



Facilitating Community of Inquiry Through Video-Enhanced Online Instruction: What are Learners' Impressions?

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Abstract

This study explores the relationship between the three elements of the Community of Inquiry (teaching, social, and cognitive presences) and video-based instruction in the online environment. The video-based instruction included instructor-created videos and screencasts, video feedback assignment critiques, video-enhanced content discussions, and synchronous video conferencing. The researchers examined higher education students' perceptions of CoI regarding the video-based instruction, the determinants that affected their perceptions, and the students' learning experiences during the video-enhanced instruction. Findings from end of the semester surveys revealed high levels of teaching, social, and cognitive presence when video-based instructional strategies were introduced.

Keywords Community of inquiry · Online learning · Video discussions · Video instruction

Distance education continues to grow within the United States. According to Seaman et al. (2018), the number of students who took at least one distance education course grew by 5.6% from fall 2015 to fall 2016 to reach 6,359,121. This increase can be attributed to affordability, accessibility of technology for students, and convenient course schedules (Dobbs et al., 2017; Daymont and Blau, 2011). While online courses can be a preferred method of instruction, some educators question how to support student learning effectively when transitioning from the face-to-face format (Chiasson et al., 2015). Such difficulty transitioning to online instruction was particularly evident during the COVID-19 pandemic (Shivangi, 2020); however, the design of online

learning is significantly different than the pandemic's emergency remote teaching, particularly in its strategic design (Hodges et al., 2020). One drawback of online course design is students having a sense of isolation from their peers (Clark et al., 2015). To limit this feeling of isolation, some faculty have integrated video as a method to increase instructor presence and student engagement (Bialowas & Steimel, 2019; Collins et al., 2019). This includes asynchronous video announcements, feedback, and discussions, as well as synchronous videoconferencing.

Designing a rich multimedia and video-based online learning environment for an instructional success has been a pivotal concern of numerous studies, (Atwater et al., 2017; Borup et al., 2012; Grech, 2022; Seckman, 2018; Thomas et al., 2017) specifically those pertaining to exploring the process of designing and teaching courses through the lens of the Community of Inquiry (CoI) framework and its three constituencies: teaching, social, and cognitive presence. Implementation of video technology including asynchronous, synchronous, or a streaming video content have been documented across different academic disciplines. Since the very first motion images were released in the early eighteen hundreds, film, movies, and video technology in general have been perceived as a valuable learning medium in a traditional classroom. However, starting from the Internet era and utilization of learning management systems in instruction, video technology has been regarded as

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a medium that brings a “human touch” to online learning. Video affordances are comprised of visuals, movement, and sound which in addition to text or animation may compensate for the lack of personal presence in a virtual learning environment.

Considering the growing trends of utilizing video technology in online courses (Ou et al., 2019; Krämer & Böhrs, 2016; Kilinc et al., 2017), this study aimed to explore how students perceive video-based methods in instruction delivered by commercial learning management systems in higher education. Furthermore, this study explored student perception of video-based instruction in relationship to the critical online pedagogical concepts of teaching, social, and cognitive presence as defined by the CoI framework proponents Garrison et al. (2000).

Literature Review

Community of Inquiry (CoI) Framework

The Community of Inquiry framework for teaching and learning corresponds with social constructivist theory and is applicable to research of online courses in higher education. The CoI guided the instructional design of the online courses examined in this study with the intent of providing significant learning experiences through video-based elements supporting cognition and socialization (Zigelman, 2018). The researchers sought to address the three interdependent elements of the CoI in the course design: teaching presence, social presence, and cognitive presence.

Teaching presence is the design and organization of the course to include facilitation of discourse and the direct instruction which supports and enhances the other two presences such that learning takes place (Anderson et al., 2001; Garrison & Vaughan, 2008). The sub-concepts within the teaching presence element are design and organization indicators, facilitation, and direct instruction, which are found to have a relationship to students’ satisfaction and perceived learning (Caskurlu et al., 2020). The design of the online learning and the role of the instructor also enrich learner-content engagement (Garrison & Cleveland-Innes, 2005). Therefore, the ability of the instructor to properly design and facilitate the instructional materials and activities in an online course is essential for learning to take place. Notably, online instructional materials such as instructor-created, context-based videos have the potential to enhance learners’ retention of content (Choi & Johnson, 2005) while sustaining teaching presence.

Social presence aids a learner’s educational experience through their ability to relate to and communicate with a learning community that has purpose, builds trust, and promotes individuality (Garrison, 2009). Fostering this sense

of community in the online environment also influences learners’ satisfaction (Kaban, 2021) and contributes to their perceived learning outcomes (Swan & Shih, 2005). Such learning communities are shaped by social interaction and progressively incorporate disciplined academic discourse and reflection in which learners “collaboratively construct, critically reflect, and confirm understanding” (Garrison & Vaughan, 2008, pg. 21). These elements facilitate a sense of belonging and opportunities for risk-free expression in the learning environment (Garrison & Vaughan, 2008). Therefore, the sub-concepts of social presence are related to affective expression and open communication.

Cognitive presence enables learners’ progress from initial inquiry, to exploration, to making connections, and finally to application (Garrison et al., 1999; Garrison & Vaughan, 2008). The focus is on learners’ aptitude for knowledge-construction through sustained reflection and interactive discourse (Garrison et al., 2001). Other verbiage for these sub-concepts of cognitive presence is triggering event, exploration, integration, and resolution. To facilitate cognitive presence in online course discussions, a prompting question must be designed to affect the cognitive levels of students’ responses (Meyer, 2004) and encourage in-depth discussion of topics, thereby allowing for individualized reflection as well as collaborative knowledge construction (Shea et al., 2022). Further, discussions designed to elicit multiple responses help to facilitate learning and discourse among learners (Jeong, 2003), a key component for supporting cognitive presence in online learning.

Video in Online Learning

This section reviews the literature associated with the video-based instructional strategies implemented in this study and their connection to CoI in online learning environments.

Instructor-Created Videos and Screencasts The use of videos and video lectures have been prevalent in online and distance learning for many decades. The types of online instructional videos have included talking-head, voice-over presentation, picture-in-picture, and screencast. According to Guo et al. (2014), the informal talking-head format tends to engage online learners, and other research found that screencast and picture-in-picture formats aid in learning more so than voice-over presentations even though they are more effective at sustaining attention (Chen & Wu, 2015). However, based on Mayer’s (2005) image principle, it may aid student learning to begin with the talking-head format and move towards using relevant visuals with audio voiceover as content becomes more difficult. Learners perceive screencasts to be better than texts and effective in helping them learn when the instructors are highly qualified and the video design is of high-quality (Ghilay & Ghilay, 2015).

Also, shorter videos (10-minutes or less) tend to be watched to completion (Ozan & Ozarslan, 2016) and are more engaging for learners (Guo et al., 2014). When online instructional videos incorporate the instructor, whether visually or auditorily, teaching presence is enhanced simultaneously along with the instructional components supporting cognitive presence. In recent years, ubiquitous technologies and networking tools have offered transformational use of video for online learning (Grant, 2016).

Assignment Feedback Videos Formative feedback designed to improve learning and performance, regardless of delivery mode, should be non-evaluative, supportive, timely, and specific (Shute, 2008). Instructor feedback on assignments significantly influences learning and achievement with appropriate timing, as well as with the type and distribution method of feedback (Hattie & Timperley, 2007), thereby shaping cognitive and teaching presences in an online course. Video feedback facilitates deeper explanations of assignment evaluations and assists students with reflecting on their learning and assignment revisions (Kleinknecht & Gröschner, 2016; Cheng & Li, 2020), thus elevating the CoI element of cognitive presence. In a study of blended pre-service educational technology courses, participants identified video feedback as more impactful on the instructor's social presence than text-based feedback (Borup et al., 2014; Thomas et al., 2017). It was also found that instructor video feedback provides a conversational, expressive tone and creates a sense of closeness not perceived by textual feedback comments (Borup et al., 2014).

Asynchronous Video Discussions Discussion platforms are a common tool in online environments partly due to their asynchronous nature which facilitates learning without constraints of time or location (Mick & Middlebrook, 2015). Further, asynchronous discussions among learners provide opportunities for analyzing real world problems while activating cognitive and social presences. Therefore, the resulting benefits of online discussions include assisting learning and increasing social interaction. The presentation of authentic tasks during the discussions facilitates learners' knowledge construction (Gašević et al., 2015). In tandem, the higher-order thinking resulting from participant-centered interactions (Jeong, 2003) generates cognitive presence in the online environment. As small groups of learners continue to have opportunities for asynchronous discussions, the perceived level of cognitive learning increases (Kilinc & Buyuk, 2022), demonstrating that experience with these tools is beneficial to learning. Regular participation is also helpful to the development of learning communities due to the increased connection with other learners (Li, 2004; Kilinc & Buyuk, 2022). Additionally, Wise and Cui (2018) found that discussion of course content

builds community-like connections among participants, thereby supporting social presence. Recently, to avoid the constraints and overuse of synchronous live meetings during the COVID-19 pandemic, video-based platforms have transformed discussions through their visual approach which helps the learners feel more connected to the course and engaged in the learning process (Lowenthal et al., 2020). Video-based discussion platforms such as Flip help increase student voice during learning (Green & Green, 2018).

Synchronous Video Conferencing Synchronous video conferencing tools (e.g., Blackboard Collaborate Ultra, Teams, Zoom) provide real-time interaction amongst online classroom participants and meet all three elements of CoI. Similar to a traditional face-to-face classroom, video conferencing provides students with the opportunity to see the teacher, view non-verbal cues, engage in immediate social interaction, and co-construct knowledge. Jaber & Kennedy (2017) found that social presence was evident when students were able to see and interact with each other during video conferencing. This established a sense of trust and identity, which are key components of social presence within CoI (Garrison, 2009). While conducting synchronous video conferencing, teaching presence occurs when the course instructor demonstrates instructional design, facilitates online discussions, and displays their personality to demonstrate their humanity (Nowak, 2001). Cognitive presence is formed by adding strategies to online classrooms that foster communication (i.e., video conferencing tools) and facilitate knowledge construction between students and the instructor (Holbeck & Hartman, 2018). Teaching and social presences support cognitive presence during synchronous sessions when the instructor-designed interactions facilitate the communication required to construct meaning (Clark et al., 2015). A key benefit of synchronous video conferencing is the development of group cohesion and affiliation, which helps students feel a “part of the group” and thereby increases engagement and participation (Pinsk et al., 2014). Synchronous video conferencing personalizes the classroom experience which aids in bridging the gap between traditional forms of instruction and online instruction (Choppin et al., 2019).

Alignment of Instructional Strategies Implemented in the Study to the CoI Framework

Over the course of one academic year, the researchers implemented video-based instructional strategies in both asynchronous and synchronous formats within their courses. This section discusses the strategies and how they support a Community of Inquiry.

There were asynchronous, instructor-created videos embedded in the course modules and posted in the weekly announcements. These videos included voice-over presentations, picture-in-picture videos showing the instructor talking while displaying the content, and screencast tutorials dedicated to upcoming content and assignments. There were also assignment feedback videos created by the instructor in lieu of text based feedback for some assignments. The instructor-created instructional videos, as well as the assignment critiques, facilitated cognitive and teaching presences as the instructor activated the students' critical thinking and reflection about both the content and their assignment submissions.

The traditional discussion was transformed to facilitate learning and community more effectively in the courses. Students responded asynchronously to discussion prompts by recording a video within Flip and then replying to their classmates via video. The Flip video-based discussions platform served as a replacement for the traditional text-based discussion board and promoted both cognitive and social presences due to the nature of the prompts and the visual approach to interactions.

Regarding synchronous video communications, Blackboard Collaborate Ultra and Zoom were used for the online course meetings. These online video conferencing tools provided students the opportunity to interact with their instructor and engage with their classmates in real time while co-constructing knowledge. Online meeting activities included reviews of course materials and content, overviews of weekly assignments, questions from students, and breakout sessions for student group activities and deeper content discussions. These synchronous conferences addressed the three areas of the CoI framework through the design of the interactions for learning, as well as through the role of the instructor and the interactions between the instructor and students.

Considering the four video-based instructional strategies implemented in the study, all three elements of the CoI (teaching, social, and cognitive) were evident throughout the courses as noted in Table 1.

The researchers' intention was to expand on the current literature and identify how video-based instruction and students' experiences with it relate to their perceptions of CoI.

Methodology

Purpose

The study aimed to investigate student perception of the Community of Inquiry model and its three constituencies, teaching, social, and cognitive presence in a video-enhanced online learning environment. Furthermore, the present research explored student satisfaction with instructional strategies associated with video-based activities and learning content. Thus, the study focused on the following research questions:

- 1) What are students' perceptions of CoI in video-based online instruction?
- 2) How do students describe their learning experiences in video-enhanced online instruction?
- 3) How does satisfaction with the video-based instructional strategies relate with students' perception of the CoI elements?

The researchers believe the scope of the study is distinctive and worthy of investigation as video technology has been significantly infused in the field of online learning. Additionally, the voice of students in research related to online learning environments is essential and should be central to such investigations (Andrews & Tynan, 2010).

Research Design

The study utilized a survey research design (de Leeuw et al., 2008; Nardi, 2018) for data collection to examine the students' perceptions of CoI with emphasis on the teaching, social, and cognitive presences. This research design was selected due to the nature of explored phenomena and available study resources. Also, this is an exploratory survey study that employs measures for participants' web-based self-reporting. Finally, non-experimental surveying is the most applicable research approach considering the scope and study purpose. Additionally, the current study is enriched with a significant portion of qualitative open-ended questions aimed to collect students' in-depth insights and opinions relevant to the process of facilitating CoI through video-based instruction and discussions that are not quantifiable.

Table 1 Video-based course elements addressing the CoI presences

Video design elements	CoI Presences		
	Teaching	Social	Cognitive
Instructor-created videos and screencasts	X		X
Video feedback assignment critiques	X		X
Video-enhanced discussions and peer responses		X	X
Synchronous video conferencing	X	X	X

Population and Study Sample

The target population was a combination of undergraduate and graduate students at a medium size liberal arts college and a state university located in metropolitan areas of two major cities in the Northeast and Southeast areas of the U.S.A. There were three courses and multiple course sections included in the study. The course from the liberal arts college was the required introductory technology literacy course for all undergraduate majors. The two state university courses were core requirements for students in both the MEd and EdS graduate-level Instructional Technology degree programs. Both degree programs are among the top enrolling online programs at the institution.

For the purposes of this research, a convenient random sampling procedure was utilized. Thus, the population for this study was both undergraduate and graduate students who were attending a selected course offered in online delivery modality. The estimated size of the targeted population was approximately 600 students. The sample of the study consists of all students who agreed to take part in the study. The sample size consisted of 114 participants in total.

Instruments

The study utilized the slightly modified Community of Inquiry (CoI) survey (Garrison et al., 1999) entitled Facilitating Community of Inquiry through Screencasting and Video Announcements (FCoISVA). The FCoISVA is a measuring instrument that consists of 32 Likert five-point scale items and five open-ended qualitative questions purposefully designed for measuring the extent of student perception of CoI within online courses.

The survey's Likert items consisted of three subscales for measuring teaching, social, and cognitive presence in online courses that are strongly supported by customized video-based instructional materials and discussions. The customization of video-based materials reflects the researcher's aspiration to utilize self-made and specifically designed video materials to address the course topics and discussions. In other words, this course did not include externally produced video content that is readily available on public video-sharing platforms or developed by major educational publishers. The instrument subscale "Teaching Presence" includes six items, subscale "Social Presence" consists of seven items, while the subscale "Cognitive Presence" incorporates 12 items. More importantly, all three subscales yielded a high Cronbach's Alpha coefficient: Social Presence (0.84), Cognitive Presence (0.81), and Teaching Presence (0.82). In addition to CoI three sub-scales, the research instrument includes six five-point Likert types of questions for measuring student satisfaction and their previous experience with online learning and multimedia. The Cronbach's Alpha

index for the entire FCoISVA survey was 0.87. Thus, the overall FCoISVA internal consistency coefficient was more than satisfying in terms of reliability.

In addition to the main FCoISVA measuring instrument, the researchers included a set of nine questions aimed to collect data regarding learning environment, student's previous online learning experience, level of computer literacy, student's year of study, gender, and employment status.

Data Collection and Analysis Procedures

The research employed a web-based survey entitled FCoISVA for collecting both quantitative and qualitative participant responses. As complementary data sets, both quantitative and qualitative data were used for exploring the main study variable - student perception of CoI.

However, the quantitative data set was primarily utilized to gain insights into a number of study variables that can be grouped into the following: (a) participants' demographic (age, gender, GPA, etc.); (b) online learning background; (c) technology proficiency; and (d) satisfaction with the video-based instructional environment.

Online learning background is a study variable focused on students' previous experiences with online learning, including preparation for the online learning process and subjective perception of learning accomplishments in an online learning environment. The study instrument includes three questions associated with this variable. Technology proficiency refers to the student's level of skills related to general computer literacy, ability to manipulate with a computer operating system, file management and multimedia learning resources. This variable also encompasses students' expertise in editing video materials. Undoubtedly learning in an online environment requires a certain level of technology and multimedia use, thus the researchers found that this variable may be relevant to the intent of this study. Lastly, student satisfaction with video-based instructional strategies was designated as a separate variable of interest in this study focused on student perception of CoI.

The researchers performed the appropriate statistical tests to analyze the quantitative data and discover if there was a significant correlation between the study variables and/or sub-groups of students. Quantitative data was analyzed by using SPSS and included a variety of descriptive statistical measures, correlations, as well as more advanced procedures such as the Analysis of Variance (ANOVA) and the t-test.

An inductive approach and descriptive coding strategy were implemented for qualitative data analysis (Saldana, 2015). Memos were taken during coding and codes were modified until the researchers were satisfied with the coding structure. Qualitative findings are presented in themes and sub-themes which are used to support the study's quantitative results.

Results

Analysis of both quantitative and qualitative data sets confirms the central study assumption that the students’ perceptions of the CoI model is associated with the video-based instructional strategies implemented in the courses. The overall student perception of CoI is shown through descriptive statistical measures followed by three interrelated sections that provide combined quantitative and qualitative results relevant to teaching, social, and cognitive presence. Therefore, the data analysis is organized and presented in a manner to reflect the proposed research questions: (a) Demographics and overall perceptions of CoI; (b) Student learning experiences in video-enhanced online instruction; and (c) Satisfaction with video-based instruction and perception of CoI.

Overall Perception and Demographics

Descriptive measures indicate that the study participants highly regard the overall CoI ($M = 4.31$) as well as each of its constitutive components – teaching, social, and cognitive presence (Table 2). It is noticeable that the study intervention contributed to the higher perception of the concept of teaching presence in comparison to social and cognitive presences. The descriptive trends in the distribution of student demographics such as gender, GPA, or employment status that are relevant to the overall perception of the CoI and selected contextual variables are presented in Tables 3 and 4.

The presented descriptive data indicate that students with higher GPAs tend to perceive the overall CoI higher in comparison to their peers with lower GPAs. Additionally, students with full-time employment are more inclined to favor video-based instruction than students who are not employed. A number of significant correlations were also found such as (a) correlation between student gender (Male: $M = 3.96$, $SD = 0.630$; Female: $M = 4.40$, $SD = 0.878$) and the overall perception of CoI ($M = 4.31$, $SD = 0.706$, $r = .251$, $p < 0.001$, $n = 114$) and (b) correlation between student employment status (Full-time employee: $M = 4.40$, $SD = 0.604$; Part-time employee: $M = 4.00$, $SD = 0.913$; Full-time student: $M = 3.93$, $SD = 0.884$) and the overall perception of CoI ($M = 4.31$, $SD = 0.706$, $r = .217$, $p < 0.001$, $n = 114$).

Table 2 Student perception of CoI, teaching, social and cognitive presence: descriptive measures

	Community of Inquiry (CoI)	Teaching Presence (TP)	Social Presence (SP)	Cognitive Presence (CP)
M	4.31	4.75	3.97	4.26
SD	0.706	0.541	0.973	0.741

Table 3 Demographics & Student perception of CoI: Descriptive measures

Student demographics		Community of Inquiry
Gender	Female	$N = 95$, $M = 4.40$, $SD = 0.878$
	Male	$N = 19$, $M = 3.96$, $SD = 0.630$
GPA	3.75 or higher	$N = 68$, $M = 4.40$, $SD = 0.602$
	3.75–3.25	$N = 36$, $M = 4.36$, $SD = 0.723$
	2.75–2.25	$N = 8$, $M = 3.38$, $SD = 0.744$
	2.5 or less	$N = 2$, $M = 3.35$, $SD = 1.414$
Employment	Full-time employee	$N = 84$, $M = 4.40$, $SD = 0.604$
	Part-time employee	$N = 15$, $M = 4.00$, $SD = 0.913$
	Full-time student	$N = 15$, $M = 3.93$, $SD = 0.884$

Student Learning Experiences in Video-Enhanced Online Instruction

The conducted qualitative analysis concerning student experiences in video-enhanced online instructional compliments descriptive quantitative analysis and provides further insights into the explored phenomena. The qualitative trends regarding participants’ perceptions of the use of video emerged from the qualitative data analysis of 556 coded phrases from the open-ended survey items. Tables 5 and 6 contain the major codes and their frequency categorized by positive perceptions of video use and potential barriers to learning. The themes presented relay the overarching perceptions regarding learning experiences in the video-enhanced online environment. The researchers also describe barriers that influenced some participants’ learning efforts.

Theme 1: Videos were Helpful in the Learning Process The participants described the instructor-created video announcements and assignment feedback critiques, video discussions, and synchronous sessions as helpful to their learning. Instructor videos were perceived as a clear and concise learning aid. One participant said the videos were,

Table 4 Student perception of contextual demographic variables: descriptive measures

	OCL	OSP	FMP	VPP	EM
M	4.18	4.13	4.01	3.15	3.78
SD	0.847	0.782	0.847	1.146	0.910

OCL: Overall Computer Literacy

OSP: Operating System Proficiency

FMP: File Management Proficiency

VPP: Video Production Proficiency

EM: Experience with Multimedia

Table 5 Positive perceptions of video use: frequency of major codes (n)

Code	Frequency (n)
Videos aided learning	79
Videos clarified assignments and expectations	65
Comfortable with video discussions	60
Videos clarified content	32
Videos created a sense of community (instructor-created & discussion-based)	25
Videos were clear and/or concise	25
Videos could be reviewed again	24
Videos were informative	24
Videos provided connection to professor	20
Videos were relevant	15
Prefers listening to and/or watching videos (over reading)	14
Videos modeled best practice	9

Table 6 Potential barrier to learning: frequency of major codes (n)

Code	Frequency (n)
Self-conscious about video discussion	20
Uncomfortable with video discussion	15
Difficulty using new video discussion tool	14
Difficulty verbalizing ideas in video discussion	8

“relevant, easy to understand, and not too long.” It was also said that, “The videos were short and straight to the point.”

The CoI element of teaching presence was evidenced by the participants’ comments related to how the instructor-created videos clarified assignment expectations and content. These videos provided direct instruction on the topic and highlighted examples of exemplar assignments, which increased understanding of the content and how to complete the assignments. Participants noted, “I especially liked the feedback videos to give exemplars of the project so I could more clearly see the expectations” and the instructor’s “videos really helped explain different topics well, from course assignments to concepts covered in the module.”

The participants also indicated that the various video formats were informative, relevant, and modeled best practice. A participant stated, “The videos were straight forward and provided relevant information that supported the course readings.” One other said, “The videos were informative and a valuable resource to consult prior to discussions and completing assignments.” The participants also liked being able to “pause the videos to take notes or screenshots and read over them and use them to review.” Others found the video transcripts to aid their learning and that the videos provided

“ideas on how to implement video in their own classes to promote collaboration amongst students.”

The videos and discussions engaged learners’ cognitive presence by providing the opportunity to explore content and exchange information with their peers. It was noted that, “Video narration while an instructor is explaining a novel concept or [while] a peer is explaining their reasoning resonates on a better level of understanding than text alone.” Another found the video discussions allowed them to “gain information and knowledge from their peers.”

Theme 2: Use of Video Facilitated a Sense of Community Both the video discussions and the instructor videos contributed to a sense of community according to participants as “it put a face to a name.” It was noted that the discussions facilitated free expression of ideas: “With the ‘Share one Thing’, I felt like I knew classmates better and did not feel uncomfortable sharing my ideas.” One participant noted enjoyment in viewing classmates and communicating with them, “I enjoy seeing my classmates and professors because it is reassuring to remind myself that I am in a class with real people who are going through the same struggles and triumphs as me.” The Flip video discussion platform also featured emoticons which participants used to express themselves on the initial screen of their video post. The open communication resulting from the peer video responses and the ability for participants to respond in a risk-free manner facilitated social presence in the courses.

Comments also focused on how the instructor videos, whether for providing instruction or for feedback on assignments, helped the participants to feel more connected to the professor. One participant stated, “The videos posted provided a deeper connection to the professor and allowed for more understanding of their perspectives regarding the course material presented.” The participants enjoyed the instructor’s message and discussion of content and assignments: “It makes the online schooling experience easier for me as I have anxiety about working independently and without face-to-face guidance.” The students appreciated instructor’s video announcements and assignment feedback for guiding their understanding of the content.

Potential Barriers to Learning The majority of comments regarding comfort level indicated that participants were comfortable with the process of creating a video discussion post and sharing their ideas with others. However, several participants noted that they were uncomfortable creating the video discussion posts and peer responses. Concerns regarding creating the video discussions focused on a variety of issues.

Several participants were self-conscious about their appearance and felt the need to prepare their appearance prior to creating their video. One stated, “I was comfortable using the video software, but I do not like recording myself.” Another said, I was not used to seeing myself on camera/video; it made me more self-aware.” Others didn’t like to hear themselves in the video, some due to difficulty verbalizing their ideas. Some comments included, “My thoughts do not always verbally come out the way I intend” and “I tend to get nervous while recording and find myself stumbling over my words.” Some participants also felt intimidated by the video discussion tool due to it being new or a challenge. A few participants also felt nervous about preparing a video discussion response to share with their classmates. Since these concerns could potentially create a barrier to learning, they are important considerations to address in future iterations.

Satisfaction with Video-Based Instruction and Perception of CoI

Pearson correlation coefficient was computed for all CoI sub-scales separately as well as for the entire survey to identify the strength of correlation between video related variables and student perception of teaching, social, and cognitive presence. The obtained results show significant correlations between the majority of the analyzed items (Tables 7 and 8). The strength of correlation between student Satisfaction with the Video-Based Intervention (SVBI) and perception of the CoI model and its three constitutive elements teaching, social, and cognitive presence is ranging from weak to strong, and.

Table 8 Pearson correlation: CoI and CoI-sub-scales & student satisfaction

	Satisfaction with video based-materials
CoI	0.575**
TP	0.406*
TPDO	0.451*
TPDI	0.419*
SP	0.443**
SPAE	0.473**
SPOC	0.339**
SPGC	0.429**
CP	0.636**
CPTE	0.546**
CPEX	0.562**
CPIN	0.577**
CPRE	0.539**

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

p* < .05 *p* < .01

n = 114

For instance, there was a significant positive correlation between SVBI (*M* = 4.45, *SD* = 0.705) and the overall CoI survey (*M* = 4.31, *SD* = 0.706, *r* = .575, *p* = < 0.001, *n* = 114). Thus, a higher student satisfaction with video-based instruction is associated with a higher perception of the CoI in general. The strength of the identified correlation is moderate. A strong significant correlation (*r* = .636) was found between SVBI and the Cognitive Presence CoI sub-scale.

Table 7 Pearson correlation: descriptive measures

	Satisfaction with video based-instruction (SVBI)												
M	4.45												
SD	0.705												
	CoI	TP	TPDO	TPDI	SP	SPAE	SPOC	SPGC	CP	CPTE	CPEX	CPIN	CPRE
M	4.31	4.75	4.76	4.61	3.97	4.11	3.78	4.02	4.26	3.78	4.09	4.18	4.36
SD	0.706	0.541	0.503	0.633	0.973	0.972	1.11	0.968	0.741	0.900	0.815	0.719	0.667

M: Mean

SD: Standard Deviation

TPDO: Teaching Presence - Design and Organization indicators

TPDI: Teaching Presence - Direct instruction

SPAE: Social Presence – Affective Expression

SPOC: Social Presence – Open Communication

SPGC: Social Presence – Group Cohesion

CPTE: Cognitive Presence – Triggering Event

CPEX: Cognitive Presence – Exploration

CPIN: Cognitive Presence – Integration

CPRE: Cognitive Presence – Resolution

Not pivotal but worth mentioning is a finding that indicates differences in perception of CoI based on students’ video background skills. In addition to correlational analysis the researchers conducted an independent sample t-test to determine any differences between the groups of students without proficiency or with a very low level of proficiency in video editing and the students who have strong or advanced video editing skills. The results show a significant difference in the perceived level of CoI for “video beginners” ($M=4.03, SD=0.713$) and the group of students with advanced video skills in the online learning environment ($M=4.53, SD=0.620, t \{137\} = -3.171, p = .002$). Tables 9 and 10 illustrate the overall findings that are relevant for both groups of study participants.

As indicated in the two tables presented above, the “advanced video users” reported a higher perception of the overall CoI over the “video beginners” within the online learning courses. The significance was found at the 0.01 level of confidence.

Discussion

The study intent was to address the proposed research questions centered around two pivotal concepts (a) students’ perception of CoI and (b) the level of their complimentary satisfaction with the implementation of video-based instructional strategies in an online learning environment. The

presented analysis suggests that video-enhanced instruction is associated with the explored phenomena. On one hand, quantitative analysis provides conclusive evidence regarding a positive relationship between the video-enhanced online learning environment and student perception of CoI, as well as complimentary satisfaction with the instructional process. On the other hand, qualitative analysis reveals that student experiences provide invaluable insights into video-enhanced instructional strategies that can be used to facilitate establishment of online learning communities and learning processes.

The overall obtained findings are congruent with a body of research (Atwater et al., 2017; Cleveland-Innes et al., 2019; Scagnoli et al., 2019) that emphasize instructional potential of video technology in enhancing the teaching, social, and cognitive presence within the CoI conceptual model. Therefore, this study confirms that the video-based instructional strategies contribute to the process of establishing a community of online learners in asynchronous courses delivered via LMS.

The context of the present study involved the use of authentic video content and/or video-based activities purposefully designed on the behalf of instructors (or a team of instructional designers) to support the given course units. For example, all video announcements, feedback, tutorials, or mini-lectures had the course instructors for a narrator, often in a talking head video format combined with other visuals, text, or motion. No external media (e.g. pre-made

Table 9 Group comparison – Proficiency in video editing * CoI

Preparation for online instruction	N	Mean	Std. Deviation	Std. Error Mean
Students without video editing skills	68			
Strong or advanced skills in video editing	47	4.53	0.620	0.090
Students with a very low level of proficiency in video editing	29	4.03	0.713	0.136

Table 10 Group comparison – Proficiency in video editing * CoI

	Levene’s test for equality of variances		t-test for equality of means					CI – 95%	
	F	p	t	df	p	MD	SED	Lower	Upper
EVA	0.085	0.772	3.171	74	0.002*	0.497	0.157	-0.810	-0.185
EVNA	-	-	-	-	-	-	-	-	-

Independent-Sample t-Test: Validation of homogeneity of variance for students who studied in different learning environment on perceived level of stress

* - Significance detected at 0.01 level (2-tails)

CI-95% = 95% Confidence Interval of the Difference

EVA = Equal Variances Assumed

EVNA = Equal Variances Not Assumed

MD = Mean Difference

SED = Standard Error Difference

video clips from video sharing platforms or instructional video released by the major publishing companies) were utilized in this study intervention. Intriguingly, research conducted by Wood et al. (2021) claims that intentionally created video content for the given classroom audience has stronger impact to student perception of CoI presences. Although, the researchers of this study did not collect data to further explore such a variable, it is valuable to note that the present research context intersects with the design and findings of other contemporary studies.

Student demographic characteristics including GPA, are identified as determinants of the three explored online presences. Gender appears to be a significant component of student community perception in video-based instruction. Although this result is similar to Sligar et al.'s (2017) findings, which indicate that a subsample of female students favors more video-based learning content, the researchers of this study did not have conclusive data for explaining what potentially influenced the difference between male and female students.

This study also demonstrates that student employment status significantly correlates with the overall perception of online Community of Inquiry and its three presences. A limited body of contemporary research (Cortes, 2021; Hintz, 2014; Savage, 2015) confirms that an employment status can be associated with the students' active engagement in higher education including their perception of teaching, social, and cognitive presences. Congruent with the findings of this research, the study conducted by Burnette (2014) shows that online students are more likely to be employed in comparison to traditional learners. Specifically, in the present study only 15% of the participants reported full-time student status, while 85% indicated full or part-time employment status. Obtained results are comparable with Shea and Bidjerano's (2011) more robust empirical research focused on exploring the adequacy of the CoI framework for detecting differences in learning outcomes. Based on a sample of 723 respondents, this research claims that there is a small but significant positive effect on student employment status regarding their ratings of teaching presence. In other words, students who were employed rated teaching presence in a more positive manner. Our study confirms this finding as it also found a positive correlation between student employment status and their perception of CoI. However, there is insufficient data for further elaboration of possible reasons for the identified relationship between employment status and level of overall student perception of CoI.

With regard to student GPA, research (Dupuis et al., 2013) suggests there is a positive association between students with lower grade point averages and learning benefits from using instructional online videos. Additionally, the comprehensive literature (Bloemer et al., 2018; Cochran et al., 2014; Mould & DeLoach, 2017; Warrican et al., 2014)

predominantly suggests that GPA is a predictor of student retention and academic achievement. Based on analyzed data, this study indicates a relationship between GPA and student perception of CoI in the online courses.

Within the multitude of addressed research variables, proficiency in video production and satisfaction with video based-material were two investigated elements that gained the most attention. Reported level of proficiency in video production is a strong determinant of the overall student perception of the CoI. This proficiency is also positively related to the Social Presence sub-scale indicators – Group Cohesion and Open Communication, as well as to the Cognitive Presence indicators Triggering Event and Exploration. In other words, this study shows that higher proficiency in video production is associated with a higher perception of cognitive and social presences. Collected data are not sufficient for providing conclusive evidence that may indicate underlying reasons for this relationship. As such, the extent of the present study was adequate for identifying the association between explored variables, while discovering factors that impact this relationship, if any, and may be a valuable research question for some future studies.

As summarized by Stanley and Zhang (2018) a body of research focused on the effect of student-generated video materials in online courses indicating a variety of benefits ranging from enhancing student interaction, teamwork, and satisfaction to cognitive involvement. Although this study was not conceptually rooted in the CoI model, their research question was centered around investigating whether student-generated video content enhances course engagement and improves learning outcomes. As reported, the majority of participants (62%) did better on the material-related questions. The authors concluded that video production can improve engagement and learning outcomes in online coursework, however this should be interpreted in conjunction with other modifying factors (incoming GPA levels, gender, ethnicity) and within certain limitations.

However, on the other spectrum, recent empirical studies (Collins et al., 2019) reported the absence of a relationship between using video-based instruction and student perception of social presence. According to the authors, the integration of asynchronous video-based instruction did not affect student perception of social presence, but it was a significant factor for students' course engagement. Regarding the process of enhancing social presence, the authors concluded that “the important component may not be the medium used to communicate, but the content of the communication” (Collins et al., 2019, p.64).

The most profound result in the study discussed herein refers to the relationship between student satisfaction with video-based instruction and overall perception of the CoI module. As results suggest, student satisfaction with video-based instructional strategies is strongly related to all three

components teaching, social, and cognitive presence, including all sub-scales without exceptions. Although the researchers hypothesized that there would be association between these variables, such solid and all-inclusive relationships were not expected. A number of studies (Johnson et al., 2019; Lampros and Panagiotis, 2019; Maher and Prescott, 2017) point to satisfaction with video instruction as a determinant of CoI perception, but only of certain components within the CoI model. For instance, in a study based on the CoI conceptual framework and aimed to assess the role of video-based instructional strategies, Borup et al. (2012) found that the video's integration impacted both student and instructor social presence. However, this study does not provide additional data regarding cognitive and teaching presence.

A conceptually nearly identical study conducted by Wang et al. (2016) provides valuable and comparable results to this research. These authors assessed the ways in which WeChat (video-based synchronous platform) facilitates teaching, social, and cognitive presence in a semi-synchronous language course. Respecting the differences regarding the study participants, course characteristics, and video technology used in their intervention, the results of this study's findings suggest similar outcomes. For example, among others, the results suggest a strong relationship between satisfaction with video content and student perception of being able to reach the Exploration and Integration phase within the sub-concept of cognitive presence in an online course. A possible interpretation of this finding is that video materials provide multimedia stimuli, including both audio and visual input, which seem to elicit learning during exploration and/or integration of content into an already existing body of student knowledge.

Concerning the Social Presence aspect of the explored model, the obtained results show that the most substantial relationship is associated with the Affective Expression sub-concept. This is an expected outcome considering that the researchers intentionally designed video-based activities to promote a human dimension of learning. Similarly, within the Teaching Presence aspect, Design and Organization had the highest index of relationship. The conducted intervention included video-based announcements that provided straightforward instructions regarding the course activities, assignments, and due dates. Undoubtedly, this instructional approach directly contributed to the course structure by enhancing the clarity of the instructional messages.

In terms of the qualitative data, the voice of students in online learning environments is critical for reflective teaching and meeting students' needs (Andrews & Tynan, 2010). Thus, the open-ended survey questions designed to gauge learners' perceptions clarified aspects of the instructional strategies that were helpful during the learning process and facilitated a sense of community, as well as clarified

potential barriers. These findings are essential considerations for the researchers' future instruction and relevant for online course designers interested in learning about related student perspectives.

According to our participants, the various uses of video and associated instructional strategies aided their learning. Their comments evidenced teaching and cognitive presence, as well as facilitated social presence within the courses. Not only did participants find value in the instructor-created videos for helping them comprehend course material, they felt the video-enhanced discussions allowed them to explore the content more deeply and learn from their peers while also facilitating a sense of community. Similarly, a study by Clark et al. (2015) found significantly higher self-reported perceptions of social and teaching presence when participants used a video-enabled discussion platform versus the traditional text-based discussion.

One unique factor was expressed by participants as a barrier to the creation of video discussions. The barrier related to the participants' level of confidence regarding appearance and verbal expression of ideas. Several participants indicated they were uncomfortable with creating the video discussion responses due to self-consciousness about the way they looked on the screen or the way their response sounded, whether it be lack of clarity in their ideas or unsmooth expression in their speech. Research suggests that implementing a strategic process for creating videos and practicing video creation may help enhance communication and technical skills, as well as improve comfort levels (Mohamad et al., 2016). Therefore, this barrier can be addressed with guidance from the instructor on developing video scripts and other techniques related to video creation, as well as opportunities to practice these skills and build confidence.

Limitations

The main study limitation reflects the researchers' inability to identify and measure any pre-existing conditions or factors outside of the classroom that could potentially be associated with student perception of the explored phenomena. For instance, the participant study sample was drawn from multiple undergraduate and graduate courses. It may be anticipated that undergraduate students had different educational experiences than graduates. Specifically, it is possible that undergraduates did not take multimedia production courses while graduates may have a higher likelihood of completing such courses, resulting in a better video or technology proficiency in general.

Furthermore, two additional limitations were also taken into consideration before selecting the sample for this study. The first refers to the relatively low number of students enrolled in the online sections in comparison to the traditional modality of instruction. Considering that liberal arts

colleges tend to cultivate intimate learning environments with extensive interactions among students and faculty, as well as the fact that online learning is still a novelty in this type of educational institution, this particular limitation regarding enrollment must not be overlooked.

The second limitation refers to the students' willingness to participate in this specific research. The target population was limited to students who attended courses instructed by the researchers. Although all students in the courses were asked to participate in this study, not all chose to do so. A significant number of other studies were conducted at the same time in the given educational institution; therefore, students experienced a high level of saturation caused by having multiple invitations to participate in numerous concurrent research.

Conclusion and Future Direction

This study investigated the level of student perception, satisfaction, and complimentary learning experience in video-enhanced online instruction. To address the proposed study questions, the researchers sought to design video-enhanced learning experiences that would engage participants in social expression, cognitive thinking, and meaningful understanding of content with the intent of modeling effective video-enhanced instructional strategies. Conceptually, the course design intervention was intentionally crafted to support the three CoI presences as initially proposed by Garrison et al. (2000). Furthermore, this study contributes to the limited body of research related to the application of versatile video-based instructional strategies to elevate online learning communities in courses delivered by standardized learning management systems such as Canvas, Blackboard, or Moodle.

The researchers found that social presence was evident in the instructors' online synchronous sessions and video-based discussions. Students had the opportunity to identify with the community and develop interpersonal relationships by projecting their personal characteristics (Garrison, 2009). Cognitive presence was facilitated by sustained communication about course concepts throughout the study (Garrison et al., 1999). Teaching presence was addressed by the instructors' online facilitation and community development during the synchronous sessions, as well as by the instructional videos (Anderson et al., 2001).

Findings suggest that participant perceptions of these video strategies were positive. Participants found the interventions to be helpful in their learning process and a contributing factor to their perceived sense of community. Students who highly satisfied with the video-based instruction also perceived CoI presences within the courses and tended to have more experience with video editing overall. Consequently, the main barrier that participants acknowledged

relating to their lack of comfort in creating the videos could have been due to a lack of experience with creating videos.

This study provides noteworthy implications for transforming future research including clinical practice associated with online learning. Considering some of the study limitations, for instance the inability to identify pre-existing conditions or factors outside of the classroom, the future research calls for a more holistic approach that will include measuring the pre-existing factors or context. Given the study delimitations, i.e. the selected survey design, the obtained findings cannot imply causal relationships which are necessary for a more in-depth analysis of the explored phenomena. Pre and post testing of the course intervention is needed. Thus, one of the implications for future research is validating the present results but through a quasi-experimental research or even more rigorous experimental research design. The researchers believe, this survey-based study undoubtedly offers a solid foundation for more complex and comprehensive future research endeavors.

Concerning the future course iterations, the present study results inform effective video instructional strategies for online course designers and educational practitioners. Two possible implications may be highlighted. As noted in the "Discussion" section, online students highly value the instructor-created videos. Reinforcing instructor-created video learning content, especially providing video-based personalized feedback add a much needed *human touch* to the online learning process. The researchers suggest that application of this particular instructional strategy may diminish student feelings of alienation triggered by the overuse of pre-made commercial or open-source video instructional materials (Andel et al., 2020; Kyunghbin et al., 2010; Ryan, 2021; Seckman, 2018).

Additionally, the study confirms that having strong or advanced video editing skills make students more satisfied with video-based instruction. These skills are specifically meaningful in a context of video enhanced course discussions thus empowering students to take an active role in producing video-based responses. Moving beyond the text-based discussion exchange strongly conveys the personality of students which in return enhances social presence, decreases feelings of isolation, and ultimately contributes to the development of an online learning community. As a possible instructional strategy, the researchers suggest providing optional learning resources, ideally tutorials focused on developing student video-editing skills. This study implication calls for additional research to confirm the anticipated causal relationship between levels of video editing proficiently, social presence, and participation in video-based discussions.

The researchers suggest several possible avenues for extending the current study findings. Particular questions to ponder are as follows: (a) What strategies could be implemented to facilitate student comfort with creating

video-based discussion posts?; (b) What types of video proficiency are a determinant of CoI?; (c) Is there an in-depth relationship between student satisfaction with media delivery and CoI?; and (d) What aspects of the instructor-created video format are most valued by learners? Answers to these questions are vital to the process of advancing online learning communities and providing optimal opportunities for implementing the Community of Inquiry concept.

Author Contributions All authors contributed to the study conception design and implementation as follows:

- a) Study conceptualization - Lazarevic, Fuller and Cain;
- b) Design - Lazarevic, Fuller and Cain;
- c) Material preparation and data collection was conducted by Lazarevic, Fuller and Cain;
- d) Data analysis was performed by Lazarevic and Fuller.
- e) The first draft of the manuscript was written by Drs Lazarevic and Fuller.
- f) All authors Drs. Lazarevic, Fuller and Cain read and approved the final manuscript.

Data and/or Code Availability The study survey data are available in a SPSS format upon request.

Declarations

Ethics Approval • The research methodology and survey for this study was approved by the IRB committee of Kennesaw State University, the University Office of Research on January 9, 2019. The study qualifies as exempt from continuing review under DHHS (OHRP) Title 45 CFR Part 46.101(b)(2) - educational tests, surveys, interviews, public observations.

- The study was approved by Christine Ziegler, Ph.D., KSU Institutional Review Board Director and Chair.
- Ethics approval number: #19 – 003.

Consent Informed consent was obtained from all individual participants included in the study.

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