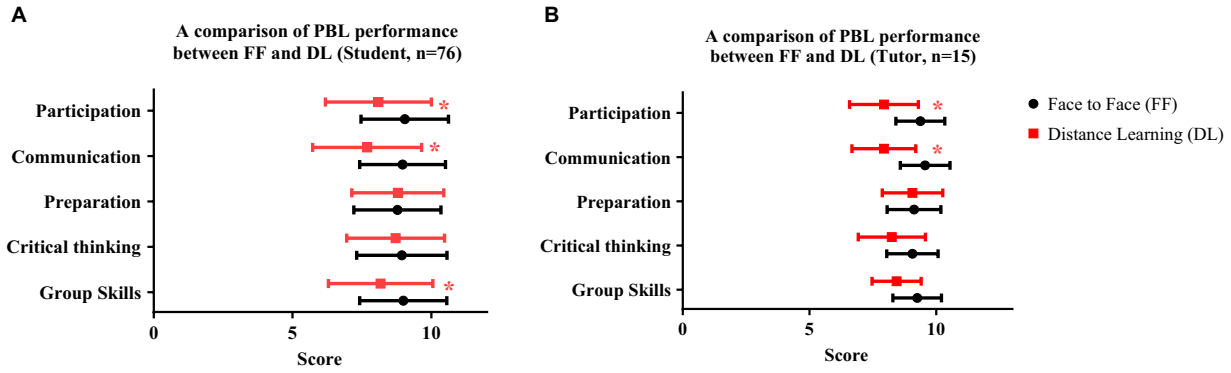

FIGURE 4
Comparison of PBL performance between FF and DL (Class C).*$p < 0.05$.

during class in both traditional lectures and online teaching (Poláková and Klímová, 2021). Participants use their eyes to supplement verbal communication; improving this aspect of the online experience is expected to improve participation and communication.

PBL classes are led by students rather than by tutors. A key role is that of the chairperson, who leads the PBL discussion. The chairperson should ensure that the conversation includes all members. In this step, if there are interruptions due to internet connectivity, it will disrupt the flow of the discussion. Another role in the PBL group is the transcriber, who writes down key discussion points and ideas on the whiteboard in the FF class. In the online course, transcribers must use online media or write using an electronic whiteboard (such as an iPad) (Supplementary Figure S1). As shown in Table 1, the chair and the transcriber should be familiar with the operation of the online platform and monitor the stability of the internet to ensure efficient and fluent discussion. In our research survey, Class C tutors who had experienced more online classes and were more familiar with online tools showed no difference in group skills. These results suggest that group-based learning courses can work well even in a DL format.

Distance learning (E-learning) in the post-pandemic era

Due to the challenges of COVID-19, educational institutes worldwide have started to emphasize the importance of online classes and modernizing the educational environment. From 2020 to 2021, the spread of the global pandemic caught schools unprepared and necessitated rapid implementation of new methods. For example, in the past, growing demand for internet connectivity led to schools increasing Wi-Fi coverage, but in the COVID-19 period, more stable internet connectivity was more important than range.

Our study included a text survey to collect students' opinions; interestingly, some students gave positive feedback on DL. For example, some students prefer the electronic writing board over the traditional whiteboard. Reasons included that the electronic writing board could be viewed on every member's laptop or mobile phone. Text and figures could easily be imported and their display location rearranged.

New learning methods will likely transform FF and online DL classes in the post-pandemic era. These findings highlight the importance of building familiarity and proficiency with online tools before using them for PBL discussion. The educational landscape of the last few years demonstrates the importance of methodological flexibility and the potential benefits of adopting new technology and methodologies. We recommend two approaches for online teaching: first, during outbreaks of infectious disease or similar crises, classes could move entirely online to avoid FF interaction. Second, if only a few members are affected by COVID-19 or other illnesses, in-person classes could still be conducted but include a synchronous online discussion.

Conclusion

In this study, a questionnaire found reduced participation, communication, and group skills in DL classes in comparison to FF classes. Our research provides insight for classes such as PBL classes that focus on discussion and member brainstorming. The PBL methodology is crucial for medical students to develop communication and critical thinking skills. In the post-pandemic era, whether FF or DL, classes should be appropriately adjusted to facilitate effective student communication.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Human Research Ethics Committee at National Cheng Kung University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

F-HC: Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft, Writing – review & editing. P-JW: Investigation, Methodology, Writing – review & editing. C-HC: Conceptualization, Methodology, Supervision, Writing – review & editing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2023.1289526/full#supplementary-material

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Time and day: trends in student access to online asynchronous courses in communication demonstrate time poverty in action

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Objective: As changes to higher education following the rapid transition to online learning resulting from the COVID-19 pandemic impacted students and their perceptions of what is possible in scheduling their daily lives around school, this study investigates trends in student access to online asynchronous courses.

Methods: This study utilized course reports of student access from the learning management system for thirty-one sections of eleven different online asynchronous communication courses taught by ten different faculty members over the fall and spring semesters at a large research university in the southwestern United States. A total sample size of 1,201 students were involved in the study.

Results: Profile Analyses indicate clear curvilinear trends for time of day and day of the week in student course access. Repeated Measures ANOVA results indicate those trends vary significantly from a no effect condition, suggesting that students: (a) schedule their course activities around personal schedules, and (b) that time bound synchronous course may not work for them.

Conclusion: Recommendations for class management by instructors relating to student time poverty need regardless of teaching modality, and future directions for research on time poverty in higher education, are provided.

KEYWORDS

teaching modalities, student access, course management, learning management systems, time poverty

1. Introduction

In recent years, researchers have increased interest in student outcomes related to online learning. Although the fields of education, communication and psychology (primarily) as well as scholars in other fields engaged in exploring the characteristic of their teaching strategies have been investigating online education over the past few decades, the rapid transition to online learning due to the COVID-19 pandemic increased interests in this area of study substantially. Within this field of inquiry, scholars have begun investigating student participation and access to asynchronous online courses.

A review of the literature on the subtopic of student online access reveals a large body of research (see Granic, 2022; Stone, 2022). However, very little of this research has focused on time of day or day of the week access to asynchronous online courses given the changes in higher

education (see Hachey et al., 2022). More specifically, what has not been so widely studied are the external time constraints which may influence student participation in online learning. This study seeks to initiate and broaden the interests among scholars of education on the time-based characteristics of student online access to higher education.

2. Background

A systematic search of the literature on online student access through the *Web of Sciences* database, with no time frame using the search terms "student online access" found 12,610 articles. To reduce this number to a more manageable search, within Web of Sciences, the Highly Cited Papers filters for all years applied to only the fields of education and educational research, social psychology and communication resulted in a total list of 15 articles, the earliest published in 2012. Given the recent changes to online education due to the rapid transition to online learning, the fields and highly cited filters were removed, and the years were restricted to 2022 and 2023 only. This search resulted in 3,648 articles. These articles were reviewed for relevance specific to the purpose of this study, resulting in 21 articles meeting the criteria. Of these articles, six utilized some type of systematic literature search to report on characteristics of student online access, and 17 were empirical studies using student or teacher self-report surveys and/or interviews or public data. These 21 articles covered "student online access" in three mean areas: Online learning (in general), the COVID-19 response, and "time poverty."

Further expansion on the topic of time poverty involved a second search for literature in *Web of Sciences* using the keywords "time AND poverty," with no time frame restriction, resulting in a total of 209 articles, of which an additional fourteen articles were relevant for the specific purpose of this study.

2.1. Time poverty and education

To be sure, student learning requires a commitment of time to the enterprise by students and teachers alike. However, the specific question related to barriers of time for study has up to this point been lightly researched. In a recent study, Hachey et al. (2022) conducted a systematic review of empirical research on *ERIC*, *Education Full Text*, and *PsychINFO* between 2010 and 2021 and found almost no research on the relationship between increased work and family commitments and student outcomes in online and face-to-face courses. The changes in the lives of students (and teachers) during the COVID-19 pandemic brought the issue of time commitment into focus. Many students may have experienced strains to their time for school-work over the last several years due to these changes. Such strains on the time needed to accomplish various goals, including going to school has been termed "time poverty."

Vickery (1977) first defined time as a second dimension, along with the known dimension of income, that influences poverty. Over the next several decades, researchers have studied both the characteristics and effects of time-poverty. Recently, Giurge et al. (2020) defined time poverty as a persistent sense of lack of time to accomplish needed tasks. According to Mullens and Glorieux (2023), multiple temporal dimensions influence the degree of time wealth and time poverty including total duration of leisure time, share of leisure time during the weekend, fragmentation of leisure time, and subjective time pressure.

Merz and Rathjen (2014) measured interdependent multidimensional poverty (IMD) among the German population which considered the interactional effects of income and time poverty. According to Merz and Rathjen, "families have an increasing IMD poverty risk with an increasing number of children, for single parents in particular and for couples" (Merz and Rathjen, 2014, p. 474). Chatzitheochari and Arber (2012) argued that the construct of time poverty should consider the difference between weekday time and weekend time for typical full-time workers. However, even this differentiation may break down in light of part-time workers or workers with more than one job who may also be working nights and weekends. Regardless, Chatzitheochari and Arber (2012) found that working women have more constraints on their time compared to working men.

These time constraints limit the amount of time available to individuals to pursue long-term goals. Such freely disposable time may be set aside to meet short-term needs. According to Hobbes et al. (2011), freely disposable time may be the best measure for determining the amount of time left over for adults to pursue engagements for investment in the future, such as higher education, after meeting basic needs for themselves and their dependents.

For example, individuals from households with children are more likely to be time-poor than individuals from households without children (Kalenkoski et al., 2011). According to Burchardt, single parents in the UK have considerably more constraints on free time than dual-earner couples, and "those with low educational qualifications, or who are disabled, face particularly pressing constraints" (Burchardt, 2010, p. 339). Additionally, employed mothers experience time pressure due to insufficient time for discretionary activities, need to multitask between work and home responsibilities, and emotional and organizational work (Rose, 2017). In Canada, this time deficit is highest among working single parents (Harvey and Mukhopadhyay, 2007).

Leisure, in and of itself, is not the only potential lost resource due to time poverty. Giurge et al. (2020) claimed that time poverty is associated with health-related consequences including cognitive overload. For example, time-poor individuals spend less time per day on exercise than non-time-poor individuals (Kalenkoski and Hamrick, 2013). According to Zheng et al. (2022), perceived time poverty is strongly and positively associated with physical, mental, and emotional fatigue.

Early in the research on time-poverty, researchers were recommending new technologies to reduce time spent out of the home for travel to work as a mechanism for reducing time poverty. For example, Turner and Grieco (2000) recommended tele-strategies to reduce time poverty for single mothers. These new technologies have provided opportunities for online learning. The advancement of digital learning technologies has occurred alongside the growth of online learning. However, as noted by Hachey et al. (2022), very little research has tied this growth with the construct of time poverty.

In a recent study, Xavier et al. (2022) interviewed students who decided to withdraw from online programs and discovered that time poverty and time-related conflicts were the major contributors to their decision. In many cases, time-related conflicts were due to unrealistic time-management expectations. However, circumstances involving

work and family commitments, as well as personal health concerns were the most important contributors.

According to Wladis et al. (2018), students with preschool-aged children have significantly less time for college-related work, and have less quality free time than students with no children. In the US, parents with children under the age of thirteen had significantly less discretionary time and spent more time simultaneously studying and caring for children compared to students without children under the age of thirteen (Conway et al., 2021).

In another study, Wladis et al. (2022) found that students who enrolled in at least one online course had higher rates of time poverty compared to face-to-face only students. However, the authors also found that these online students were also more likely to complete their online courses (Wladis et al., 2022). Additionally, based upon a survey of 120 Australian students, Burston (2017) found a negative correlation between time spent working and semester weighted (grade) averages. The relationship between online enrollment and college credit accumulation is directly mediated by degree of time poverty. These findings suggest that time-management by the online students may be key to their success.

2.2. Online learning

Online learning has transformed over the years from distance learning models such as correspondence courses and remote lectures via closed-circuit television to internet-based asynchronous courses (Kentnor, 2015). In more recent years, the development of communication technology has presented opportunities for changes in course delivery in classroom settings as well as remote settings. Education institutions have embraced multiple delivery modes, even within the same programs, from face-to-face, fully-online synchronous (meeting online at a specified time and day), fully-online asynchronous (no set time and day meeting online), or some hybrid combination which may include some set meeting time and day including face-to-face. Considerable growth in online teaching and learning preceded and continued beyond the COVID-19 pandemic. Current research in student learning outcomes has found focus in the development of online learning (Ulfa and Fatawi, 2021). For example, in a recent study, Smith et al. (2022) found moderate correlations between first access to learning materials and success on exams in online asynchronous courses.

Recently, Granic (2022) conducted a systematic review of articles from *Web of Science* between 1996 and 2022 regarding student online participation and found that student participation was enhanced through online technologies including discussion forums, blogs, chats, and personalized communication. As previously stated, online learning may refer to different modalities, including hybrid or blended models. According to Dziuban et al. (2018), blended learning which incorporates qualities of traditional face-to-face instruction with advanced information communication technologies increases student perception of learning while increasing access.

Regardless, the development of online learning has engendered new questions about student participation and the consequences to learning outcomes. For example, Stone (2022) argued that evidence from the literature demonstrates that online learning enhances student equity and increases access to higher education. However, such trends may be influenced by teaching strategies within the online environment. According to Barrot and Fernando (2023), teachers' misuse of teaching strategies can have a significant impact on students' ability to navigate online courses. Indeed, instructors can have a profound effect on learning outcomes by utilizing student-centered techniques.

Such focus by instructors on student-centered techniques may also influence student participation. Panigrahi et al. (2018) argued that virtual learning communities can increase student engagement in online learning with resulting positive learning outcomes. These results for students may also be positive for teachers. Often, teacher self-efficacy in online environments correlates with student participation, and in the online environment that participation equates with internet access (Mustafa et al., 2022).

Many factors are thought to influence positive student learning outcomes. According to Lu et al. (2023), cognitive engagement is the only factor which influences intentionality toward continuous usage of asynchronous online courses, where intrinsic and extrinsic motivation and perception of multiple sources had little to no direct effect. However, barriers to student learning may have the opposite effect. Demir Kaymak and Horzum (2022) applied the learning barriers identified by Muilenburg and Berge (2001) to online learning environments and found that time and support for studies, among other barriers, most strongly predicted perceived learning by students. They also found that both gender and job status influenced academic achievement and perceived learning.

Instructors' approaches to these barriers may also have negative consequences. Barrot and Fernando (2023) found that students' time management issues were exacerbated by instructors who used the same course management for assessment in their online classes as they did in their face-to-face classes. Technology-based strategies, for example, can mitigate these trends. For example, utilizing a self-paced online learning orientation module increases student intent to keep up to date with course materials in an online asynchronous course (Mshayisa and Ivala, 2022).

Other barriers to student participation and success may be outside the instructor's control. Roessger et al. (2022) using county-level data from 1999 through 2018 demonstrated that proximity to a university is positively correlated with adult participation in higher education, although this relationship was not influenced by a growth in online learning opportunities. Time management may be one of the most important skills for students in online courses (Cox et al., 2022). Time management may be a function of social and environmental conditions outside of the online course. For example, Hachey et al. (2022) found ten factors that influence student participation in online learning including non-traditional status, family responsibilities, employment, and socio-economic status. These particular factors may contribute to pressures on time management for class participation.

2.3. The COVID-19 response

The COVID-19 pandemic of 2020–2022 is an extreme example of an environmental condition outside of the control of students and faculty that created barriers to student learning. According to Adedoyin and Soykan (2020), emergency remote teaching due to the COVID-19 pandemic is distinct from planned online learning. Technological advances in course delivery leading to online delivery methods had been occurring well before the rapid transition brought

on by the worldwide COVID-19 response. However, that response illuminated shortcomings of online delivery for students of lower socio-economic status who did not have ready access to the internet (Adedoyin and Soykan, 2020). Similarly, Asanov et al. (2021) found that a significant percentage of (Ecuadorian high school) students did not have both internet access and a computer at home during the pandemic.

Response to the environmental conditions of the pandemic also had consequential effects on student learning. Tang et al. (2020) found that students were generally dissatisfied with online learning in the context of the rapid transition to online delivery modes during the COVID-19 pandemic. The authors also found that students were highly dissatisfied with the communication modes provided by instructors during the pandemic (Tang et al., 2020).

Yet some students and faculty were prepared, having previously experienced and participated in online learning prior to the pandemic. In particular, Wang et al. (2022) found that readiness to participate in online learning was highly associated with academic success during the COVID-19 pandemic. Interestingly, both students and faculty used similar strategies to overcome the challenges they faced with the rapid transition to online learning in the midst of the COVID-19 pandemic (Barrot and Fernando, 2023).

During the COVID-19 pandemic students perceived more free time and more flexibility in their course work due to online learning, while at the same time reporting financial problems due to unemployment and the uncertainty about the future as stressors (Kohls et al., 2021). In one study, Asanov et al. (2021) surveyed students about their time-use and found that many students developed a daily routine to do school-work during the pandemic.

Given the current research on student time-related access to online asynchronous courses, the following research questions are proposed:

> *H1*: There is a statistically significant difference between trends in time of the day for student access to online asynchronous courses compared to a no time effect for student access.

> *H2*: There is a statistically significant difference between trends in day of the week for student access to online asynchronous courses compared to a no day of the week effect for student access.

3. Methods

The study procedures were reviewed by the local Institutional Review Board in January 2023 (IRB FY22-23-158) and determined the study did not meet requirements for federally regulated research, was exempt from human subjects' protections and required no further IRB oversight.

3.1. Subjects

The participants were 1,201 students in 31 distinct sections of 11 different Communication courses from 1000-level ($n = 30$ courses, $N = 1181$ students) through 5000-level ($n = 1$ course, $N = 20$ students) and their instructors ($n = 10$) at a large research extensive university in the southwestern United States. The average class size was 38.74 students (sd = 20.75, minimum = 4, maximum = 79). Courses included sections taught Fall 2021 through Spring 2023. All sections of courses were taught utilizing an asynchronous online modality.

3.2. Procedures

All instructors within the department who taught online asynchronous courses were requested via email to participate in the study. Instructors participating in the study were asked to supply student access data from the Learning Management System (LMS) Blackboard (see Ulfa and Fatawi, 2021; Smith et al., 2022). Specifically, faculty were asked to produce reports from the LMS which showed student access to the course by time and day for an eight-week period of the semester (end of the Fall, or beginning of the Spring), to de-identify the students, and submit the reports as Excel files for each individual course section. The LMS course report requested was the "Overall Summary of User Activity." The time-frame for the report was limited to an eight-week period to account for the difference between the residential program (16-week semester) and the online program (8-week quarter) course sections.

3.3. Data

Data for each section includes the time-of-day access rounded to the nearest hour on a twenty-four-hour basis and day of the week access for each student in each section, bounded by 12:00 am (midnight) U.S. Central Standard Time. The data may include, though is not identified by the LMS, multiple "hits" by a single student within a given time-frame due to logging out and logging back in within the time boundaries. The data from each section were parsed and transposed within Excel, then combined with as a row (case) with all other sections to create the dataset for use in the analysis of overall trends of time and day access among all sections of asynchronous online Communication courses.

To determine if significant differences could be attributed to level of student (undergraduate versus graduate), several diagnostic tests were conducted. First, a Kolmogorov–Smirnov (K-S) test was conducted on each subgroup to determine if the normality of distribution criteria was met. For hour of the day data, the K-S score for undergraduate students was 0.150 ($p < 0.001$, Lilliefors corrected), and the K-S score for graduates was 0.152 ($p = 0.160$, Lilliefors corrected). For day of the week data, the K-S score for undergraduate students was 0.066 ($p = 0.028$, Lilliefors corrected), and the K-S score for graduates was 0.232 ($p = 0.200$, Lilliefors corrected). Given the small subsample size and lack of normality for graduate students in both datasets, a Welch *t*-Test was conducted between groups for each hour and each day independently (see Welch, 1947). The results are presented in Tables 1, 2. To account for differences in class sizes for both hour and day datasets, all access hit data were log-transformed (see West, 2022).

Table 1 demonstrates that for each hour in which a significant difference was found between undergraduate students' and graduate students' access hits, undergraduates consistently accessed online course materials more often than graduate students. A test for

TABLE 1 Comparison of undergraduates' to graduates' log-transformed access hits per hour.

Hour	Level	*M*	*t*	*df*	*p*	Cohen's *d*
1	Undergraduate	2.7468	2.337	29	0.013	2.376
	Graduate	2.1614				
2	Undergraduate	2.4406	2.138	29	0.021	2.173
	Graduate	1.7709				
3	Undergraduate	2.1875	0.717	29	0.240	0.729
	Graduate	1.9445				
4	Undergraduate	1.9776	3.198	29	0.002	3.251
	Graduate	1.0000				
5	Undergraduate	1.7989	1.900	29	0.034	1.932
	Graduate	1.0000				
6	Undergraduate	1.7641	−0.287	29	0.388	−0.291
	Graduate	1.9395				
7	Undergraduate	1.8960	1.340	29	0.095	1.362
	Graduate	1.1761				
8	Undergraduate	2.3402	1.803	29	0.041	1.833
	Graduate	1.6812				
9	Undergraduate	2.6980	2.668	29	0.006	2.712
	Graduate	1.8976				
10	Undergraduate	2.8832	2.875	29	0.004	2.922
	Graduate	2.0792				
11	Undergraduate	3.0437	3.005	29	0.003	3.055
	Graduate	2.1847				
12	Undergraduate	3.0678	2.814	29	0.004	2.861
	Graduate	2.3404				
13	Undergraduate	3.0854	3.128	29	0.002	3.180
	Graduate	2.3010				
14	Undergraduate	3.1500	2.603	29	0.007	2.646
	Graduate	2.4624				
15	Undergraduate	3.1621	2.731	29	0.005	2.776
	Graduate	2.4518				
16	Undergraduate	3.1428	3.658	29	<0.001	3.718
	Graduate	2.2253				
17	Undergraduate	3.1524	3.117	29	0.002	3.169
	Graduate	2.4014				
18	Undergraduate	3.1447	1.023	29	0.157	1.040
	Graduate	2.8848				
19	Undergraduate	3.1735	0.755	29	0.228	0.767
	Graduate	2.9974				
20	Undergraduate	3.1962	2.235	29	0.017	2.272
	Graduate	2.6201				
21	Undergraduate	3.2396	3.543	29	<0.001	3.601
	Graduate	2.4393				
22	Undergraduate	3.2342	3.156	29	0.002	3.209
	Graduate	2.4502				
23	Undergraduate	3.2016	3.216	29	0.002	3.269
	Graduate	2.3892				
24	Undergraduate	3.0986	3.795	29	<0.001	3.857
	Graduate	2.2430				
Total	Undergraduate	2.7844	5.407	742	<0.001	1.122
	Graduate	2.1267				

homogeneity of regression slopes revealed that the regression slopes for undergraduate and graduate per hour access hits did not intersect [$F(1, 740) = 0.198$, $p = 0.657$]. Therefore, the undergraduate and graduate student access hit by hour data were analyzed together.

Table 2 demonstrates that for each day in which a significant difference was found between undergraduate students' and graduate students' access hits, undergraduates consistently accessed online course materials more often than graduate students. A test for homogeneity of regression slopes revealed that the regression slopes for undergraduate and graduate per hour access hits did not intersect [$F(1, 213) = 0.775$, $p = 0.380$]. Therefore, the undergraduate and graduate student access hit by day data were analyzed together.

TABLE 2 Comparison of undergraduates' to graduates' log-transformed access hits per day.

Day	Level	*M*	*t*	*df*	*p*	Cohen's *d*
Sun.	Undergraduate	3.7801	3.839	29	<0.001	3.903
	Graduate	2.8597				
Mon.	Undergraduate	3.5308	2.738	29	0.005	2.784
	Graduate	2.8287				
Tues.	Undergraduate	3.4522	2.883	29	0.004	2.931
	Graduate	2.5977				
Wed.	Undergraduate	3.4610	0.571	29	0.286	0.581
	Graduate	3.3062				
Thurs.	Undergraduate	3.4980	3.920	29	<0.001	3.985
	Graduate	2.5428				
Fri.	Undergraduate	3.3635	2.772	29	0.005	2.817
	Graduate	2.6385				
Sat.	Undergraduate	3.3496	1.912	29	0.033	1.944
	Graduate	2.8915				
Overall	Undergraduate	3.4907	6.253	215	<0.001	2.402
	Graduate	2.8093				

4. Results

Data were analyzed using Repeated Measures Analysis of Variance in SPSS 28, following the guidelines for Profile Analysis as described by Cengiz et al. (2021). In Profile Analysis, the three criteria to be met to determine trends in longitudinal data include: (1) Parallelism of trend lines, (2) group equality, and (3) profile flatness. Prior to hypothesis testing, to visualize potential trends in the hit counts of student access in the LMS by hour of the day and day of the week as differing from no effect (demonstrated by a horizontal line), plots were generated by treating hit count as the dependent variable, and either hour of day (H1) or day of the week (H2) as the independent variable. Figure 1 shows the trend between student access and hour of the day for H_1.

This plot shows a (non-flat) curvilinear trend with peak access times occurring in the late evening with a peak in the hour between 8 pm and 10 pm. This omnibus trend carries across all sections of all courses measured. Figure 1 indicates a possible variance from no effect, justifying a test of Hypothesis 1. A regression was utilized to determine the strength of the prediction between the hour of day and access hits, assuming a curvilinear relationship (see Robitzsch, 2020). Results indicate that the quadratic (curvilinear) regression model is more predictive of student's access by day of the week, $R^2 = 0.807$, $F(2, 22) = 84.40$, $p < 0.001$, $B = 2588.55$, compared to the linear model, $R^2 = 0.793$, $F(2, 21) = 43.99$, $p < 0.001$, $B = 3985.1$, although the

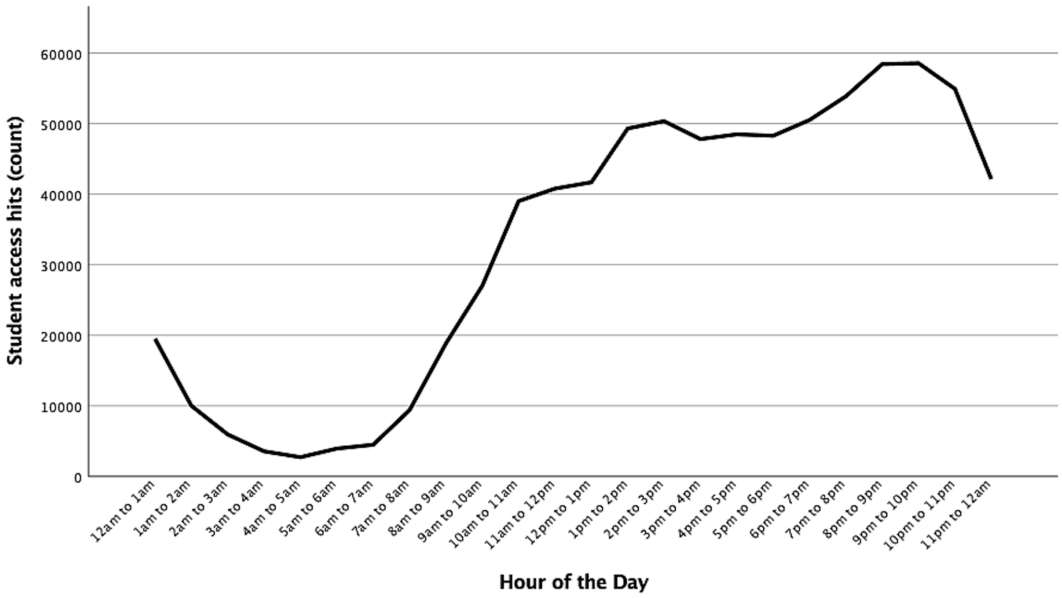

FIGURE 1
Observed counts for student access to the LMS by hour of the day.

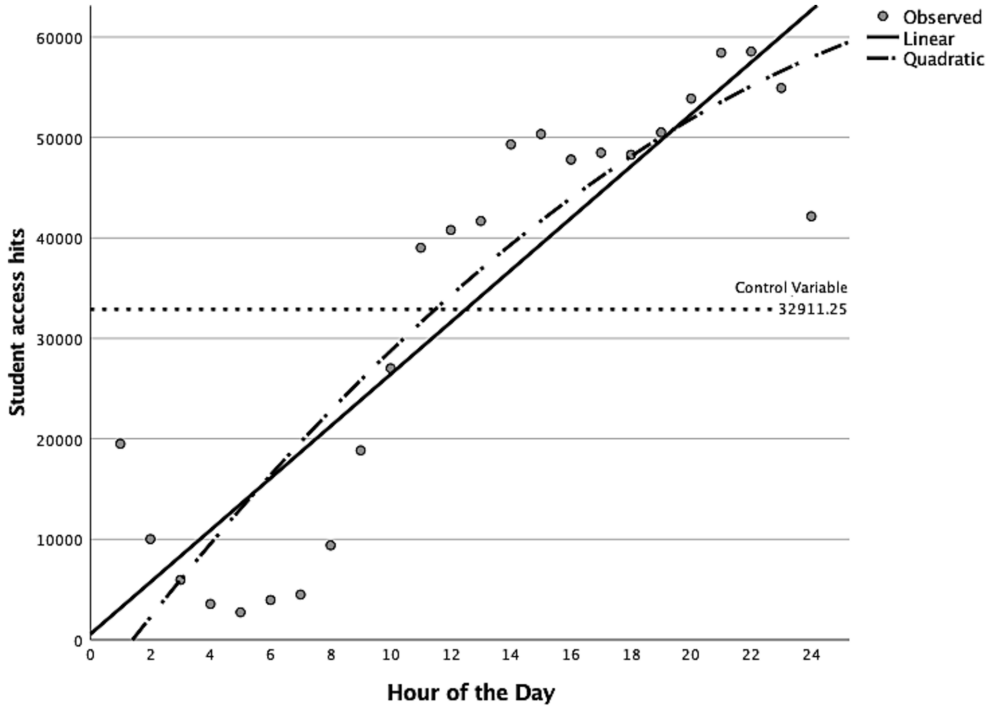

FIGURE 2
Comparison of linear and quadratic regression fit lines for hour of the day.

difference between the linear and quadratic regression lines may not be significant (see Figure 2).

To test H_1, a Repeated measures ANOVA model was constructed between the student access hits as the experimental (H1) variable and a horizontal intercept as the control (H1) both in a longitudinal structure over an hour of the day time series (non-parallel) for each hour over a 24 h period, for the eight-week study time-frame. Repeated measures ANOVA is appropriate for testing differences between groups of complex timed responses (Kumar et al., 2013; Macey et al., 2016). A horizontal intercept can be view as a stationarity with statistical characteristics which are invariant over time (see Nemec, 1996). The horizontal line (y = k) was constructed by using the mean and standard deviation of the experimental (H1) variable ($M = 32911.25$, $sd = 20551.33$) across all 24 h in the day.

The hits by hour (experimental H1) variable was slightly skewed (−0.373), and a one sample Kolmogorov–Smirnov test revealed the distribution to be non-normal (0.200, Lilliefors corrected, $p = 0.014$, see Lilliefors, 1967). To account for this, both the experimental and control variables were log transformed (see West, 2022). Repeated measures ANOVA was conducted between the log transformed experimental and control variables. Between-subjects tests revealed a significant difference between student course access hits by hour of the day and the no time-effect control, $F(1, 23) = 5609.21$, $p < 0.001$, partial $\eta^2 = 0.996$. These results support the first hypothesis.

For H_2, the number of student access hits was plotted against day of the week (see Figure 3). This plot also shows a curvilinear trend with peak access times occurring on Sunday with a smaller secondary peak occurring on Thursday. This omnibus trend carries across all sections of all courses measured.

Figure 3 indicates a possible variance from no effect, justifying a test of Hypothesis 2. A regression was utilized to determine the strength of the prediction between the day of the week and student access hits, assuming a curvilinear relationship. Results indicate that the quadratic (curvilinear) regression model is more predictive of student's access by day of the week, $R^2 = 0.822$, $F(2, 4) = 9.26$, $p = 0.032$, $B = -49817.27$, compared to the linear model, $R^2 = 0.684$, $F(1, 5) = 10.83$, $p = 0.022$, $B = -16195.61$, although the difference between the linear and quadratic regression lines may not be significant (see Figure 4).

To test H2, a Repeated Measures ANOVA model also was constructed between the hits by day of the week as the second experimental (H2) variable and a horizontal line as the control (H2) for each day over a seven-day period, for the eight-week study time-frame. The hits by day (experimental H2) variable was highly skewed (−1.927), and a one sample Shapiro–Wilk test revealed the distribution to be non-normal (0.781, $p = 0.026$, see Shapiro et al., 1968).

The horizontal line (y = k) was constructed by using the mean and standard deviation of this experimental variable ($M = 112838.57$, $sd = 42297.86$) across all 7 days of the week, then each variable was log transformed. Between-subjects tests revealed a significant difference between student course access by day and the no day-effect control, $F(1, 6) = 10483.96$, $p < 0.001$, partial $\eta^2 = 0.999$. These results support the second hypothesis.

5. Discussion and conclusion

In general, a pattern emerges for student online access to asynchronous Communication courses by both day and time. Given

the number of discreet sections ($n = 31$), unique courses ($n = 11$), unique instructors ($n = 10$), and number of students ($N = 1{,}201$), evidence suggests that time of course access by students is a factor by both day and time. The ratio of graduate students to undergraduate students in the study was 3.39%. In comparing hours of the day accessed by graduate students to hours of the day accessed by undergraduate students, no clear pattern of difference emerged. For access hits based on hour of the day, the ratio of access hits between graduate students and undergraduate students varied little from a minimum of 0.13% at 6 am to a maximum of 2.56% at 6 pm ($M = 1.30\%$, sd > 0.01). For access hits based on day of the week, the ratio of access hits between graduate students and undergraduate students varied little from a minimum of 0.78% on Friday to a maximum of 2.99% on Thursday ($M = 1.55\%$, sd > 0.01).

More interestingly, although patterns that emerged did demonstrate that particular days and times were more active,

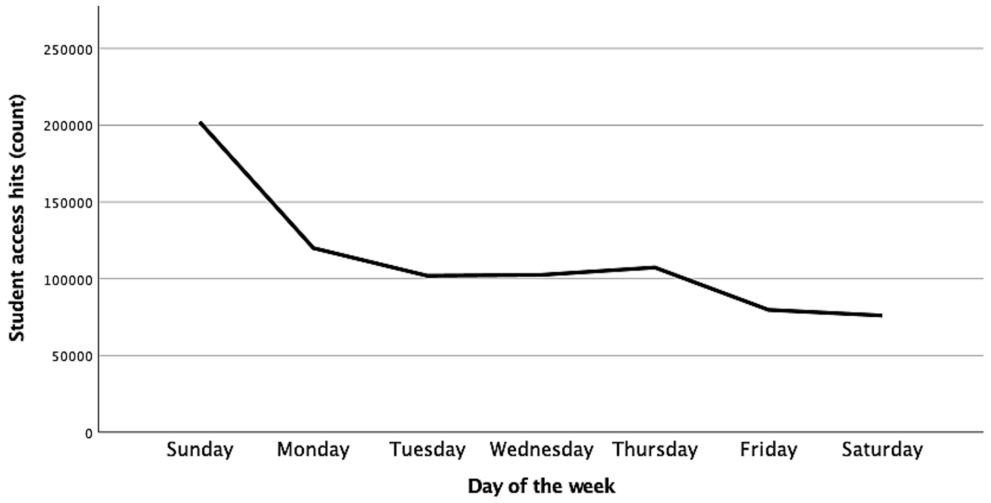

FIGURE 3
Observed counts for student access to the LMS by day of the week.

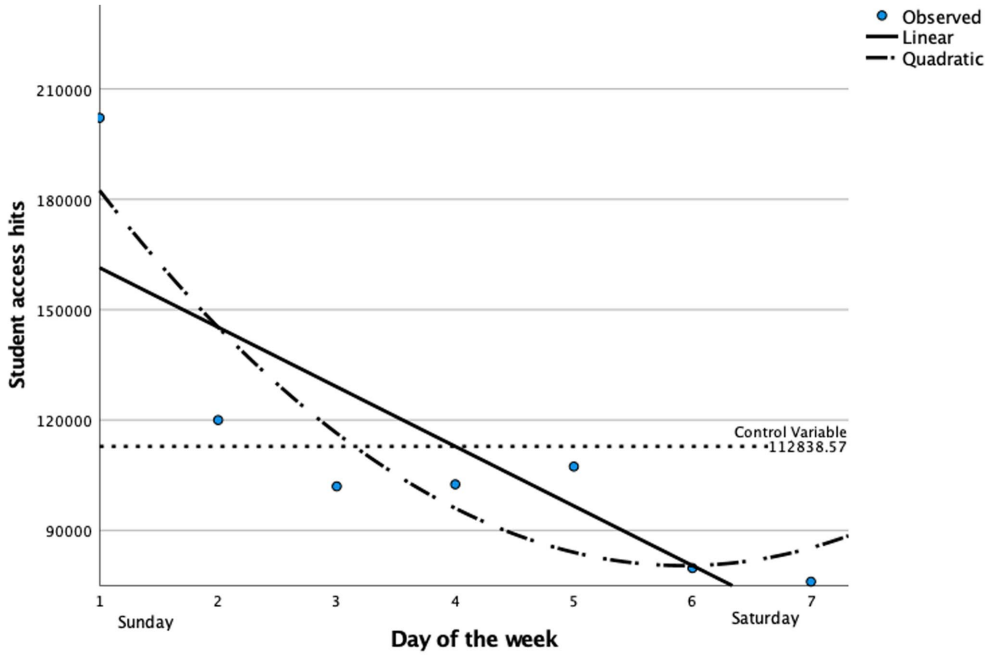

FIGURE 4
Comparison of linear and quadratic regression fit lines for day of the week.

students accessed these courses at all hours of the day across all 7 days of the week. None of the 961 cells in the student access data were empty. As revealed in the analysis, peak times fell on certain days of the week and hours of the day. Follow-up with faculty who provided the data uncovered a trend to require assignments to be turned in at 11:59 pm on Sundays for 4 faculty members in 15 class sections, and at 11:59 pm on Mondays for 1 faculty member in one class section. Other faculty members did not report back or reported requiring assignments to be turned in over multiple days of the week (1 faculty member for six class sections). Regardless, these patterns seem to suggest that students enrolled in asynchronous online courses take advantage of time flexibility that may not be available to them in a residential face-to-face course, synchronous online course, or hybrid course where some aspect of the course happens at a set time. These findings comport with previous research on time poverty in higher education (see Wladis et al., 2018, 2022; Conway et al., 2021; Xavier et al., 2022).

Given emerging research interests in student time-management in the current climate, these findings provide urgency to considerations of educators and education scholars regarding issues of time-poverty among college students. The current need for research on the topic of time-poverty among college students was demonstrated in this article, it is important to note that the approach to data gathering for this study is currently unique in the research literature. Other studies found and reported here utilized self-report through survey or interview rather than actual student access "hit" data. The existence of such "hit" data in the Learning Management Systems used to manage college courses, including non-asynchronous courses, can be used to measure and verify statistical trends across large populations of students.

This study is not without limitations. Although this study involved multiple sections of differing level courses, these courses were still within a single department. Additionally, the current study did not control for distinctions between residential students in an online class and online program students. These populations may have different characteristics not measured here. For example, it could be that the residential students are taking a one-off online course to balance their schedule, whereas online program students take all of their classes online, and may have completed a more robust online program orientation.

Additionally, the study utilized LMS course access data. The LMS does not collect demographic data in its reports, only access records by student name. Further, to meet IRB requirements, the data had to be de-identified eliminated any possibility of cross-checking access record by student against student academic records which may include demographic data. As such, this study may not provide an opportunity to generalize asynchronous online course access by student demographic characteristics.

Other limitations to the methodology include not testing whether a given instructor specified a particular day of the week, or time of the day, as a deadline for submitting assignments. Given the course and instructor sample sizes, such analyses may not have been appropriate. It is important to note that of the ten instructors who participated in the data collection from their courses, only six (60%) specified which day of the week they requested for assignments to be submitted, with four requesting Sunday (only) submission, one requesting Monday (only) submission, and one allowing submission multiple days of the week depending on the assignment. Faculty who attended prior training in best practices for online asynchronous may have selected strategies that differed from those who did not, but these data were not collected for the study.

Additionally, because the data were collected for two semesters and between eight-week and sixteen-week courses (although all were tested over an eight-week period), the start and end dates may have influenced the outcome of the second hypothesis test. The data indicate that the start day for data collection, based upon the course start day could have been one of 5 days with the most common start day being Monday (41.9%) and the least common being Friday (6.5%, mean percentage = 20.0%). The end days of data collection were based upon the last day students accessed to course between all of the sections, which included all 7 days of the week. The peaks in the trend lines may be accounted for by these types of instructor strategies or variances in the data.

Despite these limitations, the current study points a direction for future study of the effects of time-poverty on student access to online courses. The current study also demonstrates the necessity for educators to consider the lives of their students outside of their classes when designing the course.

Data availability statement

The original data and analysis code presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human data were approved by Shannon Marquess, Senior Research Compliance Coordinator of The University of Texas at San Antonio [P: (210) 458-4793, E: Shannon.Marquess@utsa.edu]. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements.

Author contributions

HPL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2023.1264868/full#supplementary-material

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Meaningful connection in virtual classrooms: graduate students' perspectives on effective instructor presence in blended courses

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This qualitative study explored 15 graduate students' perspectives on effective online instructor presence. Analysis of interviews, a survey, and a focus group revealed students value early relationship-building through consistent participation, authentic personality-sharing, and learner-centered course design. Results indicate effective instructor presence fosters trust, satisfaction, engagement, and positive student mindsets while reducing stress and anxiety. Students preferred visible, accessible instructors who connect through prompt communication, constructive feedback, and active listening. Additional findings suggest leveraging synchronous interactions enhances social presence and relationship-building. However, disconnected instructor presence caused frustration and negative emotions. Overall, intentional instructor presence is critical for successful online instruction and profoundly shapes learners' holistic experiences beyond solely academic goals. While limited to one program, these learner-centered insights provide a starting point for identifying high-impact presence-building strategies tailored to graduate contexts.

KEYWORDS

instructor presence, distance education, online education, online learning, online learners, graduate students, higher education

Introduction

Effective online instructor presence is increasingly vital as remote and hybrid learning expand. However, creating a meaningful instructor presence remains an evolving puzzle requiring learner-centered insights. While prior research demonstrates the benefits of instructor presence for satisfaction, engagement, and learning outcomes (Caskurlu, 2018; Law et al., 2019; McNeill et al., 2019; Um and Jang, 2021), few studies deeply explore graduate student perspectives, especially within blended environments. This qualitative study helps fill that gap by interviewing graduate learners about the specific behaviors, actions, and dispositions facilitating effective instructor presence in virtual classrooms.

Current literature conceptualizes instructor presence as the specific actions and behaviors through which an instructor projects themselves as a real person to students, as well as how the instructor is socially and pedagogically positioned within the online community (Richardson et al., 2015). Instructor presence is connected with academic performance, student engagement,

a sense of community, and collaborative learning (Garrison et al., 2000, 2001; Shea et al., 2014; Wang and Liu, 2020).

The aim of the current study is to advance the understanding of effective online graduate instruction by gathering rich, qualitative insights into the specific behaviors, actions, and dispositions that facilitate instructor presence from a learner perspective.

Prior quantitative studies demonstrate the benefits of instructor presence, but few qualitatively explore student interpretations of how presence is established, especially in blended contexts. This study helps fill the gap by interviewing graduate students to unveil practical techniques for relationship-building, engagement, and interpersonal connections from their lived experiences. This exploratory approach will provide in-depth insights into the pedagogical and relational approaches students find most meaningful for presence, tailored to graduate needs in blended environments.

Literature review

Instructor presence

Establishing effective instructor presence has emerged as an important focus in online education research, yet exactly how to create meaningful presence remains an evolving area of inquiry. Going beyond the concept of teaching presence within the Community of Inquiry framework, instructor presence encapsulates the individual behaviors, actions, and dispositions of the teacher as a real person forming interpersonal connections with learners (Richardson et al., 2015). Instructor presence influences key outcomes like student performance, engagement, satisfaction, and sense of community (Arbaugh et al., 2008; Shea et al., 2014; Khalid and Quick, 2016).

Online instructor presence can determine students' performance (Arbaugh et al., 2008; Law et al., 2019), engagement behaviors (Zhang et al., 2016; McNeill et al., 2019), and learning satisfaction (Khalid and Quick, 2016; Kyei-Blankson et al., 2016), the latter of which has been shown to influence students' intention to continue to use online learning (Um and Jang, 2021).

Recent studies reveal complex, multifaceted aspects of effective online instructor presence. For example, Trammell and LaForge (2017) identified behaviors like using video conferencing, giving timely feedback, and sharing personal stories as key strategies for presence. Similarly, Van Wart et al. (2019) found instructors enhanced presence by leveraging announcements, audio/video, and interactive tools to create an approachable, caring persona. However, Lowenthal and Dennen (2017) note obstacles like workload and communication challenges can impede presence.

While quantitative measures provide useful data on instructor presence (Armellini and De Stefani, 2016), few studies deeply explore student perceptions and preferences through qualitative methods. A learner-centered perspective is critical for delineating the aspects of presence most influential on satisfaction, engagement, and learning. As Clark et al. (2015) argue, "a priority for future research should be exploratory studies that give voice to the lived experiences of participants" (p. 194).

As open questions remain around which specific instructor dispositions and pedagogical approaches graduate students find most meaningful when establishing presence, especially in blended and synchronous contexts (Martin and Bolliger, 2018), this study aims to address that need by qualitatively analyzing student interpretations of effective online instructor presence. Findings will provide humanizing insights to guide professional development and identify high-impact presence-building strategies tailored to graduate contexts.

Online presence

The unique features of online environments have led to the change and expansion of the instructor role. As instructors assume various roles in online instructional environments, they establish an online presence (Richardson et al., 2016). "Online presence" refers to the ways in which instructors make themselves socially and pedagogically present in the online learning environment (Garrison, 2015). This can involve having a personal page on the course website, being active in discussion forums, keeping the video camera on during live sessions, using audio feedback on assignments, responding promptly to student emails and questions, and facilitating frequent interaction with and among students (Garrison et al., 2000).

Social and facilitating roles are emphasized in online environments because of the lack of physical interaction and presence. To overcome the geographical barriers associated with learning at a distance, online instructors should actively facilitate discussion, provide timely feedback, and enable social connections with and among students (Anderson et al., 2001; Picciano, 2002). This online presence helps create a sense of community for students who may feel isolated or disconnected in online courses (Garrison and Arbaugh, 2007; Vesely et al., 2007).

Theoretical framework

The theoretical framework leveraged for this study is the construct of instructor presence. Instructor presence (Figure 1) is comprised of three key components: behaviors, actions, and position. Behaviors refer to how an instructor interacts with students in an online environment. Actions are the specific things an instructor does to project themselves as a real, engaged person to students. Position relates to how an instructor situates themselves socially and

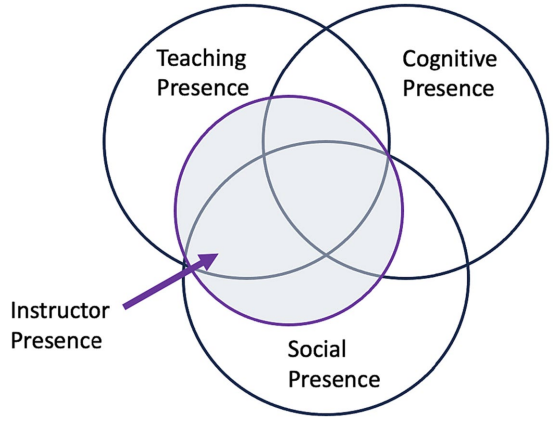

FIGURE 1
Instructor presence within the community of inquiry framework.

pedagogically within the online community. In other words, instructor presence includes the behaviors and actions an instructor displays, as well as the position they establish through roles, styles, and interactions with students (Feeler, 2012; Richardson et al., 2015). This multidimensional concept encompasses not just what instructors do, but how they situate themselves in relation to students in a virtual setting.

Research question

In this study, we aim to answer the following question: What do students articulate as significant factors in establishing and maintaining an effective online instructor presence? Concerning the guiding question, it is important to clarify that this study focuses on the instructor presence component of the CoI framework theory, which connects both cognitive and social presence (Richardson et al., 2015).

While establishing presence is essential for successful online learning, there has been limited qualitative research exploring instructor presence from the graduate student viewpoint, particularly within blended asynchronous and synchronous environments and instructional technology programs. This study aims to uncover practical techniques for relationship-building, engagement, and interpersonal connections by interviewing graduate students regarding the specific behaviors, actions, and positions that promote meaningful instructor presence in virtual classrooms.

Methods

Approach

The study was carried out using a qualitative approach, as the descriptive, exploratory nature of qualitative inquiry contributes unique value to expanding knowledge and informing policy, practice, and research in ways quantitative data alone often cannot (Merriam and Tisdell, 2015). Qualitative methods like interviews and observations enable the collection of personalized, descriptive data based on individuals' lived experiences in their own words (Mohajan, 2018). Additionally, the inductive approach of qualitative research allows unexpected themes and insights to emerge directly from the data. This can challenge assumptions and lead to new theories and directions for future research (Creswell and Poth, 2018).

This project stems from discussions about the role of instructor presence in fully online courses. The aim was to understand how graduate students define and experience effective instructor presence. Through an iterative process, the authors identified the guiding research question and qualitative methods to elicit learners' interpretations of presence-building strategies.

Researcher descriptions

The authors have research expertise in instructional technology and online learning. Author #1 holds a Ph.D. in Instructional Leadership focused on technology and presence. Author #2 brings experience from graduate degrees in Instructional Technology and Language/Literacy. Their training positioned instructor presence in blended environments as a key research interest.

Their familiarity with graduate distance learning allowed them to sensitively capture learner perspectives through interviews, surveys, and focus groups. Professional relationships with the students enabled the coordination of data collection. The authors' combined expertise in online pedagogy and qualitative methods facilitated gathering insights into meaningful presence-building behaviors, actions, and dispositions.

Participants

The study participants (Table 1) were graduate students ($n = 15$) enrolled in a 100% online instructional technology program at an R1 university in the southeastern United States. All students were enrolled in at least one online IT course during the Fall 2022 semester and had completed at least one IT course before the Fall 2022 semester. Among the students, 20% ($n = 3$) were men and 80% ($n = 12$) were women. The duration of the study was approximately 9 weeks.

In this study, while the participants' program is 100% online, their collective experience was not 100% asynchronous for all learners. Participants reported that several instructors in the program offered several synchronous Zoom meetings during the courses, which were optional for students to attend. It is possible that the synchronous components may have altered the way the study participants would have responded in a 100% online and 100% asynchronous instructor presence.

Participant recruitment and selection

Author #1 obtained IRB approval to conduct the research before participant recruitment began. To recruit participants, Author #1 emailed all graduate students enrolled in the instructional technology master's degree program at an R1 university and invited them to participate if they met the criteria (i.e., a student in good standing at the R1 university, completion of one course in the instructional technology master's degree program, and currently enrolled in one course in the instructional technology master's degree program during the semester in which the study was being conducted).

If a learner responded to the initial email indicating they fit the criteria of the study and were interested in participating, Author #1 replied by email and delivered more information on study participation and the consent document. Before signing their consent forms, participants were given the chance to ask questions about the study and their participation. Over 9 weeks, 15 graduate students took part in the study.

TABLE 1 Demographic information of the participants.

Number of participants	15 graduate students
Gender	3 male, 12 female
Age distribution	20% = 25–34
	33% = 35–44
	27% = 45–54
	20% = 55+
Student status	Part-time

TABLE 2 Data sources.

Semi-structured interviews	$n = 15$	13 questions
Open ended survey	$n = 10$	11 questions
Focus group	$n = 4$	5 questions

TABLE 3 Instructor presence components and interview questions.

Behavior	Actions	Position
Q 2, 12	Q 3, 7, 8, 9, 10, 11	Q 1, 4, 5, 13

While all 15 students participated in the semi-structured interviews, time limitations and schedule constraints resulted in some students participating in the subsequent survey and focus group more than others. Ten students participated in the open-ended survey and four students participated in the focus group.

Data collection tools

To examine the factors that participants identified as significant in establishing and maintaining an effective online instructor presence, we conducted semi-structured interviews, an open-ended survey, and a focus group (Table 2). During each data collection segment of the study, participants were asked to articulate their insights, observations, and experiences related to effective instructor presence methods, strategies, and behaviors in online courses at the R1 university.

Since this is a qualitative study, using multiple methods with open-ended questions allows for a more comprehensive exploration of students' perspectives on instructor presence. Here is how each method contributes: The semi-structured interviews with all 15 participants provide rich, descriptive details about their experiences and thoughts on instructor presence. The open-ended nature gives flexibility to probe and clarify. The qualitative survey completed by 10 out of 15 students allowed for gathering more perspectives. The survey questions also corroborated findings from the interviews. The focus group, despite its small size with 4 participants, brought out collaborative reflections not found in the individual interviews.

Though each method had limitations, the convergence of findings across the datasets strengthens credibility through triangulation. The multi-method approach provides a well-rounded understanding of how students experience instructor presence.

Semi-structured interviews

Semi-structured interviewing is a common technique for exploratory research aimed at gathering rich, descriptive insights from participants. This method combines structure with flexibility (Longhurst, 2003). The interviewer prepares core questions in advance but can also ask follow-up questions tailored to the participant's responses. This conversational style provides more flexibility than fully scripted interviews or surveys (Given, 2008). As a result, semi-structured interviews allow researchers to collect more detailed, nuanced qualitative data about people's lived experiences, perceptions, and opinions (Adams, 2015).

Before conducting the semi-structured interviews on Zoom, the authors created 13 predetermined, open-ended questions (Supplementary Appendix A). The interview questions were based on the three key components of instructor presence: behaviors, actions, and conditions (Richardson et al., 2015). Table 3 shows the three instructor presence components and the corresponding semi-structured survey questions.

For example, interview question 3, "In what ways and how were you and your peers introduced to the course by the instructor?" relates to the "position" component of instructor presence. Interview question 12, "How is feedback shared with students?" corresponds to the "behavior" component of instructor presence.

As the interview questions were semi-structured, the authors adapted to the participants' responses during the interview. The authors were able to ask probing questions and get to know the individual participants on a more personal level, which is valuable for the current study and future research (Jain, 2021). As outlined in the consent form, the interviews were video and audio-recorded. The length of each interview was approximately 30–45 min.

Survey

An 11-item survey (Supplementary Appendix B), administered through Qualtrics, was used as a data collection tool after the semi-structured interviews were completed and analyzed. The qualitative results reinforced some of the interview findings, lending more credibility to the study through method triangulation. By conducting the survey post-analysis, the authors gathered more perspectives, gained insights into the participants' opinions, and were better prepared to plan and conduct the survey (Jain, 2021).

To develop the survey questions, the researchers examined the 13 interview questions and determined that more information was needed from the participants in terms of specific examples of instructor presence behavior, actions, and position, description of how instructors can improve the effectiveness of their behavior, actions, and position, and how the behavior, actions, and position affected the participants' own behavior, reactions, and perceptions. Questions included, "What examples of effective online instructor presence can you list?" and What is your reaction when an effective instructor presence exists in an online course?"

Focus group

Focus groups allow researchers to efficiently gather a breadth of perspectives, attitudes, and beliefs about a topic in a short time span (Krueger and Casey, 2015). The group discussion dynamic sparks ideas and insights that individual interviews may not reveal, as participants hear others' views and experiences (Stewart et al., 2007). Interaction within the group highlights areas of agreement, disagreement, and nuance in perspectives (Morgan, 2019). While small focus groups can generate fewer data and tentative findings compared to larger samples (Stewart et al., 2007), this data collection method reinforces and complements the semi-structured interview data and survey results, producing insights beyond the sum of individual contributions.

For this study, participants were asked to respond to five focus group questions (Supplementary Appendix C). By conducting the

focus group after analyzing the survey replies, the authors were better able to create targeted focus group questions to clarify and gain more detailed responses.

To develop the focus group questions, the researchers reviewed the 11 survey questions and decided that the concepts of trust, academic barriers, community, and the day one course experience should be examined in more depth. Examples of those questions include: "Thinking about the concept of trust in any online course, describe how or ways in which this can be established through instructor presence" and "Thinking about the first day of an online course, how can you be introduced to that course in a very effective way? What would that look like?

The focus group lasted 1 h and was conducted with four participants. Four to seven participants are standard for focus group data collection to gain additional insights into the participants' viewpoints and perceptions (Krueger and Casey, 2000) related to effective instructor presence strategies and methods in courses.

Data analysis

Transcripts from the semi-structured interviews were analyzed using inductive and deductive content analysis. Content analysis is a qualitative research method used to systematically analyze written, verbal, or visual communication artifacts (Elo et al., 2014). It involves coding and categorizing data to identify themes, patterns, biases, and meanings represented in texts or images (Vaismoradi et al., 2013). Overall, content analysis is a flexible method used to generate knowledge, new insights, representations of facts, and practical guidance by producing data from examining human communications (Krippendorff, 2018).

Transcripts from the focus group and the text document from the open-ended survey were analyzed using inductive content analysis. In the deductive analysis, the following instructor presence components were adopted: behaviors, actions, and position.

Author #1 transcribed the interview and focus group audio files verbatim using Rev.com. Participants' responses to the open-ended survey were exported from Qualtrics into a text document. Following an inductive approach to coding, Author #1 and Author # 2 reviewed the transcripts and text document for accuracy and read the transcripts and text document to become familiar with the data.

The transcripts and the text document were analyzed using inductive and deductive content analysis. Inductive coding was used to identify codes, categories, and themes from the data (Ezzy, 2002; Richardson et al., 2016). In the deductive analysis, the instructional presence components were also applied.

The data were coded manually and with NVivo, a qualitative data analysis software tool. Throughout data analysis, Author #1 and Author #2 independently coded the transcripts and text document and met weekly to discuss codes and apply cross-case analysis. Cross-case analysis allows authors to locate and discuss similarities and differences articulated by the participants (Richardson et al., 2016) regarding their perceptions of effective online instructor presence. To determine the final codes used in the data analysis, the authors met to examine, discuss, and resolve any discrepancies to reach a 100% consensus (Creswell, 2014). After coding, the data was examined for patterns and subsequent themes to answer the study's research question.

Results

Based on the analysis of 15 interviews, 10 surveys, and one focus group, the findings are categorized by data collection method to answer the research question: What do students articulate as significant factors in establishing and maintaining an effective online instructor presence?

Findings from the semi-structured interview

Several themes emerged in relation to the semi-structured interview questions (Supplementary Appendix A).

TABLE 4 Semi-structured interview categories, themes, and codes.

Category	Themes	Codes
Instructor behavior	*The instructor connects early and often*	Continuous communication ease of accessibility guidance Listening to students prompt replies See and hear instructor Accessible, available, responsive
Instructor actions	*The instructor is visible, connected, and engaged*	Feedback Guidance as an expert Optional synchronous online meetings Instructor is present and engaged
Instructor position	*The instructor builds trust and sets the stage for learning*	Values student success Relationship and connection Trust Structure and organization Assignments that help me learn Meaningful content with depth and variety Clear navigation and objectives
Disconnected Instructor Presence	*A disconnected instructor results in learners feeling overwhelmed and anxious*	Delayed or no feedback Ineffective and disconnected Little instruction or few expectations Learner stress, feeling overwhelmed, and anxious

The resulting themes, as seen in Supplementary Appendix are: (1) The instructor connects early and often, engaged, (2) The instructor is visible, connected, and engaged, (3) The instructor builds trust and sets instructor presence results in students feeling, and (4) Disconnected instructor presence results in students feeling overwhelmed and anxious.

The instructor connects early and often

In their descriptions of Facilitating Discourse, several of the participants ($n = 11$) indicated that continuous communication is necessary for students to be successful in online courses. Many participants ($n = 7$) described that weekly videos from the faculty helped them connect to the course material and the instructor, along with course announcements and group or individual emails. One participant commented:

> I think those weekly videos are a good place to address misconceptions from the past week or like, yeah, I noticed several of you made the same error in this assignment. Here's a different way of thinking about it

Visibility of the instructor or being able to see and hear the instructor was viewed by many participants ($n = 12$) as a crucial part of a successful, satisfying online learning experience. Visibility also included an instructor who interacts, pays attention to the students' needs, and is present in the course. One participant described:

> Being able see the faces of the professors makes things really easier to go through. It makes you feel more confident and actually makes it easier to communicate with your professors. the instructor does a weekly recording of themselves, kind of going over the material. So you still get to see their face, you still get to interact with them.

Additionally, participants ($n = 10$) emphasized that ease of communication with and accessibility to the instructor as important factors. Participants ($n = 10$) also described that they enjoyed autonomy in online courses but desired the ability to reach out to the instructor and receive a prompt reply. Most participants ($n = 10$) expected an instructor's reply within 24 h. Participants also felt less stress in an online course if they believed they could reach out to an instructor with no repercussions. One participant shared:

> I think is just the responsiveness of an instructor. if someone is able to respond to me within 24 hours, I'm pretty much like, oh wow, that's awesome.

The instructor is visible, connected, and engaged

Nearly every participant ($n = 12$) agreed that effective online instructor presence means that the instructor is accessible, available, and responsive to students. Equally important to participants was that the instructor is a real person who is also engaged and approachable from day one and throughout the entire course. One participant responded:

> I keep wanting to say the word prioritization, making the online course feel like it's just as important as if we were face-to-face. They are almost as engaged in the course material as the students. It is just as focused as if it were in person.

Most of the participants ($n = 9$) underscored that an effective online instructor presence means that the instructor values student success. One participant responded:

> I do feel like that instructor is present and cares about whether or not we're actually understanding and getting the information. It's not just lip service, it's thoughtful responses.

All participants ($n = 15$) mentioned that quick, constructive, and detailed feedback created trust and was necessary for deep learning. Participants ($n = 8$) preferred feedback that conveyed positivity, and encouragement, and provided specific information on improving the quality of a submission. Several participants ($n = 5$) emphasized that they felt less anxiety and more trust if the instructor conveyed constructive feedback in a way that was not negative and shared that mistakes are part of the learning process and it provides an opportunity for growth, not punishment. One participant commented:

> I know he will tell me if something is good or not good. So I trust that he will provide me with good information. And he always does.

One participant responded:

> So, the having the opportunity to do a rough draft, get feedback and turn it in is invaluable to me. It. It gives you the opportunity to show what you already know, but it's a safe place to mess up. And I really do find that I learn more from mistakes than from what I did right.

The instructor builds trust and sets the stage for learning

When we interviewed participants about significant factors that represent or convey an effective online instructor presence, they had much share about the topic and how they experienced it.

Participants described that effective online instructor presence is demonstrated when an instructor gives students the opportunity to know them. Participants ($n = 10$) described cultivating feelings of trust, confidence, and support when an online instructor connects with students in a way that is deeper than surface level.

Several of the participants ($n = 9$) placed emphasis on the importance of being able to establish a relationship with the instructor and not feeling like just another student in the course. Part of that relationship building, according to many participants ($n = 8$), means the ability to see and hear the instructor. One participant explained:

> When a professor establishes an online presence throughout the course, you get to really know their style. You got to see their face and interact with them a lot more, which built more of a relationship. It felt more like being in a classroom setting.

Several participants described the significance of not just learning content but learning new skills applicable to learners' jobs and lives

($n = 8$) and the need to have assignments that push them out of their comfort zone ($n = 4$). Additionally, it was pointed out that scaffolding is crucial for deep comprehension with new information building on earlier information everything builds off the week prior ($n = 7$). One participant commented:

> I can look at the modules and I can look at sort of the goal of each section. And I feel pretty confident that I could. Based on how is organized tell you, okay, this is what they want me to get out of this course

Several of the participants ($n = 13$) voiced that content depth and variety are extremely helpful as a learner. Many participants voiced that more than a textbook was needed to understand and digest the course material, describing that the use of video, podcasts, articles, visuals, and short summaries provide different perspectives on a particular topic. One participant explained:

> I could like go for a walk right, and listen rather than just like sitting more. I can read the notes for this or I can listen to it and I absorb things better if I read them than if I just hear them.

It was also expressed by participants ($n = 11$) that they desired an expert instructor, both in the synchronous and asynchronous environments, who was an established professional with the ability to effectively teach online. Participants expected that instructors be an expert in the subject being taught.

Disconnected instructor presence results in students feeling overwhelmed and anxious

Several participants ($n = 7$) talked about the learner stress, feeling overwhelmed, and anxious. Students relayed that these feelings surfaced after viewing the way the instructor presents the structure, flow, and workload required in a course. Relatedly, if the online course navigation is confusing, the content is outdated, or the instructor is uncomfortable with technology, it triggers feelings of learner stress and unease. Several participants ($n = 4$) expressed that feelings of being overloaded caused them to drop a course. One responded:

> There was one class that I withdrew from because I felt overwhelmed. The first thing I did as a student, I would go through and look at every module, and if I felt like, oh my goodness, this is going to be overwhelming, or I do not feel like I can do this.

Nearly half the participants ($n = 7$) described the frustration caused when the instructor offered few or no instructions and few or no expectations of the students in the online course. Additionally, a few participants ($n = 3$) mentioned feeling tense and confused when an instructor changed due dates and did not notify the students. One participant explained:

> I think in this class I'm in, it's been taking like three weeks for me to get feedback on my assignments.

Delayed communication and delayed assignment feedback, especially when the feedback lacks depth or substance caused participants ($n = 7$) additional stress and feeling overwhelmed. One participant responded:

> If I send you an email and you don't respond for a week, there's challenges with that as a virtual student.

Several participants ($n = 8$) expressed concern and frustration with ineffective instructor presence, specifically when an instructor is disconnected, does not participate, or communicate, and is not engaged with the course or the students. One participant shared:

> You're just standing back there as God of some sort that just watches it all happen.

Additional frustration was expressed by participants ($n = 4$) who perceived assignments to be punitive, worth zero credit, or were related to using technology for technology's sake and not pushing learning or skill-building forward. One participant responded:

It was basically writing a paper every single week, which I got to say was not my favorite. And it reflected that. When I did my course evaluation, I also said that's not effective because it's just punitive at that point.

Another participant replied:

> This specific class, we have quizzes at the end, but personally, I don't like the quizzes because he doesn't give us a value on them. He gives us a zero. And to me a zero is like just completely devastating because I take my studies very seriously.

Findings from the survey

Several themes emerged in relation to the open-ended survey questions (Supplementary Appendix B) asking participants ($n = 10$) to answer questions based on the three components of online instructor presence: behavior, actions, and position. The resulting themes (Table 5) were: (1) Clear, logical course content and structure, (2) Engaged, committed, knowledgeable instructor, and (3) Effective instructor presence creates trust, investment, and less stress.

Clear, logical course content and structure

Most of the survey participants ($n = 8$) desired clear expectations and instructions from the instructor from day one and throughout the course. Similarly, participants ($n = 8$) identified that a logical flow of course content reflected effective online instructor presence and mentioned that the organization of the course should be easy to understand. All survey participants ($n = 10$) agreed that effective online instructor presence means that the instructor has prepared the course with clearly defined, structured modules that are scaffolded and built from a base of previous understanding. One participant commented:

> As clearly as possible. As structured as possible. Built-in flexibility when appropriate. For me, start with the big picture and zoom down into the specifics. I know not everyone sees the world that way, but it helps me.

TABLE 5 Survey categories, themes, and codes.

Category	Themes	Codes
Instructor position	*Clear, logical course structure*	Clearly defined, structured modules Consistent, weekly comm (sync or async) Logical course content flow Scaffolding used Clear expectations and instructions Variety of relevant, up-to-date material
Instructor behavior	*Engaged, committed, knowledgeable instructor*	Available and accessible for students Show a mastery of technology Personal style and communication
Result of effective instructor presence	*Effective instructor presence creates trust, investment, and less stress*	Engage and focus more invested Engenders trust Less stress and greater comfort Impact on satisfaction Learn more Greater interest in topic

Many of the participants ($n = 8$) agreed that it is crucial to have relevant, up-to-date content in a course. Participants also expressed that they want to know why a task or assignment is important, not just do it because it is required.

Engaged, committed, knowledgeable instructor

All survey participants ($n = 10$) shared that effective online instructor presence was reflected by being available and accessible for students throughout the entire course. This included the instructor responding quickly and fully to emails and communication from students, without making students feel intimidated. It also means providing students a timeframe during which they can expect their grades and grading promptly with the addition of rich, critical feedback for improvement. One participant explained:

> Comment on the positives. Critique the negatives with an eye toward improvement. I do enjoy a gold star, whether through video or written comments, but I appreciate hearing the instructor's perspective.

A need for consistent, weekly communication from the instructor was also discussed by all participants in their responses ($n = 10$). That communication can take many forms, including posting a video introduction, holding a synchronous welcome meeting, in addition to optional Zoom sessions, and sharing text, video, or audio updates and encouragement. One participant shared:

> A rousing speech! I'm with you. I'll help you. You can do this! Here are tips to succeed.

Effective instructor presence creates trust, investment, and less stress

Nearly all the participants ($n = 9$) shared that effective online instructor presence helped them engage, invest in the course material, put forth more effort, and focus on learning and skill development. Additionally, participants explained that effective online instructor presence causes them to feel less stressed about assignments. Participants ($n = 9$) expressed that effective online instructor presence engenders trust in the instructor and facilitates greater comfort and interest in the course topic. Additionally, participants ($n = 7$) shared that effective online instructor presence impacts student learning and satisfaction. One participant explained:

> I feel that I do better in courses where there is an effective teaching presence. Generally, it means the difference of me checking boxes and engaging with material. It increases my investment and I grasp more information.

Most of the participants ($n = 8$) reported that an instructor's personal style and communication are reflective of effective online instructor presence, particularly in terms of the instructor's personality and compassion. Participants commented that when instructors share their personal style it establishes credibility and introduces them as a real person.

Findings from the focus group

From examining the focus group responses, several themes were determined after analyzing the data to gain additional insights into the participants' viewpoints (Krueger and Casey, 2000) related to effective online instructor presence behavior, actions, and position. The resulting themes (Table 6) were: (1) Creating trust and satisfaction from day one, (2) Establishing a positive student mindset, and (3) Instructor delays and disorganization cause frustration.

Creating course satisfaction from day one

All participants ($n = 10$) indicated that effective online instructor presence strategies include creating a comfortable course cadence and pacing. Participants shared that chunked content helped avoid cognitive overload and uniformity with assignment due dates helped reduce stress levels. Additionally, participants stressed the importance of consistent course structure and organization, including inside the individual modules and module sections. One participant explained:

> I know that for every class it's split into the different like modules and sections, but if there's consistency in the way that each of those look, it makes it a lot easier to be able to go in and say, okay, I need to start here. Look at this, look at this. And just that consistency definitely helps me to be able to be successful.

Participants ($n = 10$) stressed the need to understand why the course was important and the reason why the context, activities, and skills are necessary. Other participants ($n = 5$) explained that receiving context and information from the instructor before the course began helped ground them in the course and assisted students in more quickly assimilating to the course requirements and content. One student shared this about day one of a course:

TABLE 6 Focus group categories, themes, and codes.

Category	Themes	Codes
Course ecosystem	*Creating trust and satisfaction from day one*	Course cadence and pacing Explain the course purpose and why it is important Discussion boards versus peer reviews
Student mindset	*Establishing a positive student mindset*	Updates and communication needed Autonomy needed for students with busy lives Student balance Clarity on how the professor operates
Frustration (instructor-driven)	*Delays and disorganization cause frustration*	Additional guidance needed from instructor Delays and disorganization cause frustration Not being able to reach professors Sub-par professor responses; more attn. to detail Tech for tech sake is not helpful Instructor understand competing priorities Too many assignment choices do not work well

> Just giving the syllabus and the course schedule I feel like is not enough. I feel like there needs to be like a video or a Zoom or something where there can be a little bit more like conversation about the course.

Participants ($n = 10$) had a lot to say about discussion boards and peer reviews. Most participants ($n = 9$) shared that they disliked discussion boards, found them stressful, and questioned the value and purpose of this activity. Several participants ($n = 5$) debated whether the purpose of discussion boards was to interact with peers or whether it was to determine if students understood the material, citing that the activity should not be included because it's always been included as part of a course. The participants ($n = 9$) also expressed that the ability to communicate with the instructor easily and quickly, if needed, resulted in satisfaction and the perception of effective online instructor presence.

Establishing a positive student mindset

Most participants ($n = 8$) agreed that autonomy and the ability to work at their own pace in an online course is needed for graduate students with busy lives. Additionally, many participants ($n = 9$) described that it takes time and gaining trust in the instructor before it feels comfortable to engage and communicate inside the course and about the material. One participant responded:

I'm not ready to just launch into the, the bulk of the content of the course until I feel like I'm really clear on how this instructor works.

Participants ($n = 5$) were also successful in establishing a positive student mindset when they could have productive conversations with the instructor. It was also helpful for participants to have access to instructors at times that were convenient for busy, working adults.

Instructor delays and disorganization cause frustration

All participants ($n = 10$) expressed concern regarding the inability to contact or receive guidance and answers from instructors, particularly after hours when the student is required to work a 9–5 day. One student explained:

> I do not feel like I can ever get that communication and that foundation, it, it's almost like I do not trust that professor to take care of me, so to speak.

Another student commented:

I work during the traditional school day, so if a professor is only going to reply to things or whatnot during the workday, it can be very hard to have an open back-and-forth of communication and get all of the questions I need answered while I'm trying to also wrangle 37 students at the same time. So being able to communicate with my professors during the evening is the best thing for me and not being able to do that is a roadblock.

> Other participants ($n = 4$) described frustration over receiving incomplete or vague instructor responses and shared their annoyance when instructors do not pay attention to detail or respond to emails or questions thoroughly. One participant responded:
>
> Then there are some [instructors] who like answer the first thing and, and that you are left with two other questions that were never addressed. And so that's when I start to get stressed out. Well, I need these other two questions answered, but they already did not answer them.

Many participants ($n = 8$) articulated confusion and frustration over course expectations not conveyed by the instructor in a timely manner or missing information in the syllabus or instructions. Additionally, the participants expressed that it is overwhelming to have work to complete in week one of the course without advance notice or information in the course on day one.

> To pile all on the very first day if the student is like juggling a number of classes, just really front loads and can be kind of caused this flurry of stress right at the very beginning. It is really defeating to feel like I'm already behind the ball.

Other participants ($n = 3$) described concerns surrounding decision fatigue when an instructor offers too many choices or options when completing an assignment or when the assignment appeared to be using technology for technology's sake.

> I've had a course before where the professor had this really cool technology tool that he wanted us to use, but nobody could figure out how to use it. And there were so many emails and Zoom calls of us trying to use it that the actual purpose of the assignment kind of got lost behind this technology tool.

Trustworthiness

We employed several strategies to ensure the trustworthiness of this qualitative study's findings:

Credibility: Using three different data collection methods (interviews, a survey, and a focus group) allowed for triangulation of the results. Additionally, we utilized member checking by sharing preliminary findings with participants to check the accuracy of our interpretations.

Transferability: We provided thick description of the context, participants, and findings to enable readers to evaluate the potential transferability to their settings. However, as a small sample at one institution, transferability is limited.

Dependability: We utilized code-recode strategy by coding the transcripts twice with a 1-week interval and comparing for consistency. We also maintained an audit trail detailing the data collection, analysis, and interpretation processes.

Confirmability: As researchers familiar with the graduate program context, we practiced reflexivity through reflective journaling and memoing to surface any biases or assumptions. We used direct participant quotes to ensure findings were shaped by their perspectives rather than our own.

All three data sources revealed the importance of timely, caring communication for effective instructor presence. The need for instructors to be engaged and accessible was also a consistent theme across data sources. Additionally, findings from all three sources converged around students' desire for authentic relationship-building from instructors. Participants' need for clear course structure and organization emerged in both interviews and the survey. The interview findings highlighted reducing negative emotions, which did not appear in other data.

While qualitative studies cannot demonstrate generalizability, these strategies bolster the credibility and trustworthiness of the findings within the framing of a small, exploratory study. Further research is needed to assess the transferability of these instructor presence insights to other student populations, disciplines, and institutional types.

Discussion

This qualitative study investigated effective online instructor presence through the lens of graduate students enrolled in a master's-level instructional technology program. The study's finding that instructor presence positively impacts satisfaction aligns with previous studies showing links between presence and student satisfaction (Khalid and Quick, 2016; Kyei-Blankson et al., 2016). The importance of timely communication and feedback found in this study echoes previous work identifying these as key strategies for presence (Trammell and LaForge, 2017; Van Wart et al., 2019). Additionally, participants emphasized the need for an expert instructor, which aligns with prior literature on the importance of subject matter expertise for presence (Wang and Liu, 2020).

The findings (Table 7) also provide deeper insights into instructor presence in a blended learning environment. The study also revealed new distinctions around relationship-building, emotions, and mindset as related to instructor presence, in addition to the importance of trust and establishing a positive student mindset. The participants in this study clearly desired some synchronous aspects in addition to purely asynchronous instructor presence-building. Additionally, participants identified specific pedagogical approaches like scaffolding, that add to general strategies like timely feedback.

Instructor behavior

Consistent communication = more satisfaction

Participants in the current study echoed what has been shared in the academic literature, that regular and high-quality interaction in online distance education courses (Beese, 2014). The study participants cited that effective online instructor presence entails consistent, weekly communication, either synchronously or asynchronously. As stated in the academic literature, this includes how the instructor interacts with learners throughout the course and the response from the instructor when faced with a variety of situations and circumstances (Van Wart et al., 2020). The participants articulated that especially during pinch points in the semester (e.g., the start of the course, assignment due dates, end of the course) it is crucial to have ease of instructor accessibility, prompt replies and guidance, and an instructor who listens to students.

Participants in the study clearly articulated that positive, constructive instructor communication and interactions with the instructor, are tied to their satisfaction, which is also supported by the academic literature (Akyol and Garrison, 2008; Arbaugh et al., 2008; Khalid and Quick, 2016, Um and Jang, 2021). Additionally, as found in this study, and in existing research, learners with higher satisfaction are more apt to have tenacity, perseverance, and be more invested in learning (Um and Jang, 2021).

Meaningful feedback = student growth

As shown in the current literature, the study's participants also articulated the need for quick, customized, constructive, and detailed

TABLE 7 Final themes.

Category	Themes
Instructor behavior	Consistent communication = more satisfaction Meaningful feedback = student growth
Instructor actions	Leveraging synchronous opportunities
Instructor position	Trust in the instructor Emotional/affective impact Creating a positive student mindset Establishing a pedagogical framework
Disconnected instructor presence	Stressed and unmotivated students

feedback (Richardson et al., 2016; Wang and Liu, 2020). Participants preferred constructive feedback that provided specific information on improving the quality of a submission. Several participants shared that they preferred feedback that provided an opportunity for growth. Many of the study participants also enjoyed optional synchronous online meetings that contained substantive information and stressed the importance of receiving instruction from an expert on the topic being studied in the course. Participants in the study also reported that meaningful feedback helped them engage and focus more on the course.

Instructor actions

Leveraging synchronous opportunities

The study results indicate that participants valued replicating some of the connection and visibility of face-to-face instruction in online contexts. Appreciated the ability to see and hear instructors synchronously at times, which mirrors aspects of in-person courses. Leveraging synchronous tools is a strategy online instructors can leverage to increase presence and visibility while retaining asynchronous flexibility. Synchronous spaces can enhance social presence, allow instructor personality to shine through, and provide dedicated relationship-building time apart from asynchronous content delivery.

Instructor position

Trust in the instructor

One theme realized during data analysis in the current study was the concept of trust as it relates to effective online instructor presence. Specifically, the study participants articulated that when trust in an online instructor is developed and maintained, it leads to a more effective and satisfying learning experience.

The concept of trust, as directly related to instructor presence, has received very limited attention in the academic literature. Sheridan and Kelly (2010) mention trust as an indicator of belonging and community building, Akyol and Garrison (2008) cite social presence and its role in facilitating safety and trust in communities of learning, and Shea et al. (2006) discuss trust in the process of developing a learning environment and development of trust as a component of effective learning communities.

Trust in the instructor, as a theme in the current study, as described by participants, was created when an instructor values student success and when students can develop a relationship and connection with the instructor.

Emotional/affective impact

Instructor presence has significant emotional and affective implications for students. The results of this study revealed students often feel stress, anxiety, frustration, and feeling overwhelmed in online courses with poor instructor presence. Conversely, effective instructor presence helped mitigate these negative emotional states. As complex learners, students' cognitive engagement and academic success in online courses are deeply intertwined with their emotional experiences and affective states. Instructors must be cognizant of the emotive impact their presence can have, from providing reassuring course introductions to transparent communication reducing uncertainty. While more research is needed, instructors can employ strategies like conveying empathy, checking in on student well-being, allowing revisions to reduce anxiety over perfectionism, and explicitly addressing the human need we all have for connection and relationship even in digital spaces. By proactively fostering positive emotional experiences through how presence is established, instructors can profoundly shape the learner's holistic journey beyond solely academic goals. The affective and emotional aspects of online learning deserve ongoing attention.

Establishing a positive student mindset

Participants also shared a concept that has not been extensively examined in the literature related to an effective online instructor presence: the ability to establish a positive student mindset. Participants in this study articulated a hesitancy to launch into or fully engage and commit to working in a course until they are very clear on how an instructor operates in the online course environment. Specifically, when participants felt less stress and greater comfort in a course, it was easier to establish a positive student mindset. The study participants shared several ways that an instructor could assist students with establishing a positive mindset or approach: when autonomy was extended to students, including the ability to work at a student's own pace, especially for graduate students with busy lives.

Additionally, participants articulated that the ability to establish a positive student mindset was possible when students felt the instructor valued student success and when students felt a relationship and connection with the instructor was authentic. Many of the participants agreed that it was also helpful when the instructor was perceived to be encouraging and expressed that mistakes were expected and part of the learning process.

Additionally, several participants described that it could take time to establish a positive student mindset, especially if instructors do not share facets of their style and personality. Once a positive mindset can be established, the more quickly students feel comfortable engaging and communicating inside the course and about the material.

Establishing a pedagogical framework

As articulated by participants in the current study, many factors, including different aspects of instructor presence, impact the online student experience, as detailed in the current academic literature (Farrell and Brunton, 2020). Specifically noted by study participants were factors including clearly defined objectives, well-structured modules, logical course flow, scaffolding, easy navigation, and clear expectations and instructions. In addition, participants in the study also desired consistency in modules, assignments that help students learn, meaningful content with depth and substance, and a variety of relevant, up-to-date material delivered in audio, video, text, and images. As discussed by participants, an instructor should have a mastery of technology and technology tools, as described by Singh et al. (2022).

Disconnected instructor presence

Stressed and unmotivated students

As has been cited in the academic literature, a lack of instructor presence negatively impacts students' success. An instructor who

provides little or no interaction with students also influences online course dissatisfaction (Cole et al., 2014), which can lead to retention issues (Allen and Seaman, 2013). Additional factors cited in the literature representing a disconnected instructor presence include a lack of academic community and no support available from instructors (Zembylas, 2008; Farrell and Brunton, 2020). These components foster students' decreased motivation and feelings of isolation (Zembylas, 2008; Farrell and Brunton, 2020).

As cited in the current study, participants expressed frustration and disappointment in many of the following areas: delayed feedback or missing feedback, insubstantial instruction, few expectations shared by the instructor, sub-par professor responses, little attention to detail, delays and disorganization, inability to reach instructors, and instructors using technology only for technology's sake. As a result of a disconnected or absent instructor presence, learners cited feelings of stress, feeling overwhelmed, unmotivated, and anxious. Based on feelings of feeling overwhelmed, several participants dropped out of previous online courses.

Conclusion

This qualitative study explored graduate student perspectives on effective online instructor presence within a master's program. Through interviews, a survey, and a focus group, insights emerged into behaviors, actions, and dispositions students find meaningful for presence.

Key findings indicate students value early relationship-building through consistent participation, authentic personality-sharing, and learner-centered course design. Results reveal effective instructor presence fosters trust, satisfaction, engagement, and positive mindsets while reducing negative emotions. Students preferred visible, accessible instructors who connect through prompt communication, constructive feedback, and active listening.

While limited to one context, these learner-centered insights suggest intentional instructor presence is critical in virtual classrooms and profoundly shapes holistic learner experiences. Results provide an initial framework to inform professional development and identify high-impact presence strategies tailored to graduate contexts. Further research across diverse settings would strengthen framework development.

By understanding and implementing relationship-building, participatory, responsive, learner-focused approaches students find meaningful, instructors can enhance presence to improve instructional quality, build trust and satisfaction, and empower learners. This study offers a starting point for identifying key presence-building approaches in graduate online education.

Limitations

There are several limitations to this study. First, the sample comprised graduate students from a single instructional technology program who are not representative of all online learners. Additionally, the perspectives come from students currently enrolled in online courses at one R1 university. The findings may not generalize to other graduate programs, undergraduate contexts, or two-year colleges. Further research should gather data from diverse student populations and institutions to strengthen transferability.

Additionally, this study was limited to asynchronous online courses. Comparing outcomes between asynchronous and synchronous environments could provide useful insights. The data collection methods of interviews, a survey, and one focus group, while allowing for triangulation, provide a small sample size. Expanding the sample size through quantitative analysis could reinforce the qualitative findings.

Implications for future studies

This study establishes a foundation for further inquiry into learner perspectives on effective online instructor presence. Additional research should explore presence-building from the instructor's viewpoint through interviews and observations. Comparing student and instructor interpretations could reveal disconnects to address through training.

Longitudinal data collection could provide a richer understanding of how students' preferences and needs related to online presence evolve over time. Studying presence across different graduate disciplines and course formats would highlight variations in strategies.

Finally, a large-scale quantitative analysis of the relationships between specific instructor presence-building techniques, student satisfaction, and learning outcomes would extend this exploratory study. Findings could inform comprehensive framework development to optimize online instruction across diverse contexts.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were approved by the Institutional Review Board of the University of Alabama. The research was conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in the study was provided by the participants.

Author contributions

LM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Validation, Writing – original draft, Writing – review & editing. SB: Writing – review & editing.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2023.1271245/full#supplementary-material

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Exploring undergraduates' perceptions of and engagement in an AI-enhanced online course

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In the age of globalization, an internet connection has become essential for enhancing various human activities across the economic, cultural, and defense sectors, among others. This is particularly true for online classrooms. Microsoft Teams, a widely used digital education platform, provides capabilities that allow online teachers to facilitate better interactions and create more effective learning environments in online settings. This study aimed to explore students' perceptions of synchronous online learning that occurred in an AI-enhanced online course, delivered using MS Teams. As an explorative study that examines the educational intersection of engineering and artificial intelligence, it represents the convergence of these two branches of learning and thus enriches both fields. The research involved 35 online students at the Staffordshire University, with data collected via online questionnaires to gather information about students' perceptions of online learning through Microsoft Teams. After completing the online course materials, the questionnaires were distributed to students via Google Forms. The data were then descriptively analyzed. The study's findings revealed that although online learning through Microsoft Teams was a novel experience for the students, the platform's interactive and engaging learning environment motivated them to participate more actively, ultimately leading to a better comprehension of the course materials. Incorporating AI-enhanced features within the Microsoft Teams platform further augmented the online learning experience, as students appreciated the personalized learning recommendations and real-time feedback, which showcases the synergistic potential of AI and education in the digital age.

KEYWORDS

Microsoft teams, AI classrooms, online learning, student perceptions, digital education
Microsoft teams, digital education, educational atmosphere, communication

1 Introduction

In the age of global interconnectedness, internet access has become indispensable for advancing various aspects of human life, including the economy, culture, defense, and more (Fallows, 2004). The advent of online education, characterized by digital connectivity and instructional methods, has given rise to virtual or online learning platforms (Bentley et al., 2012). These platforms offer both opportunities and challenges, and it is essential to provide a balanced perspective on the subject.

Online education has witnessed remarkable growth, with one research study (Allen and Seaman, 2017) discovering a significant increase in the number of students participating in online higher education courses. In 2016, approximately 7 million students engaged in online education, compared to 1.7 million in 2003. This demonstrates the power of technology to enrich our lives, particularly in the realm of education (Oke and Fernandes, 2020). By harnessing technological advancements, educational experiences are no longer confined to traditional classrooms but can now span vast distances.

Two studies (Dorf, 1969; Feyzi Behnagh and Yasrebi, 2020) categorize educational technologies into instructional aids, educational materials, teaching settings, and pedagogical approaches. These technologies encompass both digital and analogue tools that facilitate learning via internet access, such as textbooks, instructional guides, and various teaching resources. They also offer diverse teaching settings, accommodating a range of locations, situations, and cultural contexts. Pedagogical strategies involve the effective presentation of subject matter, including methods like repetition, cooperative learning, and skills-based instruction.

Online learning provides a flexible and engaging educational setting (Nguyen, 2015; Ferri et al., 2020). It fosters an immersive educational atmosphere and replaces in-person interactions with virtual exchanges, offering convenience and adaptability (Bakerson et al., 2015; Bower et al., 2015; Steven et al., 2018; Smith et al., 2019; Landrum et al., 2021). However, it is essential to distinguish between synchronous and asynchronous learning environments, as they require different strategies for effective multiple dimensions of engagement and collaboration.

Online education comes with its set of challenges, such as the absence of physical cues for instructors and students, potential issues with engagement, and the need for self-driven motivation (Blumenfeld, 2002; Bakerson et al., 2015; Phillips and O'Flaherty, 2019). It is crucial to address these challenges while capitalizing on the opportunities online education presents. The choice of educational technology and the quality of learning materials play a pivotal role in the success of online education (Sebastianelli et al., 2015; Pérez-Pérez et al., 2020; Hamilton, 2022).

This paper will delve into students' experience of online education delivered using Microsoft Teams, a popular communication and collaboration platform that has gained significant traction in recent years, especially in the education sector. We explore how Microsoft Teams can facilitate student engagement, interaction, and the learning environment. Additionally, we consider both the advantages and limitations of this platform in the context of online education.

Our study aims to address two key questions:

- What is the nature of students' perceptions of internet-based education using Microsoft Teams?
- What is the nature of students' interactions with the learning environment when participating in online education through Microsoft Teams?

Online education has transformed the way we learn and access educational resources. While it offers tremendous opportunities for accessibility and flexibility, it also presents challenges that must be carefully navigated. This paper will explore these facets through the lens of Microsoft Teams, shedding light on the multifaceted nature of online education.

2 Study and course background

In order to provide a comprehensive understanding of the context in which this study was conducted, this section presents a description of the online course and a discussion of the role of AI technologies in facilitating the course.

2.1 Description of the course

The course under investigation, titled "Artificial Intelligence and Chatbots," was conducted at Staffordshire University and involved a cohort of 35 students. This course aims to provide level 4 students with a deep understanding of artificial intelligence principles and practical knowledge in building chatbots using Python programming. In the United Kingdom, Level 4 is considered the first stage of higher education, also known as the "first year of the undergraduate degree." Focused on the subject area of computer programming language learning, this online synchronous course intends to equip students with a thorough understanding of computer programming language concepts and enhance their skills in this domain. The curriculum encompassed fundamental concepts such as programming language, machine learning algorithms, and natural language processing which are crucial in the development of intelligent systems and chatbot applications. The course format follows a synchronous approach, where participants attend live sessions at scheduled times. This format allows for real-time interaction with the instructor and fellow students, fostering what appears to be an engaging learning environment characterized by active participation, questions, and immediate feedback. Domain. The course structure is comprised of a combination of lectures, hands-on coding exercises, and practical assignments. Students are encouraged to apply the theoretical knowledge gained during lectures to practical scenarios, allowing them to develop their computer programming language skills through real- world examples and projects.

To facilitate effective online learning, the course is delivered via Microsoft Teams, a digital education platform known for its interactive features and capabilities. Microsoft Teams provides a virtual classroom environment where students can engage in live class dynamics, fostering active participation and collaboration among the participants. By leveraging the interactive features of Microsoft Teams, the course appeared to encourage such a dynamic learning environment. Students had the opportunity to engage in real-time discussions, ask questions, and receive immediate feedback from both their peers and the instructor. As reported elsewhere, the platform facilitates seamless communication and enhanced student-teacher interactions, fostering a sense of community and active multiple dimensions of engagement within the virtual classroom (Aguilar and Torres, 2021; Kahu et al., 2022).

2.2 Role of artificial intelligence in the course

Artificial intelligence (AI) played a significant role in the "Artificial Intelligence and Chatbots" course at Staffordshire University, particularly in the context of aiding online learning. One of the

primary roles of AI in the course was to facilitate effective online communication and collaboration. Microsoft.

Teams leveraged AI-powered chatbots and natural language processing capabilities to enable real-time discussions among students and the instructor. Chatbots assisted in answering frequently asked questions, providing immediate feedback, and supporting students in navigating the course content. These AI features promoted active participation and multiple dimensions of engagement, ensuring that students had access to timely and relevant information (Lee et al., 2022; Bakare and Jatto, 2023). Additionally, AI-powered features within Microsoft Teams supported personalized learning experiences. The platform utilized AI algorithms to analyze students' interactions, preferences, and learning patterns, enabling the provision of tailored recommendations and resources. By understanding individual students' needs, it could suggest supplementary materials, practice exercises, or related resources to enhance their understanding of programming language concepts and chatbot development (Tran, 2021; Rajaram et al., 2022).

The role of Microsoft Teams, with its AI-powered features, went beyond simply providing a virtual classroom environment. It actively contributed to creating a collaborative and engaging learning ecosystem, where students could leverage AI capabilities to deepen their understanding of artificial intelligence and chatbot development. Students had access to personalized support, interactive discussions, and automated assessments, all of which enriched their learning experiences and facilitated their mastery of computer programming language concepts. In some ways, AI appeared to take on the supportive role of a tutor/instructor thus enhancing students' perceptions of the "real" instructor's sense of presence.

3 Methods

The aim of this study was to investigate the perceptions of undergraduate students regarding synchronous online learning conducted through Microsoft Teams. The research utilized a survey-based method to collect data from 35 online students who participated in an "Artificial Intelligence and Chatbots" course delivered via Microsoft Teams. The questionnaire was distributed to students after they completed the course, and the data were analyzed descriptively. The study aimed to explore students' perceptions of online learning and how these factors influenced their active participation and comprehension of the course materials. By examining students' perceptions and interactions with online learning through Microsoft Teams, this study aims to provide insights into the effectiveness of the platform in fostering collaboration, communication, and student engagement within the virtual classroom environment. Ethical approval for this study was obtained from the relevant sections at Staffordshire University before data collection commenced. The research procedures adhered to the ethical guidelines and principles for conducting research involving human participants, ensuring their confidentiality, privacy, and informed consent.

Data were collected using Google Forms, via an anonymous link to encourage open and honest responses. Participants did not receive any incentives or rewards for completing the survey. By ensuring the anonymity of the survey and not providing any incentives, we aimed to minimize any potential bias and encourage genuine responses from the participants. We prioritized the ethical considerations of the study and aimed to maintain the integrity of the data collected.

3.1 Participants

The present study included a total of 35 undergraduate scholars at Staffordshire who were actively pursuing their bachelor's degrees. Among these participants, there were 27 males and 8 females enrolled in the course.

3.2 Instrument

The questionnaire was developed based on perception theories that were taken from the literature (Fortune et al., 2011; Gray and DiLoreto, 2016; Alnusairat et al., 2021; Rajabalee and Santally, 2021; Tsai et al., 2021). It was piloted to analyze internal consistency and reliability. Reliability was evaluated using Cronbach's alpha, and validity was evaluated using the Pearson correlation method. The questionnaire aimed to examine two primary aspects of students' perceptions: *Student engagement in virtual education* and *the educational atmosphere for students engaged in digital education*. Questions first were asked about the demographics of the students, including their age and gender. The survey then contained two sections, each of which had seven questions presented as affirmative statements to be rated on a five point-Likert scale ('Strongly Disagree,' 'Disagree,' 'No idea,' 'Agree,' and 'Strongly Agree'). The first set of seven questions/statements measured the students' perceptions of their engagement in the virtual course. Specifically, the questions related to: student interaction with teachers, comfort in expressing issues with online learning, digital education and virtual lessons generally, miscommunication, engagement among students, and navigating challenges in the virtual environment. The second set of seven questions/statements measured students' perceptions of the educational atmosphere. Specifically, the questions related to: students' comprehension of course content, the stimulating nature of the virtual classroom, the atmosphere of digital education generally, their comfort in answering questions, impact of the atmosphere on their education and educational requirements, and the conduciveness of the learning setting. The complete instrument is presented in Appendix A.

Below, we discuss the types of validity assessed and the steps taken to develop and validate the questionnaire.

- Content Validity: Content validity refers to the extent to which the items in a questionnaire represent the entire construct or phenomenon being measured. In the development of the questionnaire, the researchers conducted an extensive literature review to identify relevant theories and concepts related to online learning, student engagement, and the educational atmosphere. This literature review helped ensure that the questionnaire's items were comprehensive and covered all the relevant dimensions of students' perceptions of online learning through Microsoft Teams.
- Face Validity: Face validity refers to the extent to which the questionnaire appears to measure what it intends to measure. Before administering the questionnaire to the target sample, a pilot test was conducted among a group of 20 students with characteristics similar to the participants. The purpose of the pilot

test was to assess whether the questionnaire items were clear, understandable, and relevant to the participants. Based on the feedback received during the pilot test, minor adjustments were made to the wording of some items to improve clarity and face validity.

- Construct Validity: Construct validity refers to the degree to which the questionnaire accurately measures the underlying constructs or variables of interest. In this study, construct validity was assessed by examining the relationships between the questionnaire items and the theoretical constructs they were supposed to measure. For example, items related to student engagement were expected to have positive correlations with each other, while items related to challenges in online communication were expected to have negative correlations with items related to the ease of communication. By conducting statistical analyses, such as correlation tests, the researchers were able to assess the construct validity of the questionnaire.
- Criterion-Related Validity: Criterion-related validity refers to the extent to which the scores obtained from the questionnaire can predict or relate to external criteria or outcomes. In this study, the researchers did not explicitly mention the use of external criteria to assess criterion-related validity. However, future research could consider comparing students' questionnaire responses with other measures of their academic performance or engagement to assess the extent to which the questionnaire's scores align with external criteria.
- Reliability: Reliability refers to the consistency and stability of the questionnaire's measurements. The researchers assessed reliability using Cronbach's alpha, which measures the internal consistency of the questionnaire items. A high Cronbach's alpha value indicates that the items in the questionnaire are closely related and measure the same construct. The pilot test conducted before the main study helped ensure the reliability of the questionnaire, as it allowed the researchers to identify and address any issues with item clarity or consistency.

Table 1 presents the results of the assessment and reliability of the 14 questions on the questionnaire.

By following these steps, the researchers ensured that the data collected through the questionnaire were accurate and representative of students' perceptions of their online learning experiences through Microsoft Teams.

TABLE 1 Assessing reliability and validity.

Survey questions	r value	Sig	r table	Result
1	0,720	0,000	0,363	Valid
2	0,842	0,000	0,363	Valid
3	0,883	0,000	0,363	Valid
4	0,433	0,022	0,363	Valid
5	0,744	0,000	0,363	Valid
6	0,804	0,000	0,363	Valid
7	0,535	0,005	0,363	Valid
8	0,753	0,000	0,363	Valid
9	0,866	0,000	0,363	Valid
10	0,716	0,000	0,363	Valid
11	0,807	0,000	0,363	Valid
12	0,575	0,003	0,363	Valid
13	0,778	0,000	0,363	Valid
14	0,777	0,000	0,363	Valid
Cronbach's Alpha		Critical point		Result
0,945		0,71		Reliable

3.3 Procedures

A pilot test was conducted among a group of 20 students who shared the same characteristics as the target sample. The purpose was to preliminarily test the hypotheses, which led to testing more precise hypotheses in the main study. The results from this pilot indicated acceptable internal consistency and reliability of the test.

Following the pilot phase, the survey was administered to study participants toward the end of their experience in the course, "Artificial Intelligence and Chatbots." In addition to answering demographic questions, the 35 students were also asked to provide their opinions and perspectives on their digital educational learning experience in this comprehensive synchronous course through a set of 14 additional questions.

4 Results and recommendations for instructors

The examination of the students' responses to the questionnaire resulted in the following findings and data regarding (1) their perceptions of engagement in virtual education and (2) the educational atmosphere itself. Despite the absence of any notable significance, these results are useful in that they can point readers to expanded research opportunities regarding these two critical dimensions of online education.

Table 2 presents a frequency table of students' responses to the first seven questions related to engagement, which also are illustrated in Figure 1.

The results presented in Table 2 and Figure 1 indicate that students in this study generally had positive perceptions of their engagement in virtual education. In support of that general observation, here are the responses from the student participants to each of the first seven questions.

Survey question 1: *Virtual learning increased student interaction with teachers*. Out of 35 students, 9 indicated strongly agree, 14

TABLE 2 Frequency table for student engagement in virtual education.

No	Score	Criteria	Frequency						
			1	2	3	4	5	6	7
1	5	strongly agree	9	4	2	5	3	5	7
2	4	agree	14	6	14	11	22	7	11
3	3	neutral	3	7	2	3	1	7	5
4	2	disagree	8	16	8	13	3	13	10
5	1	strongly disagree	1	2	9	3	6	3	2
Total			35	35	35	35	35	35	35

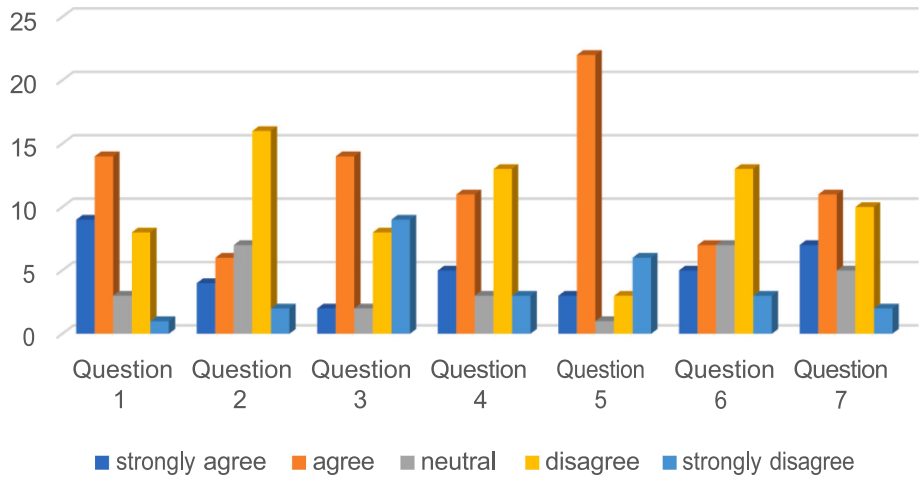

FIGURE 1
These data highlight the students' perceptions of engagement about different aspects of student engagement such as communication interactions with teachers and with other students. The figure displays the number of students who chose each option for each question. Responses were rated on a five-point Likert scale from strongly agree to strongly disagree. The figure displays the number of students who chose each option for each question.

expressed agree, 8 communicated disagreement, and 1 stated strongly disagree with the statement. These results suggest that considerably more than half the students experienced an increase in interactions with their instructors, despite what may be infrequent in-person interactions between students and instructors. Instructors using virtual learning platforms are well advised to keep in mind the importance of interactions as a means of establishing a sense of connection with all their virtual students.

Survey question 2: *It is more comfortable to express issues with online learning to the lecturers than in person*. Regarding this statement, 10 of 35 students indicated agree or strongly agree and 18 out of 35 students disagreed or strongly disagreed. These results suggest the majority of students may feel uncomfortable expressing issues with online learning to their teachers in digital learning environments, indicating a need for instructors to encourage students to express such issues more openly.

Survey question 3: *Digital education simplifies communication with instructors*. In response to this statement, out of 35 students, 2 indicated agree, 14 expressed strongly agree, 8 communicated disagreement, and 9 stated strongly disagree. These mixed results suggest there is much room for improvement in the digital education student experience and point to a need for further investigation into the obstacles to instructor student communication. As such investigation proceeds, instructors should continue to foster connections between students and instructors for effective knowledge transfer to occur.

Survey question 4: *Virtual lessons simplify student communication*. Out of 35 students, 5 indicated strongly agree, 11 expressed agree, 13 communicated disagreement, and 3 stated strongly disagree with the statement. Results from this question also show a dichotomy pointing to evidence that digital classes may pose communication challenges to student-to-student interactions for some students. Focusing on the those that disagreed or strongly disagreed, suggests that online instructors should pursue various approaches to virtual lessons and methods of interaction to simplify student communication.

Survey question 5: *The frequent occurrence of miscommunication in online courses between lecturers and students*. Out of 35 students, 3 indicated strongly agree, 22 expressed agree, 3 communicated disagreement, and 6 stated strongly disagree with the statement. These results indicate that a majority of students perceive miscommunication between lecturers and students, which is a serious concern for instructors. Given that this course mostly utilizes digital means of communication, more attention should be focused on the communication dimension of instructor communication competence and how that can be enhanced in digital learning environments.

Survey question 6: *In virtual classrooms, student engagement with one another intensifies*. Out of 35 students, 5 indicated strongly agree, 7 expressed agreement, 13 communicated disagreement, and 3 stated strongly disagree with the statement. These results suggest that virtual classrooms elicit a variety of opinions on student engagement with one another. Students may be unfamiliar or uncomfortable establishing interpersonal relationships in this context, such that instructors should consider including more interpersonal and group activities in their online courses.

Survey question 7: *In digital education, navigating challenges among students can become more manageable, such as when working on collaborative assignments*. Out of 35 students, 7 indicated strongly agree, 11 expressed agree, 10 communicated disagreement, and 2 stated strongly disagree with the statement. These results suggest the majority of students find collaborative assignments in digital education manageable. To address those who perceived navigational challenges among students, instructors need to clearly signal expectations for group interaction and engagement with one another.

Table 3 presents a frequency table of students' responses to the second set of seven questions, which are illustrated in Figure 2.

Survey question 8: *An online classroom setting facilitates comprehension of course content for me*. Out of 35 students, 7 indicated strongly agree, 9 agree, 11 communicated disagreement, and 1 stated strongly disagree. While these results indicate that more students agreed with this statement than disagreed, some students did report struggling with comprehending content in the digital setting, perhaps due to unfamiliarity with the technology. Identifying and addressing

the challenges students may face with comprehension is a matter of importance for online instructors.

Survey question 9: *The stimulating nature of the virtual classroom encourages my active engagement and comprehension of the content*. Of the 35 students surveyed, 7 agreed with this statement, 15 strongly agreed, 6 disagreed, and 1 strongly disagreed. These results demonstrate that substantially more than half of the respondents held a positive perception of the stimulating nature of the online educational atmosphere. The positive perception may be attributed to appealing resources, captivating visual aids, and enjoyable group exercises within the online framework. Instructors are advised to maximize their use of such resources.

Survey question 10: *The online learning atmosphere encourages me to pursue digital education*. In response to this statement, out of 35 students, 4 expressed strong agreement, 11 agreed, 7 disagreed, and 1 strongly agreed. The result that 12 students chose a neutral response suggests that students may think they have insufficient experience to think about digital education futuristically. However, of those who did respond, more reported positively than negatively about pursuing more digital education. This finding bodes well for instructors interested in this educational context.

Survey question 11: *I feel comfortable answering questions in an online learning environment as an AI student*. Only 4 students strongly agreed with this statement but 15 agreed. Of the 35 students, 5 disagreed and 1 strongly disagreed. These results indicate that a majority of the students have a sense of comfort when responding to questions in the digital education environment. This finding may encourage instructors to pose more questions to students in any online course, but instructors should carefully consider whether the course is being delivered synchronously or asynchronously.

Survey question 12: *The online learning atmosphere significantly impacts my education*. This statement received mixed responses, with 13 out of 35 participants indicating neutrality and a nearly equal balance between agreement and disagreement. Strong agreement was expressed by 5 students, agreement by 5 students, 10 disagreed, and 2 strongly disagreed. These results suggest that the impact of the online learning atmosphere on education is highly variable among the students. The rapid rise of online learning may account for any clear sentiment related to impact, which reinforces the need to examine instructors' communication in online classes to enhance students' perceptions of the online learning atmosphere.

Survey question 13: *Online courses provide a conducive learning atmosphere that caters to my educational requirements*. This statement elicited 5 strongly agreed responses from students and 10 agreed responses. Disagreement was expressed by 9 students and strong disagreement by 2 students who may favor the direct inquiries and immediate assistance present in traditional settings. The number of positive responses shows more than half the students are supportive of online instruction and instructor's work. However, further investigation is warranted to uncover areas of online learning that do not cater to students' educational requirements.

TABLE 3 Frequency table for educational atmosphere in digital education.

No	Score	Criteria	Frequency						
			8	9	10	11	12	13	14
1	5	strongly agree	7	7	4	4	5	5	6
2	4	agree	9	15	11	15	5	10	7
3	3	neutral	7	6	12	10	13	9	11
4	2	disagree	11	6	7	5	10	9	10
5	1	strongly disagree	1	1	1	1	2	2	1
Total			35	35	35	35	35	35	35

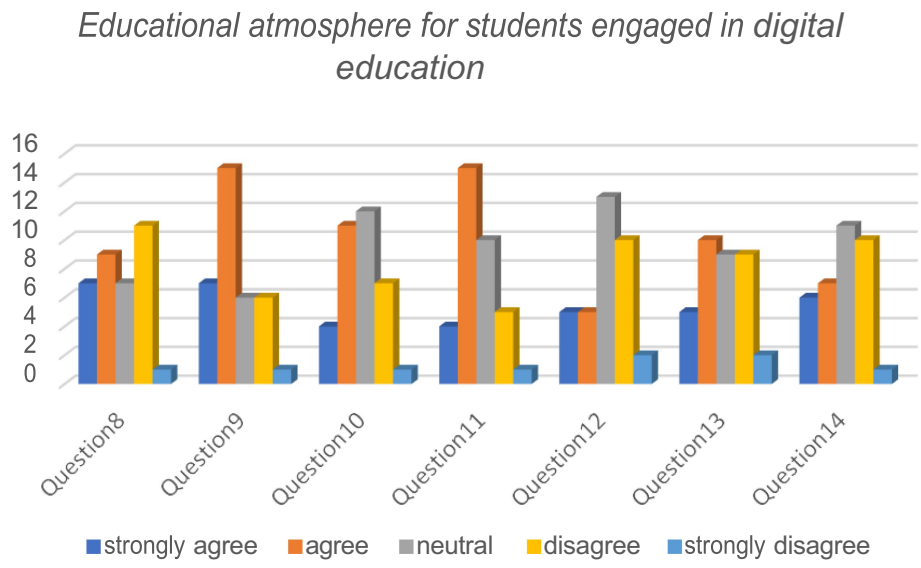

FIGURE 2
These data summarize students' perceptions of the educational atmosphere related to comprehension of course content. The survey asked seven questions about different aspects of the educational atmosphere, such as comprehension, engagement, influence, and comfort. The responses were rated on a five-point Likert scale from strongly agree to strongly disagree. The figure displays the number of students who chose each option for each question.

TABLE 4 Recommendations for instructors related to student engagement in virtual education and students' perceptions of educational atmosphere in digital education.

Categories	Question	Recommendations for instructors
student engagement in virtual education	1	Emphasize interaction to maintain a sense of connection with all virtual students.
	2	Encourage students to express issues with online learning openly.
	3	Foster instructor student communication and connections between students and instructors.
	4	Attend to challenges to student communication and approaches to virtual lessons that simplify student communication.
	5	Avoid miscommunication and pay attention to the communication dimension of instructor communication competence
	6	Include more interpersonal and group activities in online courses.
	7	Provide clear expectations for group interaction and student engagement with one another, their peers on social platforms.
The educational atmosphere for students engaged in digital education	8	Identify and address the challenges students may face with comprehension of content in online courses.
	9	Support a stimulating online educational atmosphere by using appealing resources, captivating visual aids, and enjoyable group exercises.
	10	Encourage students to pursue digital education, by enhancing the online learning atmosphere.
	11	Pose more questions to students in any online course.
	12	Communicate effectively in online classes to enhance students' perceptions of the online learning atmosphere.
	13	Continue to provide an online learning atmosphere that is conducive to students' accomplishment of their educational requirements.
	14	Continue to implement virtual education in the future, with a focus on a conducive learning setting.

Survey question 14: *It is advised to consider implementing virtual education moving forward, given its conducive learning setting.* Out of 35 students, 6 indicated strong agreement, 6 agreed, 10 disagreed, 1 strongly disagreed, and 11 expressed a neutral stance. The 11 students who disagreed (or strongly disagreed) may prefer in-person instruction where they can receive immediate evaluation from the instructor within the physical classroom. Given the nearly equal balance of positive and negative responses to this statement, instructors should cautiously move forward with virtual education efforts, while keeping in mind the results of this and other relevant research studies.

Table 4 presents a summary of the recommendations for online instructors derived from the students' responses to the 14 questions on this study's questionnaire.

5 Summative discussion of results

The summarized findings related to students' perceptions of their engagement in virtual education and the educational atmosphere in digital education suggest that such teaching and learning environments can indeed foster educational growth, to some extent (Ovbiagbonhia et al., 2019). In agreement with this notion, two other studies (Radovan and Makovec, 2015; Ameiratrini and Kurniawan, 2021) assert that a conducive learning setting is a vital component in stimulating students' eagerness to learn. Therefore, as the results of this study indicate, it is imperative to establish an inspiring and motivational learning space, which ultimately will enhance students' educational experience with learning virtually/digitally.

Managing student engagement within a virtual educational setting is crucial for fostering success in online learning. As such, interactions among students and between students and instructors must be promoted to enhance communication and dialog during each instructional activity. Two studies (Lin and Lin, 2015; Contreras et al., 2022) endorse this notion, emphasizing the importance of fostering both student–student and teacher- student interactions.

Other studies also (Peterson et al., 2018; Martin and Tapp, 2019; Roque-Hernández et al., 2021) and (Sayeg-Sánchez et al., 2022) found that the use of real-time learning methods has improved student engagement and collaborative education, allowing for more comprehensive access to learning materials. However, the current findings also indicate that 46% of students do not believe online lectures effectively facilitate interaction and collaboration. To address this limitation of real-time learning, educators should incorporate engaging activities and approachable tasks to encourage active participation and collaboration in online learning environments.

Yet more studies (Poston et al., 2020; Yang et al., 2022) and (Kerkstra et al., 2022) suggest that the use of Microsoft Teams is particularly advantageous in smaller class sizes, enabling students to work together on collaborative projects using PowerPoint. Educators must ensure that students have a solid grasp of how to utilize Teams for online courses (Silva et al., 2022). Students in this study reported feeling at ease when responding to questions and collaborating on assignments, thanks to engaging content. In this present study, students' active involvement in learning AI and programming online was fueled by the novelty and challenge of the subject matter.

The study observed that the use of the Microsoft Teams platform positively influenced student engagement, interaction, and overall learning experience in the online course. The platform's distinctive capabilities, such as real-time video conferencing, chat functionality, and document collaboration, facilitated active participation and meaningful communication among students, contributing to a more effective learning environment.

6 Limitations, conclusion, and recommendations

The authors acknowledge the limitations of their current study and propose ways to strengthen the research by involving a larger and more diverse sample, conducting replicative studies in other disciplines,

employing statistical significance tests, and integrating qualitative methods and data. In addition, future studies should consider rewording several questions to avoid "leading" students' responses and to ensure that the results indicate more clearly whether the impact is "negative" or "positive." The authors also want to emphasize the exploratory nature of their research and suggest that future studies should aim to replicate but also extend this present study to establish broader trends and patterns. For example, in this study the role of artificial intelligence and chatbots in the course was likely an influencing factor on students' perceptions that was not explored as such here. Given increased interest in AI in higher education, AI's influence on online communication and collaboration is an avenue ripe for investigation. By adopting these recommendations, the study's findings can become more useful and applicable, providing valuable insights into students' perceptions and engagement in AI-enhanced online courses delivered using Microsoft Teams.

Although the study sample size was small, it nonetheless provided further insight into students' views on digital education. Upcoming studies should delve deeper into the significance of student engagement and the role of the virtual learning space in e-learning. Further inquiries might extend the student population to encompass a wider range of academic disciplines and educational levels. Prospective qualitative investigations could emphasize students' perspectives, attitudes, and satisfaction regarding virtual classes, as well as the advantages of engaging in digital education through Microsoft Teams. Examining student interactions and the educational setting is also recommended to determine the effects on students' success in virtual learning environments. Overall, results from this study support the use of virtual classrooms and provide further evidence that using Microsoft Teams can effectively enhance the educational atmosphere for students and foster communication among peers and between students and instructors.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

Ethical approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Author contributions

All authors contributed equally to this work. They were involved in the conception and design of the study, data collection, analysis, and interpretation of the results. They collaborated closely in drafting and revising the manuscript, providing critical intellectual content, and ensuring its accuracy and scientific rigor. Additionally, all authors approved the final version of the manuscript for publication and agreed to be accountable for all aspects of the work. The collective efforts and contributions of all authors were essential in carrying out this research and producing the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix A

Dear Learner,

This questionnaire, which is composed of two parts, aims to examine AI learners' perceptions of online learning. The information will be kept confidential and will be used just for research purposes. Thank you very much in advance for your time and cooperation.

PART A: Personal data.
Age:
Gender: female ☐ male ☐.

PART B. Please read each statement and tick the response that best describes your perception for online learning as an AI student:
1 = Strongly Disagree.
2 = Disagree.
3 = No idea.
4 = Agree.
5 = Strongly Agree.

Categories	Question		1	2	3	4	5
Student engagement in virtual education	1	Virtual learning increased student interaction with teachers					
	2	It is more comfortable to express issues with online learning to the lecturers than in person.					
	3	Digital education simplifies communication with instructors.					
	4	Virtual lessons simplify student communication.					
	5	The frequent occurrence of miscommunication in online courses between lecturers and students.					
	6	In virtual classrooms, student engagement with one another intensifies.					
	7	In digital education, navigating challenges among learners can become more manageable, such as when working on collaborative assignments.					
The educational atmosphere for students engaged in digital education	8	An online classroom setting facilitates comprehension of course content for me.					
	9	The stimulating nature of the virtual classroom encourages my active engagement and comprehension of the content.					
	10	The online learning atmosphere encourages me to pursue digital education.					
	11	I feel comfortable answering questions in an online learning environment as an AI student.					
	12	The online learning atmosphere significantly impacts my education.					
	13	Online courses provide a conducive learning atmosphere that caters to my educational requirements					
	14	It is advised to consider implementing virtual education moving forward, given its conducive learning setting.					

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Towards a comprehensive framework of social presence for online, hybrid, and blended learning

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Social presence, which refers to the psychological phenomenon of perceiving other persons in technology mediated communication as "real" and with whom one can connect, has gained an increasing interest by teachers and researchers involved in designing online, hybrid, and blended learning environments, particularly group learning settings known as computer-supported collaborative learning (CSCL). While some scholars attribute social presence primarily to the physical attributes of communication media, others emphasize the importance of social contextual and individual factors. Despite considering these factors, they still cannot fully explain the varying degrees of social presence experienced across different communication and collaboration modes and modalities. Consequently, there is a need for a more comprehensive theoretical account on the antecedents of social presence. In this article we propose such an account that integrates the social information processing (SIP) theory, construal level theory (CLT), and telepresence theory into one social presence framework. In line with CLT, we propose that social presence is also influenced by the impressions (construals) we construct from other persons not only through the accumulation of messages over time but also through the psychological distance we feel to those persons, which may be imposed by features of the communication media or realities of the learning context. Further, in line with telepresence theory, we propose that social presence is influenced by the sense of being "present" in the remote physical or virtual place, as this is where other salient persons "are." This comprehensive theoretical framework allows us to understand varying degrees of social presence while in (pseudo) real-time and asynchronous communication and collaboration using a variety of different communication media ranging from text-based (e.g., e-mail, instant text messaging) to immersive (e.g., 3D computer generated; a physical remote place).

KEYWORDS

social presence, social information processing (SIP) theory, impression formation, construal level theory (CLT), telepresence, online learning (CSCL), hybrid learning, blended learning

1 Introduction

Online, hybrid, and blended forms of learning have become common additions to higher education programs. The recent covid-19 pandemic that compelled educational institutions to abruptly adopt online learning showed, however, that social isolation is a particular concern in online learning as it negatively affects well-being of students (Arslan, 2021; Aldosari et al., 2022). Social presence of teachers and peers may reduce feelings of social isolation and loneliness (Hung-Yuan et al., 2017; Phirangee and Malec, 2017). However, social presence also renders concrete benefits for group learning; for example, comparing notes and correcting misunderstandings as well as it helps building trust and communities of learners (Hostetter, 2013; Richardson et al., 2017; Poth, 2018; Lim, 2023). It is therefore that social presence has gained an increasing interest by teachers and researchers involved in designing online, hybrid, and blended learning environments, particularly group learning settings known as computer-supported collaborative learning (CSCL). CSCL refers to the instructional situation where students are grouped together to work collectively on a joint task using computer applications as mindtools for knowledge construction and meaning making in order to attain certain learning and social outcomes that benefit both individual members and the group as a whole. Especially in online CSCL, the only way to communicate and collaborate is through computers connected to the internet, which allows for both (pseudo) real-time and asynchronous communication; the latter being the usual mode for CSCL. If the social presence is low in the online group learning processes, then this will adversely affect the transactivity and epistemic interaction (Weinberger, 2003; Weinberger and Fischer, 2006) underlying collaborative knowledge construction. Therefore, comprehending the concept of social presence and identifying the factors that influence it is crucial for effectively harnessing the online group learning processes for attaining desired positive learning and social outcomes. In this article, we focus on the first (i.e., the concept of social presence and its antecedents) and not so on the latter (i.e., how social presence affects learning processes and outcomes); see for this, for example, Hostetter (2013), Zhao et al. (2014), Koutromanos et al. (2021), and Kreijns et al. (2023). Though, group learning (i.e., blended, hybrid, and online CSCL) is the backdrop from which we view social presence.

We use the following definition of social presence: "the psychological phenomenon in which, to a certain extent, the other persons are perceived as physical "real" persons in technology-mediated communication" (Kreijns et al., 2022, p. 141). In this definition, the term physical "real" does not refer to the literal reality of other persons as is the case in face-to-face settings. Instead, it refers to the extent to which a person feels the presence of these other people and is subsequently ready to interact with them because they *seem* to be real in many aspects. As a result, the person feels connected to and influenced by them. Although the definition employs the plural form "other persons," it should be understood as denoting the overall sense of collective social presence, encompassing the combined individual social presences of all others involved. Within a group learning context, certain members might exhibit more pronounced social presence compared to others, while some might exhibit no social presence due to, for example, non-participation.

Social presence is a concept devised by Short et al. (1976) to study the effects of real-time business communication on building interpersonal relationships to facilitate interpersonal interaction and decision making. Short et al. (1976) defined social presence as "degree of salience of the other person in the interaction," (p. 65). In their definition, they refer with the term "salience" to the physical "realness" of the other person; see, for example, on p. 73 they stated that social presence is invariant across communication behaviors when using a specific communication medium like a telephone: the "degree to which he is perceived as a "real person"—the Social Presence afforded by the telephone—will be the same." Short et al. (1976) even expressed this physical "realness" much stronger in the Preface of their book: "[i]t is within the scope of foreseeable technology to reconstitute by electronic means a virtual three-dimensional representation of an individual who is hundreds of miles distant" (p. v). In their view, this three-dimensional representation – which, by the way, is a reality today; see, for example, ARHT Media's Virtual Global Stage (ARHT, 2023) – was considered the utmost expression of fidelity to the "realness" of the other person. Hence, note that Short et al. (1976) clearly saw media attributes solely determining social presence. Note also that Short et al. (1976) statements mean that social presence can only be fully experienced while in real-time communication and this experience ceases once communication concludes. Note further that in their definition, the singular form "the other person" is employed, which implies that only two people are involved in the communication. However, Short et al. (1976) also applied their definition to situations involving multiple people, such as audio and videoconferencing. In these situations, they were actually referring to an overall sense of social presence rather than to individual social presence feelings.

While some scholars attribute social presence primarily to the physical attributes of communication media as Short et al. (1976) did, others emphasize the importance of social contextual and individual factors in its determination (Gunawardena, 1995; Tu and McIsaac, 2002; Kim et al., 2011). Even though these factors are taken into account, they still cannot fully explain the varying degrees of social presence in different communication situations. Consequently, there is a need for a more comprehensive theoretical account of the antecedents of social presence.

While indeed previously the former factors could describe and predict degrees of social presence perceptions in traditional communication situations using text-based media (e.g., e-mail, wikis, discussion fora, SMS) that were dominant in online education during the early years of online communication, in recent times, there has been a significant expansion in the variety of communication media available, and this trend is expected to continue in the coming years enabling non-traditional communication settings. One notable development is the emergence of Metaverse, a platform developed and promoted by Meta (formerly Facebook) that enables communication in computer-generated 3D virtual spaces where users (i.e., students) are represented by avatars. These avatars can take on diverse forms, ranging from abstract representations like cartoons to highly realistic human-like appearances. As the Metaverse – or any other similar platform – gain prominence in facilitating collaboration and communication among students, it raises questions about how social presence will be perceived in environments where students interact through avatars. Furthermore, the immersive nature of these 3D environments is likely to evoke feelings of being present in these environments, potentially influencing perceptions of telepresence.

Another significant difference in the current setup of online learning compared to the past is the prevalence of geographically

dispersed students in present-day online and hybrid learning settings. Students may come from various parts of the world but study at the same higher education institution. Consequently, they may be complete strangers to one another and differ in multiple aspects, including language and cultural background. When such diverse students are required to collaborate in online computer-supported collaborative learning (CSCL) settings, these differences may play a role in shaping how they experience the social presence of their peers. Thus, how will social presence differ between students residing in a distinct continent with a completely different time zone, as opposed to students living in the same country, possibly even within the same city?

To address the above issues, we developed a comprehensive framework of social presence by integrating (1) social information processing (SIP) theory – which focuses on impression management and impression formation in online communication (Walther, 1992, 1993, 1996), (2) construal level theory (CLT) – which centers on psychological distance and construal levels of objects, events, or people in terms of whether they are concrete versus abstract (Trope et al., 2007; Trope and Liberman, 2010), and (3) telepresence theory (Steuer, 1992; Draper et al., 1998; Waterworth et al., 2015). Note that while we linked these three theories to social presence in online, hybrid, and blended learning, it is surprising that the majority of the research related to them seldom takes these educational contexts such as group learning into account.

We recognize that individuating impressions of others is adding to feelings of social presence as hinted by Short et al. (1976, Chapter 6) when discussing the influence of "getting to know someone" and friendships on social presence. To solidify this recognition of the role of "getting to know someone" – or more precisely, the individuating impressions we construct of others – on feelings of social presence, we adopted Walther's (1992) media theory of social information processing (SIP) theory as it explains how individuating impressions develop in various communication media and relate it to our perspective of social presence theory. Another theory that considers individuating impressions is construal level theory (CLT), put forward by Trope et al. (2007) and Trope and Liberman (2010). In essence, this theory establishes a connection between psychological distance and the construal levels at which objects, events, or people are perceived. Trope and Liberman (2010) defined psychological distance as the "subjective experience that something [i.e., an object, event, or someone] is close or far away from the self, here, and now" (p. 440) whereas a construal refers to the mental representation of these objects, events, or people, which can span a continuum from being very concrete to highly abstract. An analogy of this basic proposition of CLT can be found in the adage of seeing the forest for the trees, which occurs as we increase our distance from it. Conversely, as we approach the forest, we can increasingly make out individual trees and no longer attend to the forest itself but its individual constituents. In the context of psychological and interpersonal perceptions, the mental representation pertains to salient impressions of others, which can be more or less specific and distinguishing. Thus, CLT is addressing the issue mentioned above where we see a diversity of students involved in online education, which can vary significantly in psychological distance between them because they are all geographically dispersed and communicate and collaborate mostly asynchronously. It is important to note that CLT is not a media theory; it only states that psychological distance affects construal levels and vice versa, which may have consequences for how people react, behave, or draw conclusions. But it is the combination of effects that SIP theory and CLT have on impression formation in fully online, hybrid, and blended settings that makes both theories interesting for our social presence framework.

In the above, we already mentioned Metaverse as an example for evoking feelings of being present in these environments and questioned how this feeling connects to perceptions of social presence. To explain such feelings of being immersed in a distant place, an appropriate approach can be found in telepresence theory, which is another media theory (Kim and Biocca, 1997). Telepresence theory has a long history and was originally developed in the domain of teleoperations in remote locations (Sheriden, 1992; Steuer, 1992; Draper et al., 1998; Waterworth et al., 2015) but is now entering the center of attention because of computer-generated 3D virtual environments. Telepresence is the psychological phenomenon in which, to a certain extent, in mediated communication one perceives being "present" in another place, which can be mentally constructed, a physical remote place mediated by a computer, or a computer-generated 3D virtual environment. In other words, it is the level of illusion of being "there" in the other place (Heeter, 1992; Suh and Chang, 2006). Indeed, "[t]elepresence research […] often concerns how to understand why we have a feeling of being there, in a virtual place, and how to measure this experience" (Tjotsheim and Waterworth, 2022, p. 2). Succinctly, our interest in telepresence theory stemmed from the fact that nowadays, virtual reality spaces, such as the mentioned Metaverse (see Mystakidis, 2022), 3D platforms used for serious gaming (see Hämäläinen and Oksanen, 2014) and augmented reality (promoted by Apple with their recent introduction of its goggles Apple vision pro) (see Cowen, 2023) have experienced significant growth of its application in the educational domain. These developments point to the emergence of immersive communication methods as a compelling alternative to traditional video and audio-based communication. Such environments have specific potentials for learning; for example, through making phenomena like conductance of heat or electricity visible or allowing for simulating physical space between learning partners, and will be integrated in the next generation of learning environments.

To introduce this comprehensive framework of social presence, this article will first review the different distinct perspectives of social presence that were developed by educational researchers for online learning settings, predominantly those where students learn in groups using computer-mediated communication (CMC) tools and electronic platforms (thus, within the online CSCL context). We continue by, respectively, describing Walther's (1992, 1993, 1996) SIP theory, Trope and Liberman's (2010) construal level theory, and telepresence theory in more detail. Hereafter, we present the comprehensive framework of social presence by integrating all these theories. This is followed by a discussion and conclusion.

2 Comprehensive framework of social presence

Current research about social presence is troubled as there are many different perspectives and interpretations of what social presence is and how it should be measured, making it difficult, sometimes even impossible, comparing results and drawing general conclusions (Lowenthal, 2010; Lowenthal and Snelson, 2017; Öztok

and Kehrwald, 2017; Weidlich and Bastiaens, 2017; Kreijns et al., 2022). To improve on this situation, Kreijns et al. (2022) provided a review of the many social presence conceptualizations and measurements available in the literature. They found that, aside from a variety of quite distinct understandings of the concept, many of them were also confounded within themselves; that is, they sometimes included multiple distinct concepts under the umbrella of social presence. As a result of the review, Kreijns et al. (2022) discerned four mainstream perspectives on social presence, namely: (1) social presence as the perception of being "real," determined solely by medium attributes; (2) social presence as the perception being "real," determined by medium attributes, social contextual, and individual factors; (3) social presence as an ability; and (4) social presence as a critical literacy. Each of these perspectives will now shortly be elaborated. The first perspective regards social presence as the perception of "realness" of the other persons. This perception is solely determined by the medium attributes; that is, the physical characteristics of the medium such as screen size and quality of sound (Short et al., 1976; Ahn et al., 2014). Accordingly, social presence – in this perspective – can be considered a medium attribute. Researchers adhering to this perspective tend to compare different media in their degree of social presence (Kuyath and Winter, 2006; Arsenault, 2022). The second perspective shares the view that social presence is the perception of the other persons' "realness," but it emphasizes that this perception is shaped by a combination of medium attributes, social contextual, and individual factors (Gunawardena, 1995; Tu and McIsaac, 2002; Kreijns et al., 2020). Following this perspective, social presence cannot be a medium attribute. Social contextual factors include, for example, the conversation's topic, the degree of interactivity, and tone of the communication (Tu and McIsaac, 2002) whereas individual factors concern personality traits (Weidlich et al., 2021). The third perspective characterizes social presence as an ability to project oneself via an online medium as "real" persons (Gunawardena, 1995; Garrison et al., 2001), which is reformulated as "the ability of participants to identify with the community (e.g., course or study), communicate purposefully in a trusting environment, and develop interpersonal relationships by way of projecting their individual personalities" (Garrison, 2009, p. 352). This perspective on social presence, along with cognitive and teaching presence, is central to the community of inquiry (CoI) model to describe the use of computer-mediated communication (CMC) and computer conferencing in supporting an educational experience (Garrison et al., 2001; 2010; Garrison and Anderson, 2003; Garrison and Arbaugh, 2007). In short, cognitive presence refers to the extent to which learners can construct and confirm meaning through sustained communication (Garrison et al., 2001). Teaching presence refers to "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational worthwhile learning outcomes" (Anderson et al., 2001, p. 5). It is to be noted that this mainstream perspective is currently the most dominant one with a large community.[1] Finally, the fourth perspective posits that social presence is a critical literacy that "serves an influential role in advancing and sustaining successful, meaningful learning experience" (Whiteside, 2017, p. 133). According to Whiteside and Dikkers (2016) social presence is addressing the social dimensions of online learning by examining five interconnected components that form the social presence model (SPM): (1) affective association; (2) community cohesion; (3) instructor involvement; (4) interaction intensity; and (5) knowledge and experience.

Note that in discussing these mainstream perspectives, we must remind ourselves that the original social presence theory by Short et al. (1976) was developed in an era that only used analogous telecommunication tools such as video-, audioconferencing, and telephone that did not possess any buffering capacity so that the communication had to be done in real-time. Short et al. (1976) compared social presence for video conferencing, audio conferencing, telephone, and face-to-face communication although the latter is not "technologically mediated." In contrast, the perspectives on social presence outlined above usually consider digital communication tools that often are programs or apps running on computers which are interconnected through internet. Hence, the general term for these types of communication is computer-mediated communication (CMC). Thereby, we observed that text-based CMC (e.g., e-mail) mostly supports an asynchronous mode for communication whereas video-based and audio-based CMC (e.g., video-conferencing) does so for real-time communication. But indeed, text-based communication can be (pseudo) real-time as well, as enabled by instant text message systems such as the popular WhatsApp. Also, recordings of video footages and audio also make asynchronous communication possible as they become video and audio messages.

Whilst discerning the four mainstream perspectives, Kreijns et al. (2022) disentanglement of the many different social presence conceptualizations also has led to the distinguishment of three key variables that can foster cumulative research progress: sociability, social presence, and social space. The latter, *social space*, is defined as the network of interpersonal relationships embedded in group structures of norms and values, rules and roles, and beliefs and ideals. Social space is, therefore, an attribute shared by the group as a whole. A thriving/sound social space is characterized by a sense of community, trust, and cohesiveness, which fosters productive and successful collaboration among groups because these qualities create a secure environment for transactive discourse, involving critical thinking, decision-making, and epistemic interaction. However, the emergence of a sound social space is contingent on the presence of social presence. Furthermore, *sociability* represents a medium attribute of the virtual learning environment, typically an electronic platform with CMC- and specialized collaboration tools. Kreijns et al. (2022) defined sociability as the virtual environment's capacity to facilitate the expression and experience of social presence, leading to the emergence of a cohesive social space. A practical example could be text-messaging enriched with emoticons and emojis, allowing group members to express themselves freely and, thus, is a tool for manipulating how others perceive their social presence (Tang and Hew, 2020).

We purport that the interrelationships among the three key variables - sociability, social presence, and social space - and how they mutually influence one another emphasize the importance of exploring additional factors that can influence the degrees of these variables besides the key variables themselves. Because this article is centered on social presence, it becomes imperative to develop a comprehensive framework of social presence. To this end,

1 https://coi.athabascau.ca/coi-model/

we embraced the second perspective, thus, where "realness" of the other persons in mediated communication is central and determined by a combination of media attributes, social contextual and individual factors. However, despite considering these factors, they fall short in fully explaining the varying degrees of social presence experienced across different communication and collaboration modes and modalities. To address this gap, we expanded the perspective here by the inclusion of SIP theory, CLT, and telepresence theory, effectively giving rise to a fifth perspective on social presence. This fifth perspective, in essence, builds upon the second perspective with the aforementioned expansions, collectively forming the comprehensive framework of social presence. In the following sections, we lay out these different theories and describe how they relate to the concept of social presence.

3 Social information processing theory

Our interest in SIP theory (Walther, 1992, 1993, 1996) stemmed from findings of social presence researchers that when online persons self-disclose themselves it will increase their social presence (Kim and Song, 2016; Raza et al., 2020). Self-disclosure entails revealing personal life events, information, feelings, and emotions to other people through talk (Finkenauer et al., 2018) and functions as getting to know each other. Short et al. (1976, Chapter 6) considered the process of "getting to know someone" an important aspect of any conversation as it contributes to building interpersonal relationships which may become relevant and effective when in task-related activities. According to Walther (1996) "relationships are necessary for effective negotiation. Without them, getting consensus and agreement will not progress in most cases" (p. 15). Indeed, when people are put together in groups, such as is the case in group learning, the group dynamics are in large part governed by people's impression of other group members (Storck and Sproull, 1995). Based on these impressions, interpersonal relationships can be built. Therefore, teachers often are advised to start online classes, virtual seminars, and online group learning with icebreakers and other opportunities for getting to know each other to develop relationships before learning together (Conrad and Donaldson, 2011). These activities are aimed to compensate for specific hindrances to impression formation in online settings in comparison to face-to-face settings. For instance, Storck and Sproull (1995) concluded form their study on videoconferencing that "impressions people form of remote others are different from and less positive than the impressions they form of face-to-face others, starting from an equal baseline" (p. 1492). They further showed that "people make use of different kinds of information informing their impressions" (p. 1492). Walther (1992, 1993, 1996) proposed his social information processing (SIP) theory that explains how impression formation happens online. He argued that through exchanging and accumulating messages of the other over time, impressions of the other persons will successively individuate; impression formation will thus be stepwise as each message reveals something new about the other. Note hereby, that SIP theory was primarily focusing on asynchronous text-based communication such as e-mail and forums. Nevertheless, SIP theory can be applied on synchronous communication as well such as a video-conferencing, but where then each communication episode counts as one message exchange. Note further that Walther's (1992) SIP theory was actually a critical reaction to media theories at that time (i.e., around 1970–1990) including social presence theory (as seen by the first perspective "social presence as the perception of being "real," determined solely by medium attribute"), media richness theory (Daft and Lengel, 1986; Trevino et al., 1990), and reduced social cues theory (Sproull and Kiesler, 1988) that all suggested that lean media — because, its low bandwidth constrains the transmission of non-verbal cues — to be impersonal, inhibiting relational communication, and therefore fall prone to anti-social and hostile behavior. Non-verbal cues are, for example, facial expressions, gaze direction, posture, and tone of voice. Walther's (1992) SIP theory disagreed with these so-called "cues-filtered-out" theories and claimed that even in lean media close relationships can exist because users adapt to these media and make individuating impressions of each other. Another factor driving our interest in SIP theory is that alternative perspectives on social presence defined it as an ability to project one's personality in the online community (this is the third perspective "social presence as an ability"). SIP theory also delves into impression management, which involves individuals making conscious efforts to shape how they want others to perceive them. Therefore, the ability to project one's personality in the online environment is closely connected to the process of impression management. SIP theory has been investigated by many researchers, for example, in online dating (Farrer and Gavin, 2009; Sharabi and Caughlin, 2017), social media use (Jahng and Littau, 2015), and when cultural factors are involved in developing trust between virtual team members (Olaniran et al., 2012).

According to SIP theory, and already mentioned above, communication partners develop interpersonal relationships over time; even in communication media that are low in richness in terms of transmitted cues, the same relational dimensions, and qualities as in face-to-face relationships can emerge. Two processes take place in online communication; the first process is impression formation and the second is impression management. In impression formation, communication partners construct mental models; that is, individuating impressions of each other. This occurs through the accumulation of messages collected during the many communication episodes contributing little by little to the construction of mental models or representations about the communication partners. This ultimately results in individuating impressions that are very concrete and detailed. Interestingly, as Walther (1996) showed, there is a tendency to judge the others more positive and to idealize them than would be the case in face-to-face settings, known as the hyperpersonal effect (Ramirez and Zhang, 2007). In impression management, on the other hand, communication partners are concerned with how they are going to present themselves online and how to maintain that. During the impression management process, the communicating partners consistently seek feedback to adapt the way they present themselves in the communication; this is commonly known as "projecting" oneself. Impression management is necessary as it is a way for communicating partners to "create" social presence (Gunawardena, 1995). See also, our previous example of text-messaging using emoticons and emojis. Impression management also gives communication partners the possibility to present themselves more favorably to others and in this way add to the hyperpersonal effect (Walther, 1996), as can be observed in social media (e.g., with TikTok influencers actively marketing themselves).

4 Construal level theory

Proposed by Trope and Liberman (2003, 2010), construal level theory (CLT) builds on two main ideas, construal and psychological distance, and how the two affect each other. That is, how psychological distance affects construal levels of events, objects, or people, and vice versa, which in turn affect individuals' thoughts, decisions, and behavior toward them (Trope et al., 2007). The first main idea, construal, refers to the mental representation of those events, objects, and people and the construal level is the degree to which the mental representation is concrete or abstract (Trope and Liberman, 2003, 2010). Concrete construals are focused on the specific details of an event, object, or person, such as its physical properties, sensory features, or personality; therefore, concrete construals are designated to be low level. Abstract construals are focused on the higher-level concepts or ideas associated with an event, object, or person, such as its meaning or relevance to personal goals; therefore, abstract construals are designated to be high level. For example, if someone is thinking about a close friend, a concrete construal might focus on whether she is friendly and patient, the specific sneakers she wears, and her opinions and thoughts about a certain subject, while an abstract construal might focus on the fact that she is a stranger, the country in which she lives, the culture of that country that may determine her habits in addition to the traditional clothing that she may wear. In general, concrete construals tend to be more heterogeneous and distinguishing whereas abstract construals tend to be more homogenous and uniform. The second main idea, psychological distance, refers – as already mentioned above – to the subjective experience of a separation between the self, here and now, and targets of interest such as events, objects, or people. Trope and Liberman (2010) indicated that psychological distance is caused by four types of objective distances: (1) spatial; (2) temporal; (3) social; and (4) hypothetical distance. Spatial distance refers to the proximity in physical space; thus, whether the event takes place nearby and whether object or person are in close physical proximity versus just the opposite; that is, the event takes place far away and object or person are also far away. Temporal distance refers to the proximity of an event, object, and people in time, thus whether the event takes place right now and objects or persons can be accessed right at this moment versus the event will take place somewhere far in the future as is the accessibility of objects and persons. Social distance refers to the relationship between the self and others involved in the event, for example in case of persons, social distance is the degree of similarity between the self and the other persons, which can refer to the same interest in topics, reference groups, and ambitions. Finally, hypothetical distance refers to the likelihood or uncertainty of an event happening or that an object or person can be accessed. The farther an object, event, or person is perceived to be on these dimensions, the more likely it is to be construed at a higher level of abstraction. But the opposite is also true, if the level of construal is high then the psychological distance of an event, object, or person is perceived as far and if the level of the construal is low then the psychological distance is perceived as near.

Although in CLT psychological distance concerns objects, events, and people, we for the purpose of our research on social presence, only involve psychological distance in relation to people and places – the latter (places) becomes clearer when we discuss telepresence theory. As already been noted, CLT is not a media theory, so it does not consider the role of the various communication media within this theory. However, the suitability of CLT for the comprehensive framework of social presence is based on three reasons that will be elaborated upon: (1) social presence is inextricably linked with psychological distance; (2) social presence is affected by the individuating impressions of the other persons, which are essentially the construals of these people; and (3) the causal direction of psychological distance to construal may also be reversed opening possibilities to reduce psychological distance. In regard to the first reason, we do see a link between social presence and psychological distance as did many others (e.g., So and Brush, 2008; Lee, 2010). In line with the observations made by So and Brush (2008), we concur that research in distance education should move beyond perceiving distance solely as a lack of physical proximity and place greater emphasis on the psychological aspects of distance (p. 319). These researchers posed several pertinent questions regarding learners' perceptions of psychological distance, the factors influencing these perceptions, the impact of such perceptions on learning, and effective strategies for minimizing psychological distance (p. 319). They approached these inquiries through the lens of transactional distance theory (Moore, 1997), which explores how psychological and communication distance can lead to misunderstandings in teacher-student transactions (Moore and Kearsley, 1996). However, the theory does not explicitly define psychological distance whereas CLT does. CLT draws explicit attention to psychological distance and how this affects people's behavior and thinking. Concerning the second reason, it was alluded in the previous section that social presence is affected by the individuating impressions of the other persons. In CLT, psychological distance is affecting the level of abstractness of objects, events, or people; this abstractness is reflected in the construal that is the mental representation of those objects, events, and people (Trope and Liberman, 2003, 2010). Consequently, the mental representations we form of other people, or in other words, the individuating impressions we hold of them, are essentially the construals of these individuals. Also, we may state that construals as a result of the process of impression formation, are not only influenced by the accumulation of messages over time as is suggested by SIP theory, but also by the psychological distance we feel to other persons as CLT suggests. This insight gained from CLT underscores its importance in understanding social presence. The third reason for including CLT into the comprehensive framework of social presence stems from its assertion that the causal direction of psychological distance to construal can be reversed, thus, the level of abstractness of the construals or how detailed the individuating impressions of other persons are, is affecting the psychological distance we feel with these other persons. In other words, if information sources are available to reduce the level of abstractness of the construals/impressions we form about other persons making them more detailed and concrete, then the psychological distance with them will also be reduced (Weidlich et al., 2023). Returning to SIP theory, accumulated messages over time are one of these sources. Also, the non-verbal cues about the other persons transmitted via the CMC-tools of the virtual learning environment may form another source. Because individuating impressions of other people determine social presence, we hypothesize that ultimately high levels of social presence reduce psychological distance. We may say that social presence is bridging psychological distance. This would

support earlier findings on how social presence alleviates feelings of social isolation and loneliness (Kreijns et al., 2022).

5 Telepresence theory

Above, we defined telepresence as the psychological phenomenon in which, to a certain extent, in technology mediated communication one perceives being "present" in another place, which can either be mentally constructed from transmitted cues, a remote physical location mediated by a computer, or a computer-generated 3D virtual environment. The definition is compatible with the many other definitions of telepresence, in particular for the case where the other place is mediated or generated by computers. For instance, Steuer (1992) defined telepresence as "the experience of presence in an environment by means of communication medium" (p. 6), Green and McAllister (2020) defined it as "the feeling of "being there" in a mediated or virtual environment" (p. 1), and Waterworth et al. (2015) as "the feeling of being located in a perceptible external world around the self" (p. 36). Note that in this regard and in contrast to SIP theory, telepresence theory was primarily relying on the synchronous transmission of sensory information like visuals and sound. Yet, asynchronous text-based communication can also induce telepresence experiences, particularly when messages convey details about the sender's surroundings and locations.

Initially, telepresence was researched in the context of teleoperations and performance in physical remote locations (Minsky, 1980; Sheriden, 1992), for example, locations that are hazardous for humans because of environmental radiation and, therefore, all manipulations with objects must be performed by robotics and haptics. Because teleoperations and task performance were the prime focus of the initial telepresence research, it did not consider social environments. Indeed, the remote locations were usually void of people. However, the advent of affordable video cameras and large TV screens for telepresence rooms has shifted the attention towards connecting distributed individuals. Recent studies, such as that by Standaert et al. (2016), have explored the effectiveness of telepresence as a business meeting mode compared to face-to-face and audio- and videoconferencing. It was found that telepresence communication outperformed audio- and videoconferencing but did not significantly differ from face-to-face interactions. Interestingly, Short et al. (1976) used similar communication media (face-to-face, audio- and videoconferencing, and telephone) for determining degrees of social presence conveyed in these media. Face-to-face interactions were found to convey the highest levels of social presence, followed by videoconferencing, and then audio-conferencing, with telephone interactions conveying the lowest social presence. This suggests some connection between telepresence and social presence. It is important to note that telepresence research extends beyond business meetings to include other domains, such as remote surgery (see for a systematic review: Barba et al., 2022), which emphasizes teleoperation and task performance. As mentioned earlier, apart from connecting remote physical locations, the interest in telepresence is also driven by the increasing use of computer-generated 3D environments. Here the focus is on the manipulation of virtual objects and even more on the social interaction between the virtual representations of others (i.e., the avatars) in mediated communication (Lu et al., 2015). Incorporating such 3D virtual environments into our future online platforms for group learning, which involve activities like transactive discourse, serious games, and object manipulation, necessitates careful consideration of human interaction. Specifically, when comparing the effects of ultra-realistic human-like avatars and simpler cartoon avatars on social learning, it becomes crucial to examine their potential to elicit varying levels of telepresence (and social presence).

6 Putting everything together

We have identified three theories that play a crucial role in enhancing our understanding of how the degree of perceived social presence of other persons can be affected while in online real-time, semi-synchronous, and asynchronous collaboration and communication; these three theories are: (1) social information processing theory (Walther, 1992, 1993); (2) construal level theory (Trope and Liberman, 2010); and (3) telepresence theory (Steuer, 1992). Together, with insights from the second perspective on social presence (i.e., "social presence as the perception being "real," determined by medium attributes, social contextual, and individual factors"), they form the comprehensive framework of social presence that is a fifth perspective on social presence and illustrated in Figure 1. The virtual learning environment enables all social interaction by means of its embedded synchronous and asynchronous communication and collaboration tools; the visual representation depicts this by the arrow going from "virtual learning environment" to "social interaction." When we focus on the second perspective on social presence, we see this perspective reflected by the influence of media attributes on social presence represented by the arrow going from "virtual learning environment" to "social presence." For instance, when students collaborate using a video conferencing system, the visual and audio cues transmitted through the medium directly impact their perception of social presence, as explained by Short et al. (1976). Similarly, if the collaboration takes place in a 3D virtual environment, telepresence experiences emerge (Faiola et al., 2013). Social presence motivates students to participate in the social interaction (Gunawardena, 1995; Tu, 2000); the arrow from "social presence" to "social interaction" is showing this. Conversely, social interaction reinforces social presence (Akcaoglu and Lee, 2016; Colen, 2022) as shown by the two headed arrow from "social interaction" to "social presence." In considering the social contextual (e.g., task type, demographics, conversation's topic, degree of interactivity) and individual factors (e.g., personality traits), researchers like Li et al. (2015) and Siriaraya and Ang (2012) have shown that these factors can significantly impact social presence perceptions. Despite their importance, they are nevertheless not shown in the visual representation to avoid clutter. Note that in the figure, processes (e.g., social interaction) are drawn as colored circles whereas variables influencing or be affected by these processes are drawn as rectangles.

Moving forward, we further elaborate on the visual representation in Figure 1. But before doing so, our focus shifts to the individual models linked with the theories (i.e., SIP, CLT, and telepresence). This approach aims to enhance the clarity of the comprehensive framework of social presence, particularly when integrating the individual models.

To begin with, the visual representation of Walther's (1992, 1993, 1996) SIP theory is depicted in Figure 2 using the terminology of CLT. It shows on the left-hand side the process of impression formation producing the construals of the other persons, which are

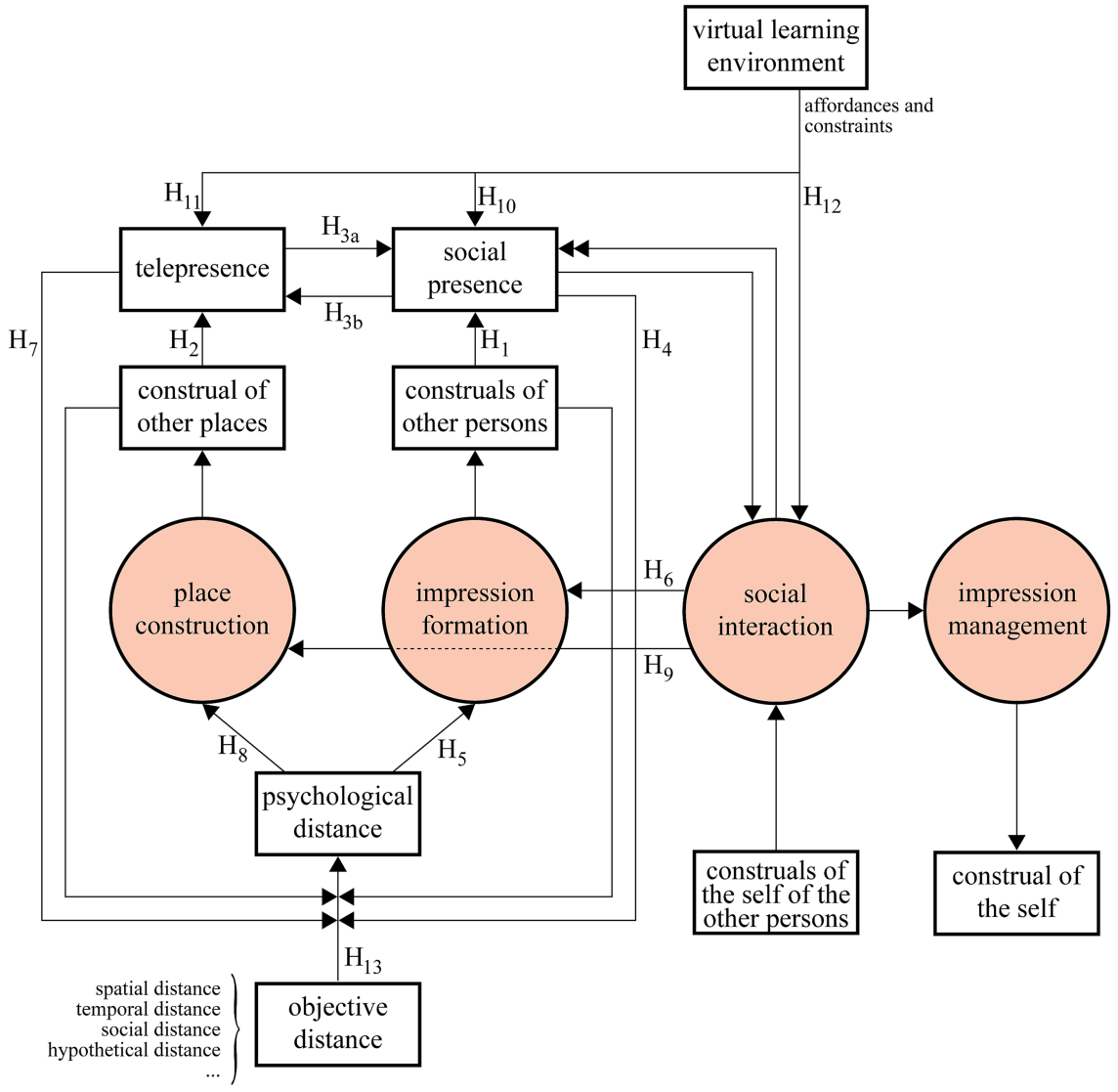

FIGURE 1
Visual representation of the comprehensive framework of social presence with hypotheses H1-H13 laid out in the discussion.

the individuating impressions of them. On the right-hand side, the figure shows the process of impression management resulting in the construal of the self that potentially may lead to a hyperpersonal impression as perceived by other persons. Construals of the self of other persons affect how individuating impressions of these persons are formed. Also shown in Figure 2 is the prominent role of social interaction which enables impression formation and management to take place.

In regard to CLT, we incorporated (see Figures 3, 4) the image presented by Wilson et al. (2013) depicting the Simplified process model of construal-level theory (the image is on p. 632 of Wilson et al. (2013), which they used to understand the impact of virtuality on distributed groups. This Simplified process model of construal-level theory is a chain that starts with "objective distance," how it affects "psychological distance," and how this then affects "abstract construal," resulting in "effects of the construal." This chain, indeed, captures the central tenets of CLT of Trope and Liberman (2010).

Regarding the connection between CLT and social presence, Wilson et al. (2013) emphasized that abstract construals have a significant impact on individual behavior and group dynamics because "distance alters *perceptions of distributed group members* [italic by authors]" (p. 629). Hence, we have relabeled "effects of the construal" by "social presence" since "perceptions of distributed group members" align with the notion of social presence. It is hereby worth noting that Wilson et al. (2013) probably were not aware of social presence theory when they conducted their study which may explain why they did not mention it. To ensure our focus remains on persons rather than objects or events, we relabeled "abstract construal" by "construals of other persons" in our framework.

The image of Wilson et al.'s (2013) Simplified process model of construal-level theory depicts an arrow that is drawn from "psychological distance" to "abstract construal" (i.e., "construals of other persons"). This arrow represents the process in which the abstract construals of the other persons are formed; in our visual

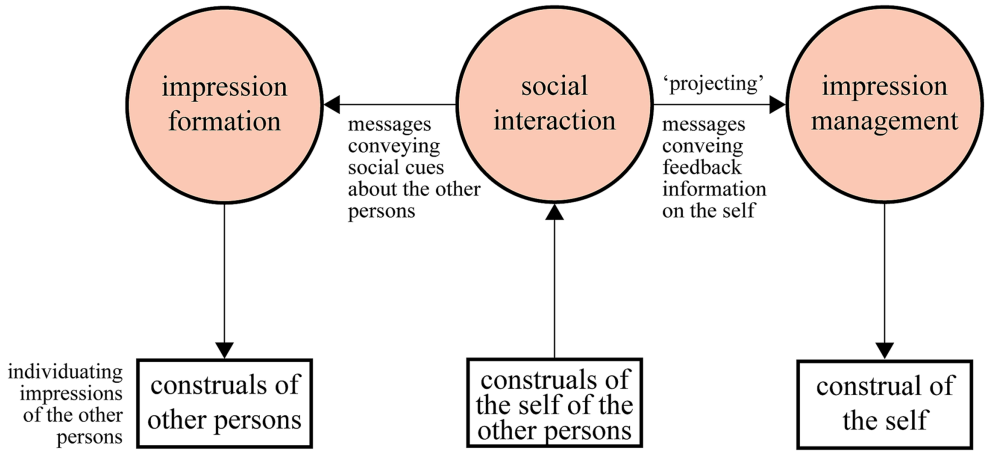

FIGURE 2
Model of Walther's (1992, 1993, 1996) SIP theory.

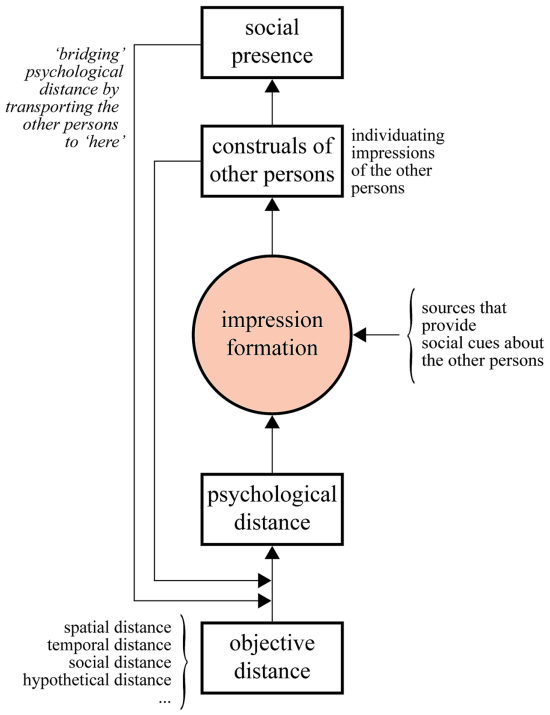

FIGURE 3
Wilson et al. (2013, p. 632, p. 637) model of CLT applied to social presence.

representation, this process is identified as the process of impression formation when the terminology of SIP theory is used.

In Figure 3, a visual representation of the chain is depicted with the new labels and the process of impression formation – note again that we draw processes as colored circles such as the one representing "impression formation." Wilson et al. (2013) saw objective distance not limited to spatial, temporal, social, and hypothetical distance and suggested other forms of distances such as cultural, linguistic, and experiential distance. Therefore, we list the first four distances in this figure and added "…" as a placeholder for all those other relevant distances. We also added an extra arrow in the figure to "impression formation" so to express that there could be numerous additional sources offering social cues regarding other persons, which could potentially impact this process. For instance, Walther's (1992, 1993, 1996) series of accumulating messages serves as an example of such influences.

In their Simplified process model of construal-level theory, Wilson et al. (2013) did not draw a back loop from "abstract construal" (i.e., "construals of other persons") to the arrow from "objective distance" to "psychological distance," nor did they do so for "effects of construal" (i.e., "social presence") (Figure 3). However, these feedback loops were depicted in the image representing the Expanded process model of construal-level theory (the image is on p. 637 of Wilson et al. (2013) where they moderate the influence of "objective distance" on "psychological distance." Although Wilson et al. (2013) included "contextual factors" as a mediator within the feedback loops, we did not do so. The first feedback loop (arrow originating from "construals of other persons") is explained from with CLT, in that when we form low level construals of the other persons, the psychological distance also becomes low thereby suppressing the influence of "objective distance." The second feedback loop (arrow originating from "social presence") complies with current social presence theory: the higher perceptions of social presence, the more one feels in proximity with other persons, and may even feel connected to them and closeness, thereby suggesting a lower psychological distance, thus, again by suppressing the influence of "objective distance." In a way, we might interpret this as the transportation of the other person to "here." Hence, a high degree of social presence is "bridging" psychological distance (see also: Breves and Schramm, 2021).

In the above, we have elaborated on the connection of CLT and social presence (Figure 3). The connection between CLT and telepresence (Figure 4) follows the same line of thought. Instead of the other persons, it is now the abstract construal of the remote physical place or the computer-generated 3D virtual environment that is the focus. We relabeled "effects of the construal" by "telepresence" and "abstract construal" by "construal of other places" in our visual representation for the same reasons as with the connection between

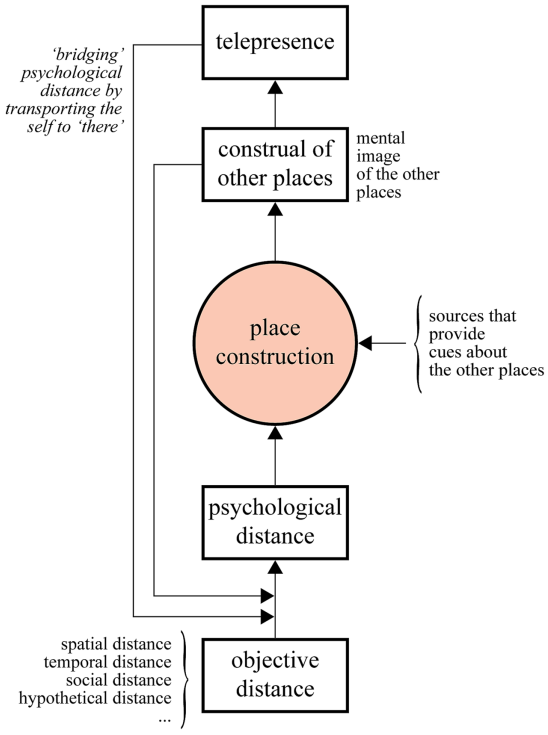

FIGURE 4
Wilson et al. (2013, p. 632, p. 637) model of CLT applied to telepresence.

CLT and social presence. We further replaced the arrow from "psychological distance" to "abstract construal" (i.e., "construal of other places") from Wilson et al. (2013). Simplified process model of construal-level theory by a circle representing "place construction," the process in which the other place is constructed in the mind.

The two feedback loops can also be found here. Both feedback loops suggest that high experiences of telepresence and of the construal of the other places will result in lower psychological distance with respect to the remote physical place or the computer-generated 3D virtual environment. In regard to telepresence, we might interpret this as the transportation of the self to "there." Thus, a high degree of telepresence is "bridging" psychological distance to the other place.

We now integrate the individual models into a visual representation of the comprehensive framework of social presence. This integration is shown in Figure 1.

Note first in this visual presentation that "telepresence" and "social presence" mutually influence each other (*cf.*, Venkatesh and Johnson, 2002; Nowak and Biocca, 2003). Note further that we have added the virtual learning environment because its affordances (e.g., sociability) and constraints determine how the social interaction; that is, the communication and collaboration will take place in the different modes and modalities, and how it affects telepresence – especially when technologies like goggles enable individuals to explore remote locations visually – as well as social presence perceptions and expressions, and the emergence of a sound social space (Kreijns et al., 2022). We further drew an arrow from "social interaction" to "social presence" because according to Tu (2000), "Social presence is required to enhance and foster online social interaction, which is the major vehicle of social learning" (p. 27). Additionally, we have included a two-headed arrow from "social interaction" back to "social presence" to signify the reinforcement of social interaction, particularly when it proves to be vivid and productive.

Finally, note that the comprehensive framework does omits the virtual learning environment and its direct influences on social presence, telepresence, and social interaction for stalled episodes in blended and hybrid learning scenarios; a stalled episode is the period of time during a learning session when the communication is interrupted or not taking place. Subsequently, impression formation and impression management will also be stalled during these episodes. If these periods are very long, they may result in the fading of construals of other places and of other persons.

7 Discussion

This contribution specifically explores the relationship between social presence on the one, and SIP theory, CLT, and telepresence theory on the other hand, an integration of theories that has yet not been attempted in existing literature. This comprehensive framework has the benefit of providing a theoretically grounded and comparatively thorough account of how social presence emerges and can be facilitated and sustained in a variety of learning scenarios and across diverse technologies and environments.

However, like all frameworks, the comprehensive framework of social presence should be supported by empirical evidence that confirms the hypothesized relationships. In our case, it means that specifically the connections between social presence and the three underlying theories (i.e., SIP theory, CLT, and telepresence theory) need empirical studies as we can already build on empirical evidence substantiating the validity of SIP, CLT, and telepresence. Regarding SIP theory, there is empirical evidence available that supports the theory (Walther and Burgoon, 1992; Walther, 1993; Parks and Roberts, 1998; Utz, 2000; Ramirez and Zhang, 2007). Interestingly, Ramirez and Zhang (2007) conducted a study on the effects of modality switching on relation communication; that is, the influence of meeting face-to-face after varying lengths of relational interaction via text-based CMC tools and vice versa. They used both social presence theory as formulated by Short et al. (1976) thus, pointing to the first perspective on social presence (i.e., "social presence as the perception of being "real," determined solely by medium attributes") and SIP theory, with particular emphasis on the hyperpersonal component (Walther, 1996). They confirmed that both theories hold; social presence theory (first perspective) was predicting low relational communication in the early stages of CMC while SIP theory predicted high relational communication in the later stages of CMC and that the formed impressions were idealized. Also, overall effects of switching modalities in early and later stages of relational communication were as expected by the two theories. Ramirez and Zhang (2007), therefore, concluded that their findings contributed to the support of SIP theory and the hyperpersonal perspective.

In relation to CLT theory, this theory has amassed a substantial body of empirical evidence across diverse fields (Soderberg et al., 2015). These fields encompass consumer behavior (Eyal et al., 2009; Sordi et al., 2022), motivation (Trope and Liberman, 2003), decision-making (Raue et al., 2015), climate change (Wang et al., 2019), interpersonal distance (Liviatan et al., 2008; Norman et al., 2016), and impression formation. In the context of the latter, the application of

CLT to impression formation diverged from SIP theory, which elucidates the development of individualized impressions over time through cumulative messages. Instead, CLT was employed to understand how individuals construct their perceptions of others based on the presently available information about them (Liviatan et al., 2008; McCrea et al., 2011; Hess et al., 2018). These researchers found on the one hand that individuals with abstract construals of others tend to emphasize their broader and central features and are more prone to being influenced by stereotypes, and on the other hand, those with concrete construals of others tend to focus on specific details and are less susceptible to stereotypes.

Regarding telepresence, there exists empirical evidence supporting the notion that immersing oneself in remote locations and 3D virtual environments elicits feelings of telepresence (Raminez-Lopes et al., 2016; Standaert et al., 2016). While no research is available that investigates the relationship between telepresence and social presence, there is research that considers telepresence and social presence both as independent variables on a number of outcomes. See, for example, on involvement of consumer brand engagement (Algharabat et al., 2018), exemplification in health messages (Westerman et al., 2015), and perceived enjoyment, perceived value, and behavioral intention in virtual golf simulators (Lee et al., 2013).

However, as stated earlier in this article, it is surprising that the majority of the empirical research related to these three theories seldom takes into account the educational context of online, hybrid, and blended learning. Therefore, from the propositions of the framework, we have generated testable hypotheses for future research studies that are situated in these educational contexts, for instance 3D immersive environments such as those that are metaverse-based (Kye et al., 2021; Singh et al., 2022; Samala et al., 2023).

We formulated the following hypotheses detailing the central constructs of the framework (see also Figure 1):

> *H1*: Levels of construal of other persons influence perceptions of social presence.
>
> *H2*: Levels of construal of other places influence telepresence perceptions.
>
> *H3*a: Experiences of telepresence affect social presence.
>
> *H3*b: Vice versa, social presence experiences contribute to telepresence.

Looking at individual components of the framework, we can specify more detailed hypotheses for the social presence component:

> *H4*: Psychological distance between other persons and the self can be bridged by enhancing social presence.
>
> *H5*: Variations in psychological distance arising from the learning context or scenario, which in turn establish the objective distance, affect levels of construal via the process of impression formation.
>
> *H6*: In addition to psychological distance, the process of impression formation is further influenced by the quantity and quality of social interaction enabling the accumulation of messages conveying social emotional cues of the other persons.

Analogous hypotheses emerge from the telepresence component of the model:

> *H7*: Psychological distance between the other places and the self can be bridged by enhancing telepresence.
>
> *H8*: Variations in psychological distance arising from the learning context or scenario, which in turn establish the objective distance, affect construal of the place via the of process place construction.
>
> *H9*: The process of place construction is influenced by the quantity and quality of social interaction enabling the accumulation of messages revealing cues of the other places.

The virtual learning environment plays a central role in the framework as it directly influences three main constructs:

> *H10*: Verbal and non-verbal cues about the other persons that are identifiable through the virtual learning environment influence social presence perceptions (e.g., by using a video-conferencing tool).
>
> *H11*: Non-verbal cues about the place that arise from the virtual learning environment influence telepresence perceptions (e.g., by using an immersive environment).
>
> *H12*: Affordances and constraints of the virtual learning environment and the communication media influence the degree of social interaction (e.g., the virtual learning environment offers only discussion).

Finally, there is the relationship between objective distance and psychological distance:

> *H13*: Variations in objective distance dimensions as established by the learning context or scenario, influence psychological distance perceptions.

Our future work will therefore concentrate on testing the hypotheses thereby validating the comprehensive framework of social presence. Also – and inspired by Short et al. (1976) who assessed social presence in face-to-face settings – we will probe the framework for face-to-face group learning and for classroom teaching, thus, extending the applicability of social presence beyond online, hybrid and blended modes for these learning scenarios. Thereby, to further elucidate the role of social presence in all the scenarios and settings, we will draw upon various pedagogical

theories, including attachment theory, educational style, teacher personality, expectations and attributions, and transactional theories in which the perception of students and the teacher would play a role.

8 Conclusion

In this article, a comprehensive framework of social presence is presented. The visual representation of the framework serves as an etiological model to describe, explain, and predict perceived levels of social presence in online, hybrid, and blended learning given that the framework is based on the well-established SIP theory, CLT, and telepresence theory.

The advantage of the comprehensive framework is that it allows us to understand varying degrees of social presence while in (pseudo) real-time and asynchronous communication and collaboration using a variety of different communication media ranging from text-based (e-mail, instant text messaging) to immersive (3D computer generated, a physical remote place). Another, and perhaps more important, advantage of the comprehensive framework of social presence is that it allows for a deeper insight in what causes levels of social presence, which may lead to the development of more effective instruments teachers and students can use to establish to some extent desired levels of social presence (see for the latter: Weidlich et al., 2022). Lastly, the comprehensive framework of social presence, which places a strong focus on the perceived "realness" of other persons, seeks to purify the concept of social presence, by taking this emphasis – that is core to Short et al.'s (1976) original definition – as its starting point and setting aside alternative definitions and interpretations of social presence developed later. Doing so, social presence is distinguished from its consequences, preventing the two from being erroneously merged, as illustrated by the example of considering social space as a facet of social presence.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

KK: Writing – original draft, Writing – review & editing. JY: Writing – review & editing. JW: Writing – original draft, Writing – review & editing. AW: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Faculty computer-mediated communication apprehension during shift to emergency remote teaching: implications for teacher-student interactions and faculty organizational outcomes

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Guided by the model of faculty readiness for online teaching (FROT), the goal of the current study was to investigate the influence of instructors' knowledge (e.g., online teaching preparation), confidence (e.g., computer-mediated communication apprehension; CMCA), and attitudes about online teaching (e.g., perceived usefulness) on their communicative and organizational outcomes (e.g., communication frequency and satisfaction, job satisfaction, motivation). We recruited 206 college instructors from a variety of institutions to report on their experiences during the transition to emergency remote teaching in the spring 2020 academic semester. Results from the study suggest that instructors' CMCA was a significant and negative predictor of instructors' communication satisfaction with online student interactions, job satisfaction, and motivation to teach after controlling for the other predictors in the model. Taken together, the findings suggest that CMCA may serve as a barrier to instructor communication competence in online teaching and may have deleterious impacts on instructor affect toward their positions. Ultimately, we recommend that faculty workshops aimed at developing online teaching competence should specifically address instructor dispositional and affective characteristics such as CMCA to prevent faculty vulnerability.

KEYWORDS

instructor computer-mediated communication apprehension, faculty readiness for online teaching, pandemic pedagogy, teacher-student interactions, teacher satisfaction

Introduction

As universities and colleges across the globe instituted swift social distancing measures in spring 2020 to mitigate the spread of COVID-19, instructors were left to figure out how to maintain academic continuity in their courses. For most instructors, this meant transitioning their courses to an online format, or what some scholars identified as "emergency remote teaching" (Quintana and DeVaney, 2020)—emphasizing the abrupt shift to virtual class formats during times of crisis (Hodges and Fowler, 2020). Unfortunately, not all faculty reported having access to the necessary personal or organizational resources to successfully transition their courses to virtual or remote

formats (Farris et al., 2022a), and as a result, many instructors reported a significant decrease in various motivating job characteristics during this time when compared to pre-pandemic scores (Kulikowski et al., 2022). Consequently, the purpose of the current study is to explore how faculty members' knowledge, attitudes, and confidence impacted their communicative and organizational outcomes during the initial wave of the COVID pandemic. More specifically, guided by the model of faculty readiness for online teaching (FROT; Martin et al., 2019), we investigate whether instructors' confidence (measured via computer-mediated communication apprehension), predicts their communication satisfaction and frequency with their students, as well as their job satisfaction and motivation above and beyond their knowledge (e.g., online teaching preparation), and attitudes (e.g., perceived usefulness) toward online teaching.

Model of faculty readiness for online teaching

The faculty readiness for online teaching model (FROT; Martin et al., 2019) is guided by assertions in health behavioral change models (Rollnick et al., 2010) and predicts that faculty who are more knowledgeable about online teaching best practices, have more prosocial attitudes regarding online teaching as a distinct form of instruction, and are more confident in their online teaching competence, are likely to have better success in online teaching (Martin et al., 2019). For the current study, *knowledge* is conceptualized by online teaching preparation or faculty members' experience, expertise, and training in online teaching. Given the context of emergency remote teaching in the initial wave of the novel coronavirus pandemic (and during the time of data collection for this study), we selected online teaching preparation as an important factor predicting both communication and organizational outcomes. According to some estimates, approximately half of university instructors were teaching online courses during the pandemic without any formal training (Saha et al., 2022). This is problematic given that instructors identified their lack of familiarity with online teaching as a primary challenge they experienced during the pandemic (Ma et al., 2021).

Moreover, existing scholarship suggests that improved online teaching preparation is positively associated with a host of prosocial outcomes including greater teaching effectiveness, accommodation of students' learning needs, student engagement, faculty satisfaction with their jobs and faculty motivation (Shea, 2007; Richter and Idleman, 2017; Liu et al., 2019; Joardar and Kara, 2023). Based on these previous findings, we predict that instructors who transitioned face-to-face courses to an online modality during the pandemic and with less online teaching preparation would also report lower communication frequency and quality with their students and lower job satisfaction and motivation. These assumptions are grounded in the context of emergency remote teaching during the spring 2020 academic semester when university instructors in our sample and across the globe shifted their courses to online formats with very little notice or choice (Drueke et al., 2021).

> *H1: Instructors' online teaching preparation is positively associated with their self-reports of a) communication frequency with their students, b) communication satisfaction with their students, c) satisfaction with their job, and d) job motivation.*

In addition to proposing an association between instructors' knowledge and online teaching readiness, the FROT model also asserts that instructors' attitudes toward technology will impact their online teaching success (Martin et al., 2019). In the current study, instructor *attitude* is conceptualized by the construct of instructors' perceived usefulness of technology or "the degree to which [an instructor] believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). We opted to expand this conceptualization to explore instructors' perceptions of the usefulness of online teaching modalities more broadly as opposed to a focus on specific platforms or technologies.

Many studies guided by the technology acceptance model provide evidence of a positive statistical association between perceived usefulness of technology and both behavioral intentions and actual technology use (Hoffman, 2013; Granić and Marangunić, 2019; Drueke et al., 2021) as well as job satisfaction among online university instructors (Fülöp et al., 2022). Similarly, existing literature demonstrates that faculty who perceived online modalities as useful to their achievement goals during the shift to emergency remote teaching also report less burnout in their jobs and earn more positive evaluations of their teaching effectiveness from their students (Daumiller et al., 2021). Consequently, we assert that instructors who perceive teaching online to be more useful during the initial wave of the COVID-19 pandemic also report communicating more frequently with their students, report greater satisfaction with their online student interactions, and will be more satisfied with and motivated in their jobs.

> *H2: Instructors' perceived usefulness of online teaching modalities is positively associated with their self-reports of a) communication frequency with their students, b) communication satisfaction with their students, c) satisfaction with their job, and d) job motivation.*

Lastly, the FROT model also predicts instructor confidence to be positively associated with effective online teaching (Martin et al., 2019). In the current study, instructor *confidence* is assessed through a deficit lens via computer-mediated communication apprehension (CMCA) or "an individual's tendency to feel apprehensive or anxious when using or anticipating using computers as a medium to interact with another person or persons" (Clarke, 1991, p. 7). The inclusion of CMCA is warranted given the empirical evidence indicating teacher-student interactions via online modalities was one of the primary anxieties and stressors experienced by faculty who felt forced to incorporate educational technology into instructional processes (Syvänen et al., 2016) and during the shift to emergency remote teaching during the early stages of the pandemic (Pu, 2020).

Although similar constructs—such as computer anxiety—have been explored in relation to faculty technology acceptance and effectiveness in online teaching, anxiety related to using computers is not synonymous with the fear of using computers *to*

communicate with others (Igbaria and Parasuraman, 1989; Scott and Timmerman, 2005). For example, faculty may feel comfortable with the use of computers as tools to accomplish their research tasks yet feel apprehension about communicating with students during a virtual synchronous class session. Similarly, instructors may feel confident to use technology in their traditional, campus classrooms, yet still feel apprehensive about using online teaching technology to interact with their students.

Similarly, an important conceptual distinction exists between CMCA and general communication apprehension—the fear related to oral communication and/or anticipated oral communication with others (CA; McCroskey, 1982; Scott and Timmerman, 2005). Although some data suggests that people with greater general CA strategically seek out computer-mediated communication as a means to connect with others as compensation for their anxiety during in-person interactions (Ho and McLeod, 2008; Shalom et al., 2015; Hutchins et al., 2021), other findings provide evidence that general experiences of CA also translate to computer-mediated interactions especially when the specific technologies facilitate oral communication (Reinsch, 1985; Scott and Rockwell, 1997; Scott and Timmerman, 2005; Hunt et al., 2012). These contradictory findings can likely be explained via trait and situational CA; whereas trait CA is considered an individual's stable personality trait, situational CA refers to anxiety triggered by a specific situation and context (McCroskey and Beatty, 1986). Thus, CMCA is a specific form of situational CA focused on anxiety resulting from interacting with others via online teaching modalities.

Finally, to further distinguish between these constructs, Scott and Timmerman (2005) report that CMCA accounts for additional explained variance in technology use after controlling for general CA and computer anxiety. Thus, theoretical and empirical evidence supports that CMCA is a distinct construct and that other "forms of apprehension may not fully capture users' anxieties related to communication with a given technology" (Scott and Timmerman, 2005, p. 692). Consequently, we included CMCA as a predictor in the current study based on the evidence that faculty experience apprehension related to online teaching interactions (Pu, 2020) and on the premise that faculty did not voluntarily opt in to transition their courses to virtual formats during the spring 2020 academic semester (Drueke et al., 2021).

Although to our knowledge, no existing scholarship explores the associations between university instructors' reports of CMCA and their communicative and organizational outcomes, previous research in other contexts suggests that CMCA impacts attitudes toward technology (Hunt et al., 2012), actual technology use (Clarke, 1991; Brown et al., 2004; Scott and Timmerman, 2005), and technological competence (Wrench and Punyanunt-Carter, 2007). Additionally, CMCA is theorized to influence interactants' behaviors via increased avoidance, withdrawal, disruption or inappropriate communication, and overcompensation or over-communication (McCroskey and Beatty, 1986). Moreover, Spitzberg's (2006) model of computer-mediated communication competence proposes that CMCA would impact competence in online interactions.

There is empirical evidence to support this line of theorizing in the context of social media wherein participants who self-report higher CMCA scores are also less likely to use specific platforms to interact with others (Hunt et al., 2012). These associations are similarly evinced in virtual teams wherein high CMCA team members engaged in lower participation quality (based on task-oriented messages and new topics introduced) and quantity and received lower performance evaluations in comparison to low CMCA team members (Fuller et al., 2016). Furthermore, previous research has demonstrated that employees with higher CMCA levels who were required to work remotely during COVID-19 reported lower levels of rapport with their supervisors. This suggests CMCA has important organizational implications, particularly in the context of mandatory mediated communication during COVID-19 (McGloin et al., 2022). Thus, while specific organizational outcomes may vary by occupation and associated tasks, we expect that CMCA influences instructor job-related outcomes for online instructors during the initial wave of the pandemic. Given the existing literature, it is likely instructors with greater CMCA also report communicating less frequently with their students, feel less satisfied with online interactions with their students, and report decreased job satisfaction and motivation.

> *H3: Instructors' computer-mediated communication apprehension is negatively associated with their self-reports of a) communication frequency with their students, b) communication satisfaction with their students, c) satisfaction with their job, and d) job motivation.*

Outcomes of interest

First, in the current study we include instructor communication frequency and communication satisfaction with students as representations of faculty online teaching readiness—the primary outcome of interest in the FROT model (Martin et al., 2019). This decision is based on conceptualizations of course communication as a subdimension of faculty readiness for online teaching in previous studies (e.g., Martin et al., 2019). While communication frequency is characterized by how often instructors communicated with their students each week after the shift to emergency remote teaching in spring 2020, *communication satisfaction* refers to positive impressions of interactions that align with the communicators' expectations and accomplish their goals (Hecht, 1978). These communication behaviors are also indicators of instructor communication competence (Spitzberg, 2006), and recent empirical evidence suggests that students' perceptions of instructors' communication with them is positively associated with their course and communication satisfaction as well as improved learning, motivation, and self-reported retention during the initial wave of the COVID-19 pandemic (Farris et al., 2022b).

Finally, we included job satisfaction and motivation as outcomes of interest based on a recent re-conceptualization of the FROT model. Cutri and Mena (2020) argue the importance of considering factors that "could impact faculty teaching online and represent a form of professional vulnerability" (p. 369). Consequently, job satisfaction and motivation are included as a means of assessing instructors' professional vulnerability and affective responses to the unique experience of "forced distance teaching and learning" (Drueke et al., 2021, p. 2) during the spring 2020 academic semester. *Instructor job satisfaction* is

conceptualized as positive "affect toward their profession and their students" (Plax et al., 1986, p. 379), while *motivation* is defined as "a teacher's passion for instructing students…even in unfavorable working conditions" (Adarkwah, 2023, p. 304). As evidence of this professional vulnerability, job satisfaction is reported to have significant, negative associations with teacher turnover intentions and burnout in a recent meta-analysis (Madigan and Kim, 2021). These authors also argue that job satisfaction and motivation are likely to have similar associations and suggest that increasing both faculty job satisfaction and motivation may have buffering or protective effects for retaining teachers in the profession (Madigan and Kim, 2021). Thus, exploring the specific instructor variables that predict faculty job satisfaction and motivation may ultimately help protect faculty from professional vulnerability.

Taken together, the goal of this scholarship is to explore whether instructors' CMCA accounts for additional variance in the outcomes of interest above and beyond perceived usefulness of online teaching modalities and online teaching preparation. It is logical to assume that if (a) instructors perceive technology to be more useful for online teaching, (b) if they are more prepared to use those online teaching technologies, and (c) are less apprehensive about communicating in mediated contexts, they would also report greater communication frequency and satisfaction with their online student interactions. As many others have discussed, the additional cognitive and emotional demands expected of instructors during the abrupt shift to emergency remote teaching had negative implications for instructors' personal and professional outcomes (Hilger et al., 2021; Moorhouse and Kohnke, 2021; Kulikowski et al., 2022). We assert that instructors with more online teaching preparation, greater perceived usefulness of online teaching modalities, and lower CMCA will report less job dissatisfaction and de-motivation.

> *H4: Instructors' reports of CMCA will account for additional variance in a) communication frequency with their students, b) communication satisfaction with their students, c) job satisfaction, and d) motivation after controlling for online teaching preparation and perceived usefulness of online teaching modalities.*

Method

Participants

We contracted Qualtrics panel services to recruit instructors of higher education (N = 206) in June of 2020. To participate in the current study, faculty must have been teaching at the college-level during the spring 2020 academic semester and must have experienced the transition from teaching (at least partially) face-to-face courses to online class formats. After acknowledging informed consent and completing the cross-sectional, online survey, participants were compensated $15.

The sample in the current study was evenly distributed in sex/gender identity (Male = 54%, Female = 45%). Instructors were primarily White/Caucasian (78.2%), full-time employees at their respective institutions (74%), and taught courses at the undergraduate level (80%) at the time data was collected. Instructors were evenly split in terms of tenure status (50% non-tenured, 49% tenure-track or tenured), while rank was more varied: Lecturer/Instructor (28.2%), Full Professor (27.7%), Adjunct Instructor (17.5%), Associate Professor (13.1%), Assistant Professor (11.7%). Instructors taught in the following disciplines: STEM (36.9%), humanities (23.3%), social sciences (13.6%), business (7.3%), health and health sciences (6.3%), fine arts (3.9%), professions (3.4%), library and information sciences (2.4%), and education and child development (1.9%).

Instruments

CMCA was measured by Scott and Timmerman's (2005) 5-point, Likert-type scale with larger values representing greater CMCA. Sample items included: "I would enjoy giving a presentation to others online" and "I look forward to the opportunity to interact with others on the computer." *Online teaching preparation* was operationalized with Robina and Anderson's (2010) instrument with response options (1 = Strongly Disagree, 5 = Agree) of larger value suggesting greater online teaching preparation. Sample items included: "I have met with an instructional support expert during an online teaching experience" and "I have been given release time to develop an online course." *Perceived usefulness of online teaching modalities* was measured by a revised version of Davis's (1989) 5-point, Likert-type scale. Sample items included: "Using online content improves my teaching performance" and "Using online content enhances my effectiveness in class." Larger means on this scale represent a greater perceived usefulness of online teaching modalities.

Instructors' *communication frequency* with their students was measured with one item that asked how often they communicated with their students each week after the shift to emergency remote teaching in spring 2020. Instructors' *communication satisfaction* with their students was measured by a shortened version of Goodboy et al.'s (2009). Likert-type scale including items such as "I dislike talking with my students" and "When I talk to my students, the conversations are rewarding." Response options included 1 = Strongly Disagree to 5 = Strongly Agree; thus, larger values indicate greater satisfaction with online student interactions. Instructors' *job satisfaction* was measured by the Generalized Belief Model (GBM; McCroskey and Richmond, 1989). Instructors responded to 5-point, semantic-differential items with sample response options including "disagree-agree," "no-yes" related to the prompt, "I am very satisfied with my job." Instructors completed Baringer and McCroskey's (2000) 5-item, semantic-differential scale as an operationalization of *instructor motivation*. Instructors responded to response options including "motivated-unmotivated" and "dreading it-looking forward to it" when asked about how they felt about their job-related motivation since the shift to online teaching. Larger values for both job satisfaction and motivation indicate greater magnitude of these variables for participants.

Results

Prior to the primary analyses, we conducted a normality check and explored the collinearity diagnostics of the predictors.

Please see Table 1 for the descriptive statistics and Table 2 for the bivariate correlations of the study variables as evidence of the data's alignment with these statistical assumptions.

To test $H1_{a-d}$-$H4_{a-d,}$ we conducted four hierarchical regressions with instructors' online teaching preparation and perceived usefulness of virtual teaching modalities entered in step one and instructors' CMCA entered in step two of the model. Instructors' communication frequency, communication satisfaction, job satisfaction, and motivation were entered as dependent variables, respectively in the separate models. Results suggest the covariates in the model significantly predicted instructors' communication frequency with their students [$F_{(3,202)} = 6.71$, $p < 0.001$], communication satisfaction with their students [$F_{(3,202)} = 17.05$, $p < 0.001$], job satisfaction [$F_{(3,202)} = 28.04$, $p < 0.001$] and instructors' motivation [$F_{(3,202)} = 34.38$, $p < 0.001$]. The predictors in the models accounted for ~8% of the variance in communication frequency ($R^2_{adj} = 0.08$), 19% of the variance in communication satisfaction ($R^2_{adj} = 0.19$), 28% of the variance in job satisfaction ($R^2_{adj} = 0.28$) and 33% of the variance in instructors' motivation ($R^2_{adj} = 0.33$).

Results of $H1_{a-d}$ primarily support our predictions: *online teaching preparation* positively predicted instructors' communication satisfaction their students ($\beta = 0.37$, $p < 0.001$), motivation in their positions ($\beta = 0.22$, $p < 0.01$) and job satisfaction ($\beta = 0.20$, $p < 0.01$). Contrary to predictions, online teaching preparation did not significantly predict communication frequency ($\beta = 0.16$, $p = 0.07$, *95% CI:* −0.01, 0.34). Thus, H1 was partially supported.

Results of $H2_{a-d}$ indicate *perceived usefulness of online teaching modalities* was a significant and positive predictor of instructors' communication frequency with their students ($\beta = 0.19$, $p = 0.04$), their job satisfaction ($\beta = 0.22$, $p < 0.01$) and their motivation in their teaching positions ($\beta = 0.21$, $p < 0.01$). Contrary to predictions, perceived usefulness of online teaching modalities was a significant, but negative predictor of instructors' communication satisfaction with their students ($\beta = -0.17$, $p = 0.05$). Thus, H2 was partially supported.

Results of $H3_{a-d}$ and $H4_{a-d}$ provide evidence that *instructors' CMCA* accounted for significantly more variance in three outcomes (e.g., communication satisfaction, job satisfaction, motivation) after being added to the model. Additionally, instructors' CMCA was negatively associated with communication satisfaction ($\Delta R^2 = 0.04$, $\beta = -0.25$, $p = 0.002$), job satisfaction ($\Delta R^2 = 0.06$, $\beta = -0.32$, $p < 0.001$), and motivation ($\Delta R^2 = 0.05$, $\beta = -0.27$, $p < 0.001$). Contrary to our predictions, CMCA did not account for any additional variance in communication frequency and was not a significant predictor of this outcome ($\Delta R^2 = 0.00$, $\beta = 0.01$, $p = 0.87$). Thus, H3 and H4 were partially supported.

Discussion

The goal of the current study was to explore the impacts of instructors' computer-mediated communication apprehension (CMCA), online teaching preparation, and perceived usefulness of online teaching modalities on their communication and organizational outcomes. Through this study, we responded to calls from scholars (e.g., Baran et al., 2011; Cutri and Mena, 2020) to expand the faculty readiness for online teaching model (FROT; Martin et al., 2019) to center instructor disposition and affective responses to online teaching demands through the inclusion of instructor CMCA as the primary predictor of interest. We recruited faculty in June 2020 to reflect on their experiences of transitioning face-to-face courses to the online environment during the initial wave of the coronavirus pandemic in the spring 2020 academic semester. Scholars have labeled this unique experience as "emergency remote teaching" (Hodges and Fowler, 2020; Quintana and DeVaney, 2020) and "forced distance teaching and learning" (Drueke et al., 2021) to emphasize the required obligation of faculty to abruptly shift their courses to virtual class formats. Given this context and theoretical framing, we predicted that instructor confidence (e.g., CMCA) would account for additional variance in the outcomes (e.g., communication frequency and satisfaction, job satisfaction and motivation) after controlling for instructor knowledge (e.g., online teaching preparation) and instructor attitudes (e.g., perceived usefulness) of online teaching modalities.

Collectively, the findings suggest the importance of CMCA to the experience of faculty transitioning their courses to online formats during the pandemic. Although the hypothesis predicting the association between CMCA and instructor communication frequency was not supported in the current study, CMCA remained a strong, negative predictor of instructor communication satisfaction with their students as well as instructor professional outcomes (e.g., job satisfaction, motivation) after controlling for the other predictors in the model. This suggests that instructors who experience greater levels of CMCA are also more likely to report decreased communication quality of their online student interactions, decreased satisfaction with and motivation to continue their jobs. This is after having considered instructors' feelings about the usefulness of online teaching to their jobs and their previous experience, training, and expertise with online teaching. These findings are aligned with critical re-conceptualizations of the FROT model that assert faculty affective responses should be considered as evidence of faculty (un)readiness and that this may impact instructors' professional vulnerability (Baran et al., 2011; Cutri and Mena, 2020).

Additionally, our findings support previous theorizing (McCroskey and Beatty, 1986; Spitzberg, 2006) and scholarship suggesting CMCA is associated with competence in virtual contexts (Wrench and Punyanunt-Carter, 2007; Fuller et al., 2016; McGloin et al., 2022). CMCA may serve as a barrier to instructor communication competence in online teaching environments given its negative association with communication quality and quantity in the current study. This may be particularly problematic, because instructor communication quality and quantity during the transition to emergency remote teaching and learning predicted various student outcomes including cognitive learning and motivation, stress and depression, and retention (Farris et al., 2022b). Moreover, given that faculty CMCA was predictive of decreased job satisfaction and motivation in the current study, this may indicate that CMCA is not only impedes teacher-student online interactions but may also have implications for faculty turnover via instructors' decreased job satisfaction and motivation (Madigan and Kim, 2021).

TABLE 1 Descriptive statistics for study variables.

	Mean (SD)	α	Skewness	Kurtosis	VIF	Tolerance
Perceived usefulness of online modalities	3.17 (1.18)	0.93	−0.22	−0.93	1.78	0.56
Online teaching preparation	3.53 (1.08)	0.87	−0.52	−0.56	1.71	0.58
Computer-mediated communication apprehension	2.42 (0.89)	0.84	0.38	−0.33	1.58	0.63
Communication frequency	2.48 (1.11)	–	0.71	−0.08	–	–
Communication satisfaction	4.33 (0.52)	0.75	−0.68	0.47	–	–
Job satisfaction	3.98 (1.01)	0.96	−0.98	0.43	–	–
Motivation	3.82 (0.88)	0.85	−0.43	−0.35	–	–

TABLE 2 Bivariate correlations between study variables.

	Variable	1	2	3	4	5	6	7
1	Perceived usefulness of online modalities	1	0.60**	−0.55**	0.28**	0.19**	0.45**	0.47**
2	Online teaching preparation		1	−0.53**	0.27**	0.40**	0.39**	0.46**
3	Computer-mediated communication apprehension			1	−0.17*	−0.35**	−0.49**	−0.51**
4	Communication frequency				1	0.13	0.13	0.18**
5	Communication satisfaction					1	0.36**	0.32**
6	Job satisfaction						1	0.76**
7	Motivation							1

**$p < 0.01$, *$p < 0.05$.

Counter to our predictions, perceived usefulness of online teaching modalities was the only significant predictor of instructors' communication frequency with their students after controlling for the other predictors in the model; this suggests that when university instructors perceived online teaching to be more useful, they also reported more frequent weekly online communication with their students during the transition to emergency remote teaching. Our findings also suggest a negative association between perceived usefulness of online teaching and communication satisfaction. Perhaps the scale's focus on the efficiency of teaching online explains both findings. For instance, the items emphasize how the use of online teaching technology "increases productivity" and enables instructors "to accomplish [their] work more quickly." As a result, it is possible that faculty who perceive online teaching technology to be adept at facilitating quick communication would also put that teaching technology to more frequent use in communicating messages to their students. These faculty may also recognize that even though these technologies may be efficient and productive, they may not be satisfied with the quality of the online interactions these technologies afford to them.

Based on these findings, faculty development and teaching and learning center specialists should focus their efforts on managing instructors' CMCA as a means of developing instructor communication competence in online teaching. Some CMCA experts assert the importance of prescreening remote workers, such that instructors should self-select to teach online as opposed to being required to do so (Fuller et al., 2016). However, given that the pandemic created "forced online teaching" (Drueke et al., 2021) and even greater demand for remote teaching beyond the initial waves of the pandemic, this may not be feasible (Cutri and Mena, 2020). Following the advice of scholars researching faculty experiences during the pandemic, higher education administrators should also emphasize reduction of job demands and simultaneous increase of resources as a means of minimizing CMCA among instructors (Zhang et al., 2022). As we have argued elsewhere, tangible, institutional support in the form of financial incentives and/or purchasing of hardware/software necessities as well as emotional and instrumental support through collective sensemaking and brainstorming/training sessions for faculty teaching online may help reduce these demands (Farris et al., 2022a). Future research should specifically explore resources and interventions that help instructors manage and minimize their CMCA. One logical starting place would be to test the efficacy of systematic desensitization, cognitive modification, and computer-mediated communication skills training as these are all empirically validated processes for minimizing general forms of communication apprehension (Bodie, 2010).

The results of the current study should be interpreted with the following limitations in mind. The cross-sectional design limits causal assertions regarding the associations of interest, and the homogenous sample limits the generalizability of the findings. Additionally, given that communication frequency was measured using a single item, it was not possible to assess the reliability of the measure. It may be that participant responses varied regarding what "counts" as a single instance of communication with students (e.g., does an email interaction thread with one student count as a single interaction or several interactions? Does a class announcement count as one interaction or 30?). This

likely explains the small variance accounted for in communication frequency by the predictors in the current study. Future studies should employ multi-item measures for communication frequency when able, especially in computer-mediated contexts. Additionally, the non-significant associations between the predictors and the communication frequency measure might be indicative of method variance given that all measures were collected cross-sectionally and that most measures assessed instructor affect.

Future directions

Scholars should consider collecting longitudinal data to explicate the potential bi-directional effects between the study variables and should attempt to recruit more representative faculty samples. Moreover, additional data related to the frequency of specific types of messages (e.g., task-oriented, relational-oriented) as well as the communication platforms or technologies instructors used to communicate with their students would be helpful. Relatedly, obtaining actual messages from faculty-student online interactions would not only aid in the potential method variance bias but also provide more objectivity to the study of online teacher-student interactions. Finally, collecting data about how instructor online teaching preparation, perceived usefulness of teaching modalities, and CMCA predict faculty members' enactment of instructional communication behaviors (e.g., verbal and non-verbal immediacy, confirmation, clarity, social presence, etc.) from both instructor and student perspectives would provide a better understanding of instructors' communication competence in these online interactions with their students.

Conclusion

Although the initial waves of the COVID-19 pandemic and accompanying emergency remote teaching are behind us, scholars have already begun identifying the long-lasting implications to higher education. For instance, there are initial reports for greater demand among students and administrators for online learning at the college-level since the start of the pandemic (McKenzie, 2021), and some scholars argue that this increased demand will make opting out of online teaching nearly impossible (Cutri and Mena, 2020). Moreover, we assert that requiring online teaching as a means of maintaining academic continuity during other forms of class disruption (e.g., natural/weather disasters, faculty medical/family leave, grid failures, etc.) will likely be one of the major legacies of COVID-19/s impacts on higher education. As a result, these findings suggest the importance of helping faculty manage their computer-mediated communication apprehension, appreciate the usefulness of various online teaching technologies, and be prepared via hosting online teacher training sessions—preferably before a crisis occurs. Collectively, these strategies may impact instructor communication competence through more frequent and satisfying online interactions between teachers and students and may help faculty be more motivated and satisfied in their roles.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Texas State University Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

KF: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. LD: Conceptualization, Writing – original draft. MH: Conceptualization, Writing – review & editing. CT: Conceptualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Having it both ways: learning communication skills in face-to-face and online environments

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In early 2020, the COVID-19 pandemic forced educators to transition to online teaching almost overnight. This paper focuses on students' perceptions of communication skills in a practice course in the spring of 2020. The beginning of the course was held face-to-face and conducted online at the end. We sought information regarding students' experiences of online course in a skill-based course. Relying on knowledge about online communication, we selected three areas to focus on in online course. First, feedback is essential in the process of learning communication skills and is included in the course learning objectives. Second involves eliciting conversations in an online environment. The third area is the connection between the audience and the speaker in public speaking. Our goal was to develop the course according to student's perceptions. At the end of the course, 26 students answered open-ended questions about the two forms of implementation. Using thematic analysis, five different themes were constructed: (1) positive perceptions of the course, (2) neutral perceptions of online course, (3) perceptions of the challenges in online course, (4) perceptions of public speaking, and (5) perceptions of feedback. During the course, the students learned much-appreciated computer-mediated communication. They believed that the good learning results were due to careful organization and connection to other students. While uncommon, few students perceived online course as neither good nor bad, just neutral. Nevertheless, online course was not without challenges; students identified several problems concerning, for example, conversations and non-verbal communication. Furthermore, students considered feedback to be successful; however, online public speaking was perceived as different from speaking to a physical audience. The results of this study indicate that in a skill-based course, the online format can be just as effective as the face-to-face format. However, especially because public speaking was regarded as different and participants appreciated practicing communication in the online setting, we suggest that students should have the opportunity to practice communication skills both online and face-to-face. Additionally, although conversations received special attention, it caused the most significant challenges in the online environment; therefore, we propose that solutions to address this problem must be investigated further.

KEYWORDS

skills-based course, skill-based learning, skill-based teaching, online learning, online teaching, online public speaking, higher education, communication skills

1 Introduction

Nowadays, higher education faces many challenges. One of these challenges is that higher education has become a possible and conceivable option for a growing number of young people worldwide (Shah et al., 2015). According to Organisation for Economic Co-operation and Development (Organisation for Economic Co-operation and Development, 2023) Education at a Glance data, the percentage of younger adults aged between 25 and 34 with tertiary degree has been rapidly growing. While in 2002 the percentage was 27.8%, in 2012 it rose to 39.2% and in 2022 it was already 47.4%. This, of course, has a remarkable influence on higher education teaching, as it caters to an ever-growing number of students from diverse populations (Callender et al., 2020). Higher education also tries to satisfy the needs of students who manage work, family, and studies (Wilton and Ross, 2017; Ren and Caudle, 2020; Webber and Dismore, 2021). Technology is seen as an answer for many of these challenges, and the integration of new technologies, such as online learning platforms (e.g., Moodle, Canvas, Blackboard Learn), collaboration platforms (e.g., Zoom, Microsoft Teams, Slack) has indeed progressed in higher education teaching, as well as in other aspects of society. Information and communication technologies revolutionize the way we learn and teach, while stakeholders demand more relevant education for the workforce (Tennant et al., 2009). Harrison et al. (2022, p. 80) stated that governments also feel the pressure to "demonstrate that their higher education systems are effective in providing value to the nation in offering educational opportunities and producing skilled workforce for the knowledge economy." This notion indicates that higher education is in a constant process of development, striving for high-quality teaching and research should serve as the cornerstone of this development. Communication studies are part of this process, and online teaching is a crucial part of teaching development.

After the COVID-19 pandemic permanently altered our perceptions of education, substantial debates and discussions have been raised by our societies regarding teaching and learning at different educational levels. Online courses are not a novel concept—they have been a functional and important part of teaching, albeit typically designed for specific purposes and striving for inclusive education, taking into consideration for example international students (Bennett and Lockyer, 2004) and students with disabilities (Macy et al., 2018). However, due to the pandemic, all courses, even those traditionally conducted face-to-face, were forced to transition online. Under these circumstances, educators have extensively discussed whether high-quality teaching and learning is possible (e.g., Bernardo et al., 2021; Lemay et al., 2021; Allaire and Killham, 2022; Guzzo et al., 2022; Engel et al., 2023; Fütterer et al., 2023). Online education has generated numerous and diverse beliefs, feelings, and experiences concerning its effectiveness, quality, and educational best practices.

After a few years of experiments, online teaching has now become a fundamental part of the educational system. We can never look at higher education in the same light as before. Now that we no longer live in constant fear of spreading a life-threatening virus, we can move on from that period, which has been termed "emergency distance education" (e.g., Toquero, 2020) or "emergency remote teaching" (e.g., Talidong, 2020), and look back and reflect. We should now determine what has been successful, what remains to be learned, and whether online teaching has succeeded in the field thus far. Answering this question requires a focus on the standards that are used as the basis for evaluation. Students, academic programs, and higher education institutions each have their own goals (Biggs and Tang, 2011). Research-based knowledge from all these areas concerning the outcomes of online teaching and learning under different circumstances should be incorporated. Students' experiences are only one part of successful teaching, which should be acknowledged when applying evidence to future courses; however, it provides a good starting point for teachers to plan effective courses with positive educational results.

As higher education faces increasing pressure to develop its education online, especially after the pandemic, the number of studies that collect students' perceptions about online courses has been expanding. However, studies have data from the same course, implemented face-to-face and online (Spencer and Temple, 2021) and usually students have participated in one of these implementations but have not experienced the other (e.g., Saurabh et al., 2021; Yau et al., 2022; Dergham et al., 2023). Studies about perceptions of students who have experienced both implementations in the same course are uncommon, but they could provide highly explicit information when comparing the two. For example, Kemp and Grieve (2014) mixed both modalities within one course. They found that even though the differences in students' test performance is not considerable, students favor completing face-to-face activities rather than online. The study also found that students feel strongly about conducting class discussions face-to-face because of they felt "a more engaged, and received more immediate feedback, than in online discussion." In 2014, the technological possibilities were different from those of today, as technology offers more options to implement different teaching strategies. Studying these two implementations within one course could provide different experiences. Research about students' experiences with face-to-face and online implementations within the same course is rare. Our study also focuses on a skill-based course, traditionally relying on the idea of being physically present and performing different practices with others. In addition, when training in communication skills, physical presence was always taken for granted.

2 Developing skill-based online course

Skill-based teaching approach can also be referred to as practice-based or described as relying on the ideas of experimental learning. Our view about skill-based teaching approach is consistent with that of Magill et al. (2022), who listed methods, such as observed practice, demonstration, and performance assessment and feedback. In skill-based courses, the learning objectives can often be rather specific and, at the same time, can be a bit abstract in more traditional lecture courses. In skill-based courses, pedagogical choices are different; however, they rely on theory and knowledge from respected disciplines. While leaning on the pedagogical thoughts of social learning theory, Cameron

and Whetten (1983) developed a model of skill-based training, containing five activities that describe the structure of skill-based teaching approach.

First, they suggested a preassessment activity to provide an opportunity for students to focus on their current level regarding the skills, to know how well the skills can be performed, and to motivate them to improve. Second, students are provided with conceptual materials based on theories, research, cases, or examples. The third activity focuses on skill analysis, in which students are asked to analyze some cases showing a student's competent and incompetent performance in real-world situations. The fourth activity is practice. In this activity, feedback is important so that the students can correct their behavior and rehearse other alternatives. The fifth activity is the application, which refers to practicing skills in real-world settings while maintaining a monitoring connection with an instructor. Students may, for example, teach the skills of observing and reporting on the actions of others. Some of these activities are easier to transfer to online settings than others and leave teachers wondering about the quality of online skill-based courses.

Experience after the pandemic has indicated that learning objectives can be achieved even in online skill-based courses, and research is starting to support this notion. However, at the same time, researchers remain persistent in developing online courses, and this persistence may have valid reasons. For example, Lowenthal et al. (2015) found that students rate instructors lower in online courses than in face-to-face courses. Furthermore, even if the learning objectives are achieved during the course, in their study of master's level negotiation courses, Callister and Love (2016) found that face-to-face learners earn higher negotiation outcomes than online learners, even when using the same technology. Based on their study, Callister and Love (2016, p. 251) argued that "reduced interactions between students and faculty are important factors to focus on in online teaching."

Despite the challenges or insecurities in shifting skill-based courses online, positive factors can also be considered in developing these courses. First, communication and human interactions occur in online surroundings more than ever before, indicating that future professionals should possess technology-mediated communication skills. This does not only refer to technical skills but also to skills to understand how to achieve your goals and comprehend different aspects of appropriate and effective communication in online settings. Second, the same need for online courses is directed toward skill-based courses as others.

2.1 Communication skills

Shifting a communication skills course online requires defining the concept of communication skills. Communication skills can be defined rather broadly. It can mean anything from writing to visualizing, from media literacy to reading, but in this study, we refer to the skills needed in social interactions. Communication skills are quite commonly seen as innate ability, but it has been acknowledged, that this is not the case and communication skills can be taught (e.g., Maguire, 1990; Hargie, 2006; Van der Molen and Gramsbergen-Hoogland, 2019). The concepts of communication skills and social skills are linked together and considered identical, because both skills are easily detected from the behavior of others. Yet, as Spitzberg (2003) reminded us, skillful behavior does not appear occasionally, but is intentional and repeatable.

The first known attempts to locate the skills linked to human communication can be traced relatively far in history. The origins of communication research are firmly rooted in ancient Greek and in the admiration for the power of persuasive and eloquent speech. Aristotle et al. (ca. 350 B.C.E./1984), with his idea of rhetoric, introduced the ingredients of persuasive speech: logical reasoning, the understanding of human character and goodness in their various forms, and the understanding of emotions.

From the shift to perceiving social interactions as more than just delivering a message in spoken word, the term social skills emerged. At their basic level, skills were split into verbal and non-verbal behaviors (Hargie, 2006), meaning that a skillful communicator has a reservoir of verbal and non-verbal behaviors. Indeed, according to Burgoon and Bacue (2003, p. 180) with non-verbal behavior, several goals or functions can be accomplished, such as (a) expressive communication, (b) conversational management, (c) relational communication, and (d) image management and influence processes. Together with verbal communication, skillful social behavior is something we either master or fail to exhibit.

However, apprehending social skills as a handy toolbox from which to select different sets of behaviors, did not seem to meet all the requirements placed on social skills. It was equally important to understand the context, and ability to achieve goals (Hargie, 2006). Several communication theories underline the function of achieving goals. For example, Fishbein and Ajzen (2010, p. 20) based their theory on the assumption that "human social behavior follows reasonably and often spontaneously from the information or beliefs people possess about the behavior under consideration," in other words, how we choose to behave depends on our predictions about the outcome. In our social interactions we have expectations for behaviors and goals both for other people and ourselves. As social interactions are driven by goals (Berger, 2002), an important part of communication skills is achieving those goals.

According to Hargie (2006, p. 11) the final feature of the definition is the skill of identifying emotions or intentions to give an appropriate response. Certainly, it is difficult to imagine that someone's behavior would be estimated to be successful without a respectful and necessary reply. Sometimes our reaction would be skillful in one social setting but not in another. An appropriate response requires that in social interactions we listen and understand the other communicator's point of view.

To conclude, "social skills involve a process in which the individual implements a set of goal-directed, interrelated, situationally appropriate social behaviors, which are learned and controlled" (Hargie, 2006, p. 13). The demand for skillful communication seems unreasonable, and Greene (2021) aptly raised the question of the communication skills paradox, where we understand and acknowledge that communication skills matter, but we also seem often to fail in our communication performance. Despite the possibility of failing, with the potential of bettering our lives, practicing communication skills is important especially for communication students who should apply their theoretical knowledge of human communication in practice in a safe environment.

2.2 Feedback

Feedback is essential in the process of learning communication skills. The ability to receive, use, and give feedback is thus included in the learning objectives of the communication skills practice course. Therefore, students should have the opportunity to practice all these areas. First, scholars have noted that students may need to develop their skills to give feedback to their peer students (Baker and Baker, 2023) and peer feedback should be emphasized, because students give and receive feedback from others without any formal authority over each other (Finn and Garner, 2011). This allows students to offer and accept advice from different perspectives.

Second, student should also receive feedback from the teacher. Feedback should offer information about the gap between the current understanding or performance and the desired goal, enabling the receiver to narrow the gap (Sadler, 1989). Adopting this perspective, Hattie and Timperley (2007, p. 86) suggested that effective feedback consists of three components: (a) feed up, (b) feed back, and (c) feed forward. Feed up means providing information about the learning goals and answers the question of where the receiver should go. Feed back concerns where the receiver's understanding or performance is going at a particular moment. Feed forward concentrates on the future, answering the question of where the receiver should go next. Overall, the feedback should engage the receiver, lead to the elaboration of the advice, and generate action (Ladyshewsky, 2013).

The teacher's role and communication are important. In particular, the teacher's verbal and non-verbal face-threat mitigation strategies and higher non-verbal immediacy seem to be positive features of influential feedback (Trees et al., 2009; Witt and Kerssen-Griep, 2011). Studies focusing on the effects of providing feedback on communication skills, have shown that the more immediate the feedback is, the more effective it is (King et al., 2000). However, there may be significant differences how immediate feedback can be provided in online or face-to-face environments. Non-verbal communication is crucial to the teacher's mitigation strategies and immediacy, and conveying these features in an online context is different and not always as straightforward as in face-to-face teaching (Clark-Gordon et al., 2018). Therefore, it is interesting to consider how the students in the present study experienced feedback when the course was transferred online.

Despite the source of the feedback, doing tasks, such as participating in communication situations, giving presentations, and having discussions, are not enough when practicing communication skills; we should also analyze the features of the communication process (Valo, 1995). Therefore, feedback enhances practice and guides the learning outcome. Furthermore, feedback is a communication situation—one that always involves a receiver who evaluates and interprets the messages (Ajjawi and Boud, 2017). Recently, for example, the feedback sensitivity of students has been found to play a key role in how feedback will be interpreted (e.g., Smith and King, 2004). Therefore, the outcome of the feedback depends largely on the receivers themselves. The receiver and the provider engaging in discussions can reduce misunderstandings and diverging perceptions of feedback, and the receiver becomes more active (Valo, 1995).

2.3 Maintaining trust and eliciting conversations

Previous research has shown that social interactions that support learning (Muilenburg and Berge, 2005; Malott et al., 2014; O'Doherty et al., 2018) and building trust (Anwar and Greer, 2012; Wang, 2014) challenge online teaching and learning. These concepts are interdependent; the better the level of trust, the better the social interaction. Especially when pedagogical objectives should be achieved through social learning, students must share an understanding of the significance of openness and trust during the course, which enables them to practice their communication skills without fear of failure. This has not always been achieved in online courses and students can become frustrated with online teaching due to a lack of interaction with both their peers and the instructor (Sellnow-Richmond et al., 2020). Furthermore, just as with other new relationships, engaging with new surroundings and social interactions might induce uncertainty, which can be reduced by self-disclosure (Berger, 1997). When enrolling in an online course, students are in the same position as other people who meet only online. They often worry about what these "distant partners are like: whether they are reliable, hardworking, enjoyable, and if they have a good sense of humor" (Walther, 2008, p. 391). Then again, if students are trusting, they will likely be more willing to share information about themselves and the course topics.

With online learning and teaching, we refer to courses where teacher–student and student–student interactions take place only in online surroundings. In addition, in this study, the teacher–student relationship is regarded as similar to other interpersonal relationships. The importance of student–teacher relationship is acknowledged. In 1992, the relational teaching approach (RTA) was introduced, and it was based on the belief that "teaching involves a process of relational development and requires effective interpersonal communication skills to achieve satisfying outcomes" (Graham et al., 1992, p. 11). This theme continues to generate interest within academia, Hagenauer et al. (2023) recently argued that the establishment of positive teacher–student relationships must be regarded as a significant educational aim. The teacher has an important role in creating atmosphere that enables open discussions and promotes trust.

The question is, however, what skills a teacher must possess to enhance interpersonal relationships with students. It would be possible to conclude that if the teacher–student relationship is identical to every other interpersonal relationship, maintaining trust and eliciting conversations require good interpersonal communication skills from both the teacher and the student. To clarify the role of the teacher, Bainbridge Frymier and Houser (2000) presented a comprehensive review of research identifying teachers' interpersonal variables that are positively related to learning. These are immediacy, communicator style, affinity-seeking, self-disclosure, solidarity, humor, caring, and compliance-gaining. From this list, research on immediacy in instructional communication has attracted particular interest (e.g., Jaasma and Koper, 1999; Baker, 2010; Khoo, 2014; Tonsing, 2018; Vareberg and Westerman, 2023).

The concept of immediacy was introduced by Mehrabian (1969, p. 203) and can be defined as the degree of creating

willingness in others to show closeness in their behavior. When teaching is viewed through a relationship lens, it develops through immediacy according to a certain development scale beginning from the first contact to separation (DeVito, 1986). Closeness can be expressed through verbal and nonverbal behaviors. Through verbal communication, the teacher can for example express distance (e.g., here vs. there), duration (e.g., longer contact vs. shorter contact), and participation (e.g., you should vs. some should) and through nonverbal communication, the teacher can express proximity, touch, and/or gaze (Zhang and Witt, 2016).

In human communication it is difficult to give simple advice about correct behavior. Relationships are messy and affected by individual backgrounds, their willingness and capacity to create and interpret messages, and the context, among other things. Immediacy then, is also dependent on these factors. However, teachers working in a pressured atmosphere will benefit from the knowledge about immediacy and efforts to create closer relationships with students.

2.4 Learning public speaking online

Students are aware of the effects of digitalization on different communication situations in a person's work life (Carraher Wolverton and Tanner, 2019). Inevitably, these effects also pertain to public speaking skills. Online presentations and meetings are an important part of future professionals' communication skills. Designing online communication skills or public speaking courses always has shortcomings. As Morreale et al. (2015) discussed in their reflection essay, teaching public speaking online often involves mimicking face-to-face courses, which leads to unsuccessful outcomes. Ward (2016) observed challenges especially regarding context, audience, speaker, and course evaluation.

Understanding the meaning of different contexts is a significant part of communication skills. Furthermore, the issue of the audience becomes a problem, as public speaking education in communication studies emphasizes interaction orientation rather than performance orientation. Public speaking is an interaction with an audience, and the speaker is expected to react to the audience's reactions. For the speaker, the concerns included questions about communication apprehension. As Sellnow-Richmond et al. (2020) found in their study, "students in online teaching felt unprepared to present public speeches in person after only delivering speeches online with no "public" present" (p. 254). The students also considered a significant difference between viewing recorded speeches and speaking live in front of a group. The situation may improve if the audience is virtually present during speech (Sellnow-Richmond et al., 2020).

Given the course objectives and the areas on which we focused, we sought additional information regarding students' perceptions of the skills they may have learned during the course and whether they perceive the course as successful. Hence, we asked:

> RQ1: How did students perceive online implementation in the communication skills in practice course, and what learning objectives do they report as achieved?

In addition, we aimed to further develop the course. To understand what worked and what did not work in both types of instruction, we asked the following research question:

> RQ2: What kind of experience was the 2020 course, and what did the students perceive positively and negatively in face-to-face and online implementations?

3 Materials and methods

3.1 Studies course: communication skills in practice

The discipline of communication studies is often regarded as practical (Craig, 2018); however, studies on communication students in university often focus on significantly theoretical, traditional, and teacher-led lecture courses. However, some communication courses can also be practical. Compared to Cameron and Whetten's (1983) design, students enter this course in three steps (a) they have estimated their individual skills, (b) they have been offered a theoretical background, and (c) they have analyzed different communication situations. However, in the beginning of this studies course they engage in self-assessment activities. The pedagogical foundation of the examined skill-based course has traditionally relied on conversation, interaction, feedback, and reflection. Thus, an open atmosphere should also be established during online delivery. At the same time, the course's learning objectives should be achieved, which requires making certain pedagogical choices. The objectives of the course are as follows:

(1) Improving communication skills by reflecting on communication behavior and using feedback;
(2) Understanding how communication skills appear in and affect communication situations;
(3) Participating appropriately in various group communication tasks;
(4) Learning how to improve the atmosphere and task management of a group, as well as how to set goals for negotiations and enhance the implementation of these goals;
(5) Learning how to plan one's communication in a goal-oriented way;
(6) Giving different kinds of public speeches and adapting one's communication to different situations;
(7) Learning how to assess and analyze different speeches and communication situations, as well as how to give feedback on them; and
(8) Understanding the relevance of all the above skills to working life.

Among students, the course has long been known to focus on public speaking. Indeed, this aspect has been a major component of the course. At the end of the course, students arrange a public speaking event at which the audience consists of other students and communication studies scholars. At this event, each student

delivers a five-minute speech, which they have had the opportunity to plan and practice in advance.

Inevitably, determining how to incorporate course practices into an online environment is challenging. As we strived to meet our pedagogical objectives, we decided to pay special attention to areas we thought would be the most challenging in online implementation. Relying on previous knowledge of online communication, we chose three main areas to focus on: (a) feedback, (b) maintaining trust and eliciting conversations, and (c) learning public speaking online.

The provision, receipt, and use of feedback; the ability to work in groups; effective negotiation; public speaking; and self-reflection are important skills for this course. In the course in question, students receive a generous amount of feedback —some from the teacher— but they also practice giving feedback to others in different situations. The communication skills in a practice course provide an opportunity to give feedback orally and instantly after practice, immediately in written form, and in a more elaborate fashion in written form based on a prerecorded video. Thus, we were unsure how the students perceived this situation and if the online environment had a negative impact on the feedback sessions. In previous implementations of the course, students had opportunities to practice both quick face-to-face feedback and highly elaborate written feedback, while also reviewing video-recorded performances. For online implementation in 2020, the same opportunities were provided, and it was anticipated that the issue of trust and open discussions would need to be addressed.

To address this problem, a few adjustments were made to the course to provide more space for relational communication. A Zoom meeting was held 15 min before the start of each session to offer students free space for sharing their thoughts. "Friday coffees" were also organized on Zoom, which lasted for an hour and allowed students to ask about the course and assignments or to discuss certain topics further. Information about how students experience different sorts of interactions is central to future course development.

Consistent with the findings concerning public speaking, the students in the course had the opportunity to speak synchronously with the audience, which consisted of their classmates and other people. The classmates were asked to keep their cameras on during these speeches.

3.2 Research design and the data

The research design for this study is based on the interpretive paradigm. Reality is seen as constructed through subjective perceptions and interpretations (Croucher and Cronn-Mills, 2021). As we were interested in (a) student perceptions, (b) what those perceptions construct, and given the novelty of the situation created by the COVID-19 pandemic including the rapid shift to online teaching, qualitative methodology was adopted. Qualitative research emphasizes exploring individual experiences, describing phenomena, and developing theory (Vishnevsky and Beanlands, 2004). According to Cardano (2020), the qualitative research process can be divided into four phases, (1) planning or design, (2) data collection, (3) data analysis, and (4) textualization. We collected textual data and according to Peterson (2017), chose a common interpretive data analysis process known as thematic analysis as our analysis method. The last phase, textualization refers to the specificity of qualitative research, and its ability to represent both the voices of the researcher and the participant when defending the presented argument (Cardano, 2020). When collecting data, research design is essential, it should be possible to answer the research questions with the collected data.

The 2020 spring term communication skills practice course was conducted with 26 students, who were divided into two groups. Usually, students participate in this course in their second year of communication studies. The students met seven times, for 4 h each time, four times in the classroom and three online. In the studied course, the majority were communication studies major students, but a few students were with other majors. Nevertheless, for this course, students must pass three theoretical courses; thus, the students have quite a similar understanding of communication studies from courses with a strong emphasis on theory and the latest research. The data were collected by asking the students to write a reflection paper that included five open-ended questions about face-to-face and online implementation and the course objectives. All 26 students completed the course and submitted their reflections to the course's online platform (Moodle), and they all gave their permission to use their answers for this study. Other socio-demographic information was not collected.

Based on the university's policy; the faculty dean gave permission to conduct this study. Before answering the questions, students were informed about the research and that they had the option not to participate in the research. Consent was written at the end of the reflection. Open-ended questions allowed us to gather accurate information about the student's experiences. The five questions were as follows:

(1) What kind of experience was it to practice communication skills as part of online course?
(2) Compare your experiences with face-to-face and online implementation. What worked well, and what did not in these two formats?
(3) What new aspects did online course bring to your communication skills?
(4) What was the feedback like in online course? What similarities and differences did you notice with feedback in face-to-face learning?
(5) Did online course succeed in developing your communication skills, given the course objectives?

3.3 Analysis

In line with our aim to determine what the students perceived as positive or negative and further develop the course, we were interested in examining what meaningful patterns could be recognized from students' reflections. Thematic analysis (TA) was chosen as the analysis method. Our approach was to highlight the most common data through inductive analysis and determine what was meaningful in terms of our first research question. For the second research question, we followed abductive coding principles (Tracy, 2020) and we coded students' positive and

negative perceptions. Braun and Clarke (2006, p. 79) defined TA "as a method for identifying, analyzing, and reporting patterns (themes) within data." For this study, this also means the possibility of leaving space for interpretation. Of course, TA is not without limitations and often raises the question about trustworthiness. Extensively accepted criteria for trustworthiness in qualitative research were presented by Lincoln and Guba (1985). They offer the criteria of (a) credibility, (b) dependability, (c) confirmability, and (d) transferability to assess quality in qualitative research. Because these criteria are linked together, we will address them when describing the analysis process.

According to Tobin and Begley (2004), dependability can be achieved by showing that the research process has been logical, traceable, and clearly documented. Furthermore, the criterion of transferability refers to the possibility to of transferring findings from one context to another (Cope, 2014) and therefore also highlights the importance of describing the research process in detail. We have addressed the theoretical background, the formation of research questions, and data collection previously in this study and now describe the analysis process. After the results, we will also discuss the limitations of this study.

In our analysis process, we followed Braun and Clarke's (2006) six steps for TA. First, the answers were read multiple times, and notes were taken to gain familiarity with the data. As Nowell et al. (2017) noted, even though the steps are presented as linear, they are a process that develops and moves constantly back and forth between phases. During the first step, the initial ideas about potential codes were written down (Braun and Clarke, 2006), and notes were made about the interesting features of the data.

In the second step, the codes were created for ATLAS.ti. In total 494 quotations presenting interesting observations, were first named as shorter descriptions, thus simplifying the data, and allowing us to focus on specific characteristics (Nowell et al., 2017). At this stage, some of the same quotations could be found under two, or sometimes even three, different codes. At the end of the coding, the quotations under the codes were viewed together to ensure that they constructed a cohesive entity. In addition, if different codes were suggested under other quotations, a decision was made about the most suitable one.

After numerous revisions, 43 codes were constructed. In the third and fourth steps, after a close inspection of the codes and quotations relating to them, themes were generated from the codes. Some code groups were identified, and raw data were reevaluated to see if the generated themes described the data accordingly. For clarification and to show the diversity in answers, we decided to arrange the results into themes, subthemes, and code groups. In this manner, within the same phenomenon, the students could present different views. Finally, the fifth and sixth steps included determining the final theme names and producing a report, respectively.

As complete objectivity is not realistic in qualitative research (Eyler, 2021), confirmability refers to getting as close to objective reality as qualitative research can. Guba and Lincoln (1989) recommend establishing confirmability through credibility, transferability, and dependability. To achieve this, we must clarify researchers' involvement in the analysis process. The analysis was conducted primarily by the first author and the teacher of this course. This gave a good insight into the collected data. Furthermore, interrater coding was done by the second author, an experienced professor with extensive experience in qualitative analysis. He went through the data, and the coding process was discussed. He also checked the emerging codes and themes at different stages of the analysis, commented on them, and made suggestions.

When addressing the criteria of credibility, the results should be recognized by coresearchers and readers (Guba and Lincoln, 1989). In other words, it should be possible to identify respondents' views from the results. In the following results, we offer rich quotations from the data to illustrate each theme.

4 Results

The research questions aimed to identify the success of the course and the positive and negative perceptions of students about the two implementations. With this information, we aimed to develop the course. Five different themes were constructed from the data: (1) positive perceptions of the course, (2) neutral perceptions of online course, (3) perceptions of the challenges in online course, (4) perceptions of public speaking, and (5) perceptions of feedback. The first three themes focus on perceptions about the course, and the latter two focus on specific communication situations. In the results, neutral perceptions were placed between positive perceptions and challenges, although references to that theme were rare in the reflections.

4.1 Positive perceptions of the course

The theme that was highlighted the most in the students' answers was that the course was successful, students learned new things during the course, and they made observations about the positive aspects of online course. More specifically, this theme was based on three subthemes: (1) a unique and successful course, (2) things learned during the course, and (3) advances in online course.

In the first subtheme, a unique and successful course, the students believed that the course's good learning results were due to careful planning and organization—instructions were found easily, information about changes was reported to students, and no problems occurred with joining Zoom. For many students, it was important that at the beginning of the meeting, the teacher took time to ask everyone individually how they were doing and if there were any problems. The students appreciated that the transition to online classes did not cause any extra work, and the course plan did not change. They also appreciated that everyone cared for the planned deadlines.

The other reason for the success of the course was the feeling of encouragement and the presence of others. Online implementation in Zoom, where cameras were open all the time, was not as lonely as online courses without joint meetings. Students reported their feelings about being heard and how everyone understood the difficulties concerning the course. For example, they did not focus on anything but the meeting in Zoom. The "Friday coffees" were also mentioned. The idea of a space for more casual interaction was perceived positively, and some even thought they were supported more in this course than others. Even if they did not necessarily join, they were happy with the knowledge that it would be possible.

The face-to-face meetings that took place at the beginning of the course helped the students gain trust in each other, and this connection remained during the online period. The students shared their feelings on different platforms, even on social media. Knowing that others were in the same situation was comforting for them. Many of this theme's perceptions were described in the words of respondent 12,

> However, despite feelings of fear and uncertainty, the course was not a disappointment at all. On the contrary—I feel that the teacher took us, the students, into account in the beginning by asking how we are doing and by arranging separate moments for discussions in the form of Friday coffees. I can see how each teacher and student were accommodated in a surprising crisis successfully and, above all, in a very flexible and positive attitude. In my opinion, the factors mentioned above had a significant impact on us students because I had an experience about how future communication professionals will have to accommodate the changes in the environment at a complex and rapid frequency.

The students shared their thoughts about successful areas during the course. Even if they were unsure if something was left out or changed, they believed that they had achieved the course's learning objectives and learned in the usual manner. Many felt that the online format could offer the same results as face-to-face course. Moreover, they were also unsure if all the practices would work online, but different communication skills practices were successfully carried out, and they obtained good results with them. Group work proceeded without substantial problems. For some students, this was the first time that group work had been organized largely online; for many of them, it was a pleasant experience. Respondent 11 described,

> In our group, in my opinion, working online was even more fluent than in face-to-face communication because we managed to arrange joint schedules and we performed efficiently. Group meetings were not so attached to specific times and places, so the assignments were done, despite where you were. In addition, in my opinion, we used different platforms efficiently, and this enabled everyone to make changes or seek information.

The uniqueness of the situation could also be identified from the students' observations about learning useful skills for the future and having an opportunity to improve themselves. During the course, the students realized that they were in an exceptional situation, but they were in it together and supported each other; this helped them get through the course. Seeing the benefits of the unique situation, they found positive sides to it.

The second subtheme listed the things students reported they had learned during or because of the course. Many reported that they learned how to improve their technological skills. The course was held via Zoom, and the students had to participate with audio and video connections; microphones could be switched off when they were not speaking. Zoom transmitted only one sound connection at a time, and they did not want to talk over others. Muting a microphone when someone spoke was considered a form of politeness, as this decreased background noise. They learned to analyze their appearance on a screen, and they used other applications, such as Word, Moodle, WhatsApp, and emails. Using different platforms was not as difficult as they had assumed it would be.

The students found that technology can also provide some positive aspects, such as the possibility for people outside their hometown to participate in their speech event. Furthermore, they welcomed the possibility of acquiring technological skills because they felt that the field of communication partly contains a requirement for technical competence. They felt that in recent years, workplace communication has been changing toward technology-mediated communication and that this change had been accelerated by the pandemic. Therefore, now was the time to learn the skills they would need in the future.

Besides technological improvement, students reported that they learned more about communication skills, more specifically about social interaction. For example, some students felt that the video connection created the feeling of being together and allowed them to interpret other students' feelings from non-verbal communication. As respondent 21 explained,

> I used to think that online communication was in some way defective compared to face-to-face communication. I think this is based on my experience with online meetings at work, where usually we use only voice connection, not so much video. The format at the end of this course changed my mind. The simultaneous video and audio connection in the student groups worked particularly well for our interactions.

One of the course objectives is "learning how to adapt one's communication to different situations," and the students considered this to be a much-needed skill in the fast-changing world of work. Some of them learned how to accommodate their communication to better suit the online environment and realized how important it is to accommodate different communication situations, especially as communication specialists.

The students also learned listening skills and non-verbal communication skills. They had to wait patiently for others to stop talking before it was appropriate to take the floor. Even with the video connection, however, some non-verbal messages, such as sighs or laughter, were lost, so they could not rely just on a smile or other non-verbal messages; they had to put their feelings into words. They described how important it was to be clear in their non-verbal expressions, articulations, rates, and tones of voice. Group communication skills were also areas in which the students felt they had learned something new. They paid more attention to sharing responsibilities and to the way they indicated their involvement as group members. They gave space to others and shared information.

In addition to technical and social interaction skills, students reported gaining a broader understanding of communication skills. They had an opportunity to perceive skills from a different view than they had anticipated before the course. This extraordinary situation helped them to reflect on their own and on other students' communication skills. In addition, students appreciated flexibility, adaptation, and patience when working online, especially given the

unusual situation. They thought that clear scheduling helped them understand and communicate better with others.

The third subtheme under positive perceptions was the advances of online course, which contained quotations where students expressed what they appreciated about online course. The most prominent advantage was that online course brought a feeling of increased control and flexibility to students' lives. Finally, it was possible to be in two different places at the same time, and no time was wasted traveling. It became easier to adjust studying to other areas of life. Some of the students reported that participating from home encouraged them to act more confidently as their true "selves," whereas others felt more relaxed being in familiar surroundings.

Many of them mentioned the realization of the changing needs of work life, and they appreciated the skills they had an opportunity to practice. In the words of respondent 1,

> It is good to recognize that the future working life goes more and more online and uses different technology services. So, it is appropriate that this use and its effects are explored during our studies. I think communication studies should maintain some kind of readiness and knowledge concerning this also after this exceptional situation.

Some students felt that the online format made the course more task oriented, better structured, and equal. They appreciated its mechanical routines and organized structure. They also felt that the teacher talked equally to everyone and that they were in the same position as everyone else. Moreover, it became difficult for individuals to draw attention to themselves during joint discussions. Our adjustments to elicit conversations and offering of additional time for relational communication were interpreted as signs of care. Another such sign was that everyone could express about their feelings at the beginning of each class. Students also appreciated practicing online communication from the perspective of preparing for a future working life.

4.2 Neutral perceptions of online course

While uncommon, these perceptions revealed that few students had been studying online consistently before, and that this experience had been suitable for them. The students did not think that the online implementation of the course had affected their learning. The fact that the course content had not changed relieved the stress of the exceptional situation. Respondent 10 stated,

> Online learning itself has not felt particularly challenging. I have done online courses before this, and the current situation has not felt as exceptional as possibly to some others.

Some of the students felt that on Zoom, other participants had reactions similar to those during face-to-face meetings and that the same communication rules applied online—you had to be clear and present and, of course, listen. They did not notice differences in the practices during the course; they were only technology-mediated. Even though only few students had neutral attitude toward online course, the notion about these students is also important. For some, studying is not dependent from the modality.

4.3 Perceptions of the challenges in online course

Even if the general opinion was that the course was successful, several challenges were also mentioned. From these mentions, five subthemes were formulated. The biggest challenges students faced concerned conversations and social interaction. Second, most of the students recognized their feelings of weariness and separateness. Third, although the joint meetings were usually easy to join and be in, technical problems caused stressful situations. Fourth, especially at the beginning, students felt uncertain about the situation and how they would achieve the goals they had for themselves or the course learning objectives. Finally, the surroundings where they had to work sometimes caused stress. All these factors had an impact on how they felt about completing the course.

The first subtheme concerned challenges in interaction and conversation that the students identified. Most of them appeared during regular interactions, harming the course, and making it difficult to complete. Students emphasized the flow of the conversation and felt pressure in this area, as it was an important part of the course; they were expected to make conversations and create a positive atmosphere. Some problems concerned the familiarity of the application, and then the technical issues brought problems. For example, joining discussions was difficult because it was difficult to follow up on what someone had just said and take turns in the conversation. It was harder to focus on others when you could see yourself on the screen. As one student explained, the others were also looking at themselves and the teacher. Furthermore, the students had to make a clear decision when they wanted to participate, because they had to turn the microphone on to be heard. Respondent 15 stated,

> In online implementation, the conversations between students are worse because in a classroom, you often want to share your thoughts. Via Zoom, there was a bigger gap, and when focusing on the lecture already took a lot of energy, you did not even necessarily have the energy to present your own opinions.

The students did not want to talk over others; however, it was difficult to estimate if someone else had something to say. Sometimes, online discussions also took a long time, and a greater risk of misunderstandings might occur. Some preferred face-to-face group work because brainstorming—talking about new ideas—was no longer on the agenda, and the groups seemed to simply execute the task without careful elaboration. The problems often involved instances in which the students assumed that seeing each other or being in the same room would make it easier to comprehend the situation or the task. Asking additional questions about the tasks felt more difficult. Sometimes, the instructions or tasks appeared suddenly, and the instructions were unclear. The teacher was not as available as before, and the students had to work more when they wanted clarification.

Practicing communication skills online was not always easy. The students were glad that some practices, including those

focusing on breathing techniques, the use of voice, and proximity, had been held face-to-face in the first half of the course. Furthermore, the students wanted more instructions about how to communicate online, especially in public speaking and group work.

The students also reflected on problems with non-verbal communication. They found it difficult to express themselves and indicate their presence to others. To have precise interpretations, they wanted to see the body language of others and tried their best to focus better. Given the small delay in online communication, interpretation has become even harder. They missed the reactions of others, such as laughs and signs of confirmation. According to respondent 14,

> Also, it is odd that online, there are no mini-reflections between other students: "What should we do, did I get this right." Not to mention the kind of whispering and non-verbal communication, which is not related to the subject and is important and humane.

Expressing active listening was difficult. The students were afraid that others would interpret their non-verbal messages the wrong way. For example, when they became distracted or caught in their thoughts, it could appear as if they were uninterested in others. Therefore, they had to indicate listening in ways other than what they were used to. For instance, they tried to express their listening by nodding franticly and commenting on the chat, trying to assure the others of their presence and support. For some, the computer screen brought others very close, and they started to pay attention to the micro-expressions; the meaning of different non-verbal messages went through elaborate interpretations. Respondent 25 said,

> You had to take more responsibility for your communication and show that you are actively listening and understanding. Active listening and taking others into account so that you do not speak over others or bother with your behavior or sounds were highlighted.

The importance of spontaneous conversations was understood and missed. With spontaneous conversations, students referred to conversations in which face-to-face course usually took place before, during, and after class. In these conversations, the students talked about what they had recently learned (or failed to learn) or confirmed their understanding of the teacher's instructions. Casual conversations were also important to create or maintain relationships, and some thought that this had an impact on getting to know other students. However, being in touch with someone you could not see was difficult; this was especially a problem when students participated using mobile phones. Some were hoping to see the teacher and other students face-to-face, especially when group work should be done. Reduced relational communication affected group formation. Some of the students felt that group work was considerably different online. It was possible to hear only one speaker at a time, and the students became more careful in the discussions. Overall, many students missed being in the same space and felt that in face-to-face, they felt closer to each other.

The second subtheme is feeling weary and detached. Many responses dealt with tiredness and feelings of separation during the Zoom sessions. The students were surprised by how tired they felt after spending the afternoon on Zoom, aiming all their focus on one spot sometimes felt overwhelming. Online learning was described as "staring at the computer" for a long time, which resulted in exhaustion.

Regarding the explanations given for this tiredness, some students simply stated that being present online was different, whereas others thought that the reason was that, in face-to-face format, they physically moved when practicing. Some thought that the novelty of the situation caused their weariness. Others mentioned possible personal factors, such as attention deficit disorder.

For some of the students, feeling detached appeared in a very concrete manner. The interaction did not feel as intimate as that during face-to-face lessons, and it was easier to lose focus. A temptation to grab their mobile phones and start scrolling through feeds or doing something else could occur. In face-to-face meetings, they would not dare do this. In a way, with online learning, a passive role is easy to take; the social pressure to be active is weaker than during face-to-face instruction.

Some of the students felt quite strongly about this situation. They regretted being separated not only from their courses but also from the entire university, experiencing feelings of loss. Being alone with their thoughts and being bystanders in the interactions felt difficult. Some felt that communication courses were, in some ways, empowering experiences; however, they now felt quite the opposite. Contact with others and the energy that came with it seemed to fade. The sense of connectedness they felt in face-to-face implementation diminished online. Focusing only on one person at a time instead of the whole group disturbed the feeling of community. Some students missed the voices and gestures of others. The words of respondent 9 illustrate these points:

> I can't comment on this from any wider perspective right now; I believe the effects will be seen only later. This is probably my last year studying, so I feel disconnected from the university very much. I will miss the last lunches and coffees and other things at university. It is really difficult to see the so-called positive side in all of this.

Some of the students were also worried that online course would provide too narrow a perspective on communication skills. The characteristics of face-to-face communication science teaching—openness, flexibility, spontaneity, and energy—were not experienced in the same way. Comparing the experiences with the two formats, some thought that it was more difficult to stimulate others online; in the long run, therefore, distance learning might make students more passive. For some, distance learning at its best is only a good substitute for face-to-face learning—nothing more.

The third subtheme concerns technical problems and distractions. The profound incorporation of technology into their studies sometimes causes tension and frustration among students. A widespread concern about the sound or video connection breaking up and the stability of the Internet signal occurred. For example, during the public speaking event, the screen occasionally froze, and keeping up with what was happening became difficult. As respondent 2 shared,

> Also, a personal problem during the course, I could not solve [problems related to] communication technologies. I do not have equipment suitable for online communication, and I felt this had affected my course performance.

For some students, technical problems arose throughout the course. When they could not participate with their computers, they had to use their mobile phones. Such a small screen made it more difficult to take notes or find information while attending lectures. Some students were unable to update their equipment and felt that this affected their achievement on the course.

One source of distraction was the uncertainty that accompanied the shift online. The students had negative expectations about the possibility of completing the course and learning communication skills online. Some felt that having to show their living quarters to others was somewhat intrusive. As the course continued, however, the students became more positive about online course and the possibilities of technology.

Finally, the students encountered unexpected situations. Sometimes, their surroundings were unsuitable for active participation. Loud background noises, such as renovation works being carried out next door, were an issue. In other cases, other people were present in the students' surroundings, doing their daily lives. Moreover, just being at home could be enough to make it more difficult to focus. It was easy to do something else while attending class. Physically moving to another location was considered helpful in mentally preparing to participate. Some students felt that it took more energy to prepare for the online meeting because they had to tidy up the background and prepare their food before turning on the camera. Furthermore, it was difficult to separate personal life from academic life.

In comparing the two implementations, students did not seem certain about how to carry on fluent discussions without distracting others in the online setting. They also worried about whether they could express themselves clearly enough, especially as a part in a group, when it seemed that everyone was focusing on their own appearance or the teacher in the Zoom meetings. Building a feeling of community or taking part in atmosphere building seemed difficult. The novelty of the online implementation and the stress concerning technology demanded a lot of effort in this skill-based course and feelings of separateness arose. The theme of challenges also brought to the surface a reminder of possible inequalities when some students reported having insufficient equipment.

4.4 Perceptions of public speaking

Perceptions about public speaking were divided into four subthemes: (1) public speaking is different without an audience, (2) perceptions about the speech event, (3) excitement, and (4) I learned virtual public speaking. Most of the perceptions highlighted the fact that online public speaking was different from public speaking in front of a physical audience. The students mentioned the feeling of being far away from the audience, the limited non-verbal communication and use of space when standing in front of a laptop camera, and the absence of a specific target to speak to. Respondent 2 explained:

> The difference between online public speaking and appearing in front of an audience was clear. The public speaking event itself was very different compared to a situation where the speaker and the listener are both physically present. As a listener, I felt I was very distant from the speaker, and as a speaker, I felt I didn't have a specific subject to talk to. The latter point is interesting because talking to an audience often involves a crowd that is spread out, while the camera is just one specific object. Probably, it would be more accurate to say that there wasn't an object to interact with. I think it's the same from the listener's perspective. Observing via the camera felt a bit like listening to a conversation at the next table.

The students felt that getting a sense of the audience's energy and reactions was difficult; that is, they did not feel the audience's presence, and they missed it. For some, the audience was too close, as unfamiliar faces were just a few feet away on the screen. A few students felt that they had not received enough information on how to be an efficient speaker in front of a laptop, and that the online format had not covered all aspects that they wanted to practice for public speaking. When reflecting on the course objectives, the students felt that public speaking was one area in which they were not properly trained and did not accomplish the level they wished for.

Despite the impression of having a different experience when giving online speeches, most of the students thought that the online speech event worked out well. Despite the concerns, the overall experience was positive, and for some students, being present online or performing to the camera was an eye-opening experience that revealed their lack of communication skills in an online context.

Technology, after all, made it possible for parents, grandparents, and other loved ones to watch the speeches. Encouraging messages in the chat was also welcomed. They said that a public speech at the event would have been useful for their future, but this was also considered a good practice. Only a few students spoke of losing significant experience when the speech event was transferred online; they had high expectations about the event, and now those expectations were not met.

Feelings of excitement were experienced differently among the students. Some felt it was easier to perform alone in front of a computer, whereas others felt more pressure when speaking publicly via Zoom. For some, this experience offered nothing different, and they felt confident in the online environment.

Some of the students found speaking to a large audience online more exciting than doing so in the same physical space, mentioning the novelty of the situation as a possible reason for this feeling. Others felt that it did not cause as much stress this way. One student stated that speaking to "emptiness" did not make the same impression. Few students reported that they felt the same about speaking online, as they probably would have felt in a face-to-face situation. There were doubts if they could get themselves psyched for the speech—whether it was the same in an online environment. Some disclosed that they were missing the sharing and talking about the excitement with others; they would have wished for supportive communication from their peers or the teacher. The students were also uncertain about whether they had the chance to confront the fear of public speaking, given they had not been

physically in front of the audience. In conclusion, emotions seemed to vary depending on the student, and they reported different reactions to giving their speeches online.

Many students were pleased with the opportunity to experience online practices. For example, speaking to a large audience at a speech event virtually was a new appreciated experience. Some students stated that they had learned online public speaking during the course. Specific things had to be considered when speaking to a camera: looking directly at the camera, moderating the speech to make it interesting to listen to it through the digital medium, and focusing on the visual side of the performance. During the course, they witnessed the development of their abilities and skills, and they felt that they had become more relaxed when speaking to the camera.

To conclude, physical presence is different from virtual presence. Technology is not yet able to transfer feelings in the same way they are felt when people are in the same physical environment. Students reported learning online public speaking and differentiated it from speaking to a live audience in the same space. Learning online public speaking was also seen as an important skill, but some expressed that they would prefer practicing public speaking in more traditional settings.

4.5 Perceptions of feedback

Feedback during the course satisfied its requirements, and the students were pleased with the outcomes. Written feedback based on video recordings was carefully prepared. The students concentrated on the words they used when describing others' behavior, and written feedback challenged them to critically analyze other students' performances. The videos made it possible to focus on details and provide more precise feedback. Seeing how the speech succeeded based on the recording and evaluating its content after receiving feedback was useful. When feedback was received orally right after the practice, the students sometimes forgot what others had said. Still, some students preferred receiving feedback immediately after the performance. However, giving feedback online was sometimes difficult, especially with criticism. Some of the students felt that, without face-to-face communication, synchronous communication could present numerous inaccurate interpretations. The receivers rarely asked for clarification, and the givers were sparing with their feedback.

The students had difficulties with feedback in online course because of the impossibility of interpreting non-verbal communication and having fluent conversations. Written feedback was one-sided and did not allow them to see how the receiver reacted; the tone or words could not be changed. Non-verbal communication cannot be read as easily as during face-to-face situations, which makes the other person feel more distant. A few students mentioned that feedback was more critical in online implementation. Some thought that this was due to the written nature of the feedback, which made criticizing easier, whereas others thought the cause was the online format.

Despite the above-mentioned challenges, the various ways in which feedback took place throughout the course were appreciated by the students, who felt that this aspect was important for their learning experience. For the students, it was important to take time for feedback, and they appreciated the effort other students put into it for them. The following excerpt from respondent 21 highlights this:

> Even at the beginning of the course, the aim was to constantly give feedback to other students about their performance. A generous amount of giving and receiving feedback was a good thing and made me discover new sides of my communication behavior, which I hadn't noticed before. The feedback from other students encouraged me and broadened my insight into who I am as a communicator. The feedback sessions after every practice motivated me to listen to and observe the behavior of others differently and more intensively.

Suggestions for better feedback included additional advice from the teacher and immediate and more elaborate feedback after the performance. Overall, the increased amount and diversified channels of feedback were regarded as a significant part of the course and the communication skills' learning process, and students felt the course taught feedback skills in a versatile manner.

5 Discussion

In this study, we wanted to determine (a) if skill-based online courses where students practice communication skills enable them to achieve their learning objectives and (b) the things that should be considered when planning new similar courses. We will first discuss issues arising from the results from a wider perspective, the differences, and similarities between these two formats affecting the achievement of the learning objectives.

As mentioned, even though special attention was paid to them, conversation and social interaction remain the most significant challenges in an online environment. Communication is more than just talking—it is about connecting and building relationships. In an online environment, where pedagogical objectives require building trust, relational communication cannot be ignored. In this case, how well the group got to know each other and whether they built trust during face-to-face classes remain unclear.

Analyzing communication in the new situation helped some students reflect on the knowledge they possessed in a very concrete manner. This allowed them to obtain a broader understanding of communication skills and public speaking. Some of the success of this course may be explained by the fact that the COVID-19 pandemic created a feeling of togetherness that pushed students to be the best version of themselves. Although their reactions to online course differed, the students were active (even proactive) during the course. They had a shared mission: to complete the course successfully despite unexpected difficulties.

According to social information processing theory (Walther, 2008), people can become familiar and have trusting relationships with one another online; the process, however, takes longer than in face-to-face interactions. Nevertheless, at the start of 2020, it was common to proceed with the same timeline as that of face-to-face instruction. Creating a "safe space" as a goal has become very familiar to university teachers. We must pay more attention to building communities where students can share their thoughts and receive support. By communities, we do not mean relationships just

between students and a teacher but relationships between students. The university is also a place to build friendships and networks, and this should be possible even in online courses. This is not to say that every online course should offer possibilities to network and connect; rather, we should view courses as entities and ensure that this is possible in most courses. For this, we suggest more discussions with the students. By setting rules, students may be able to participate more easily. In addition, in our study, some students reported feelings of weariness and detachment during online instruction. These feelings are not strange to university teachers. Teachers today balance detachment and flexibility when designing high-quality online courses for more divergent students, and holistic course planning from the perspective of relational communication (e.g., Ratliff, 2019) and social presence (e.g., Lowenthal and Snelson, 2017) might be beneficial.

One of the things we were left thinking about was feedback. In this course, feedback was perceived as successful, regardless of the way it was given. The students' responses show that they were pleased with the different ways in which they received feedback. However, the answers do not elucidate much about the process of giving, receiving, and using feedback in an online communication skill course. We were left hoping that we would have asked more precise questions. Many of the courses in communication studies rely on student peer feedback; thus, feedback in online implementation is something that deserves further investigation. It would be interesting to determine how aware students are of the feedback process and how they use the feedback they receive.

5.1 Limitations

When applying these results, a few factors must be considered. First, our sample consisted of only 26 students; thus, we should be careful not to draw any major conclusions from the results. Second, the communication skills in the practice course is not a normal lecture-based course; most of the time, the students worked in groups and practiced communication skills. When the course is delivered face-to-face, students are not usually sitting in the same spot for a long time. Our results, therefore, cannot be applied to lecture-based courses.

Third, these data were collected in the spring of 2020, when the experience of the sudden shift was very new to students. They felt that they were a part of something unique. On the other hand, this makes the data very rare, and in a way a portrait of the uncommon time, and we should remember that students could have answered differently if the data were collected after a longer experience with online course.

5.2 Implications

Results indicated that communication skills can be taught online. This requires that the course is planned and organized well. In this course, in the future communication skills will be practiced both online and in face-to-face settings. A mix of online and face-to-face course will allow for discussing the differences and similarities between the two formats and evaluating what works and what does not. While the course can be conducted entirely online, this may not be the most effective option. This is especially true of the public speaking component, as the students felt that they had missed out on connecting with the audience. Our study indicates that teaching public speaking online is different from doing so in person, thus supporting Ward (2016).

In addition, a mix of these two formats will introduce special features and different practices related to computer-mediated communication. Given the ever-changing nature of information and communication technologies and their use at work, understanding, and applying computer-mediated communication are key areas of expertise for communication students. The theoretical background should be from previous compulsory courses. Also, technical knowledge must be introduced in the course; for example, the role of cameras, how to make an illusion of eye contact, listening, nonverbal communication, adaptation, and clarity should be focused on.

Some students are not just missing the spaces; they need them. Sometimes, technological, and environmental problems disadvantage some students. These issues cannot be overlooked, especially when it comes to the evaluation process. By providing a space for learning, the university has provided at least some similar possibilities to learn, and this is no longer the case during online teaching. On the other hand, modern technology provides opportunities, for example, in terms of sustainability. Teachers in the future must balance the opportunities modern online technologies bring with the fact that no one has the same level of equipment or the same availability of study spaces.

Furthermore, in their responses, the students recognized the importance of adjusting to different types of communication situations. Changes happen all the time, and this is something they thought was important for the work lives of future specialists. They do not necessarily need new communication skills; however, they should accommodate their communication in different situations. Thus, the important aspect of these situations is crucial to observe. Communication studies should teach future professionals to understand the role of every participant in a communication situation. The students knew how they were supposed to act face-to-face but were unsure of how they should act online. In future courses, we will discuss the importance of adaptation and how to avoid misunderstandings, especially when nonverbal communication is limited. In addition, more discussions, such as a shared understanding of tasks, practices, presence, nonverbal communication, etiquette, positive atmosphere, and team spirit, can help build an environment that does not cause unnecessary stress for students.

6 Conclusion

Our results yield a few conclusions. First, when practicing communication skills online, students are practicing online communication. This was especially true regarding public speaking. Second, both face-to-face and online communication should be practiced as both will be part of students' personal and working lives. Third, although special attention was paid to relational communication and immediacy in online surroundings, problems with conversations and social interactions were reported. This

implies that there is still a lot to learn about effective teaching in the online environment.

The development of online courses continues to be an important part of higher education. By understanding students' perceptions of these courses and incorporating them into the development process, we can create courses that meet students' expectations better. With this knowledge, effective online courses can be achieved. However, student experiences are not the only aspect that should be considered when developing online courses. Other perspectives, such as those of teachers, academic programs, and higher education institutions, should also be considered.

Furthermore, online teaching has its challenges, which must be investigated further. Our results indicate that students experience both online and face-to-face teaching in different ways. As shown by previous evidence, positive and negative views vary. No solution is received in the same way by everyone. A course according to the personal preferences of every student is impossible to establish. The choice of the most suitable format must be made according to the pedagogical goals.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Author contributions

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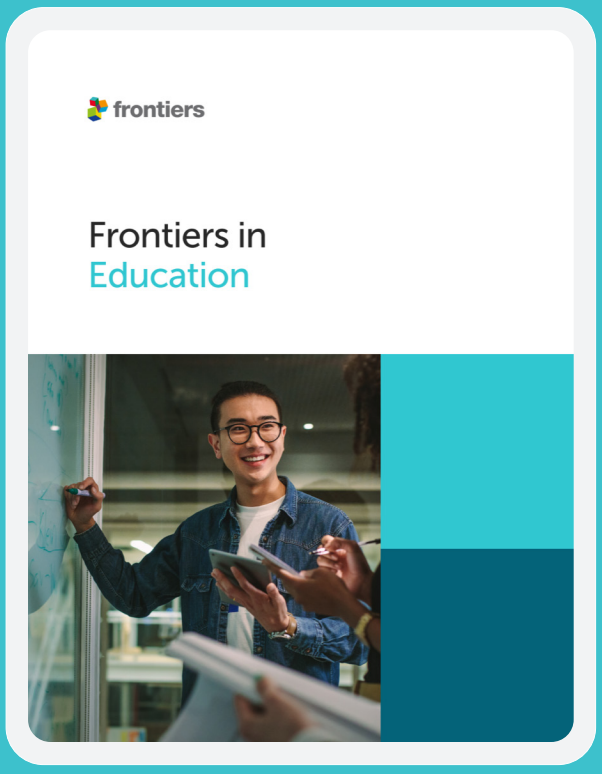

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