

# Enhancing Cognitive Presence through Videos in Online Courses

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## ABSTRACT<sup>1</sup>

Quality online programs often demonstrate significant instructor presence through videos. This study analyzes video usage in online courses based on the Community of Inquiry framework. Videos can promote social, teaching, and cognitive presence in the online classroom. The purpose of this study is to explore how asynchronous videos and synchronous videoconferencing can be utilized to create higher levels of cognitive presence in the online environment. Module introduction videos, lecture videos, and video feedback of common test errors are analyzed for cognitive presence. Examples from multiple programs/disciplines, both at the undergraduate and graduate levels at a public Midwestern university (natural sciences, health sciences, and social sciences) are discussed. Faculty and student perception of videos demonstrate high levels of cognitive presence. This paper is applicable for programs and educational institutions currently designing or offering online programs.

**Keywords:** CoI Model, Online Learning, Cognitive Presence, Video

## INTRODUCTION

Online courses have made learning accessible, convenient, and flexible. Innovative teaching strategies are imperative to keep students engaged in a world being transformed by increased use of technology. Research has shown that creative classroom techniques that incorporate technology cultivate a more productive and enriched learning environment. The use of videos in online courses has resulted in significant differences in learning outcomes. Using a Community of Inquiry (CoI) framework, this study discusses the use of videos to enhance cognitive presence in the online classroom.

University of Wisconsin-Parkside (UWP) is a small public Midwestern university. In light of the widespread budgetary

cuts in education at the state level, the university is attempting to increase its revenue stream by offering more online courses and programs that allow for higher enrollment via course scheduling flexibility. The institution's strategic enrollment management plan (2014-19) called for delivering affordable and responsive academic programs to meet the needs of its increasingly diverse student body [1]. The institution is committed to offering a high quality and high-impact transformative learning experience and part of its growth is predicated on offering online programs designed to cater to the needs of the adult student.

As such, the number of online courses at this institution increased 57%, from 332 online courses in 2017-18 to 521 courses in 2018-19. Another increase is expected for the 2019-20 academic year. Given the institution's growth in online course offerings, this study explores how cognitive presence, the most challenging to study and develop in online courses [2] [3] [4], can strengthen student learning in online courses.

The use of videos in online programs varies widely. Some online programs, instead of using videos created by their own instructors, incorporate freely available videos from other sources while other programs strive to utilize a significant number of videos produced by their own faculty. Most programs do not have a prescriptive model for video usage. Some programs adhere to standards prescribed by Quality Matters, the recognized rubric system that refers to multimedia content without being specific in terms of video requirements.

The application of videos can achieve several functions. At the onset, introduction videos can build a strong social presence thereby sowing the roots of a cohesive learning community. Videos can also be a powerful tool that helps promote cognitive presence in learning by facilitating teaching presence in the form of instructor guidance that aids critical synthesis of ideas. Lastly, the deployment of videos to facilitate discourse with the sole purpose of building an understanding of the concepts and materials in the course is

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at the heart of the teaching presence. The type of videos varies by subject matter. For example, a course in management may benefit from videos focusing on lectures, while technical subject courses such as statistics may benefit from step-by-step video tutorials on how to leverage conceptual knowledge to set up the problem and solve the same. Videos can be classified into several categories including instructor introductions, course and unit introductions, video lectures, video tutorials, and video feedback. Current practices of types of video usage are discussed in the paper. Utilizing the CoI model of learning, this paper attempts to show how videos can be used to improve cognitive presence in an online environment.

### ONLINE PROGRAMS AT UW-PARKSIDE

Several colleges at UWP offer online opportunities at both the undergraduate and graduate levels. Students can earn their online degree through completion programs, full online programs, or certificates. UWP master's programs include Masters in Applied Professional Studies (MAPS), Business Administration (MBA), Applied Biotechnology, Health and Wellness Management, Sports Management, Sustainable Management (SMGT), and IT Management. The UWP undergraduate online programs include Business Administration, Health Information Management and Technology (HIMT), Liberal Studies, Sociology (SOCA), and Sustainable Management (SMGT). Several of these programs are part of a consortium of system-wide UW universities. In this paper, using the CoI framework, examples from the MAPS, SOCA, SMGT, HIMT, and MBA programs are discussed to show how videos can be used to enhance cognitive presence and ultimately student learning in the classroom.

### CoI MODEL

The Community of Inquiry (CoI) framework is a well-established model utilized to gauge learning effectiveness in the online environment [5]. With the proliferation of online education in the post-secondary setting, both synchronous and asynchronous videos have been utilized to promote learning. The CoI model (Figure 1) assumes that learning happens within a community of learners through the interaction of three core elements: cognitive presence, social presence, and teaching presence [6].



Figure 1. Community of Inquiry (CoI) Framework

Social presence in online learning is described as the ability of learners to emotionally and socially project themselves, and thereby be perceived as “real people” in mediated communication [7] [8]. Research based on online graduate management programs indicate that group cohesion and team interaction based on open communication is suggestive of a strong relationship between social presence and learning outcomes [5]. Research shows that activities that increase social presence also increase satisfaction with students’ online learning experience. Cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse [9]. The cognitive presence unfolds in four distinct phases: (a) a triggering event that necessitates further inquiry of a problem (b) the exploration of the problem through critical thinking and dialogue (c) integration of the ideas explored whereby new meaning is constructed (d) resolution of the problem whereby learners are able to apply the new knowledge. According to Garrison and Arbaugh [5], teaching presence comprises of three components: (a) instructional design and organization (b) facilitating discourse (c) direct instruction. It is through effective teaching presence that meaningful and desired learning outcomes are attained.

### COGNITIVE PRESENCE THROUGH VIDEOS

#### Sociology-SOCA 250

Rooted in Dewey’s construction of practical inquiry and critical thinking outcome [10], cognitive presence is created and sustained depending on how communication is restricted or encouraged [9]. Cognitive presence is achieved in the SOCA 250 Statistics for Social Sciences course through the following modes of video communication: (a) weekly introduction videos for each module (b) weekly video lectures on each chapter (c) weekly discussion forum through videoconferencing. All video content is instructor created. Videoconferencing is conducted via Blackboard Collaborate Ultra.

Each week, the module introduction video introduces the class to an everyday issue that serves as a triggering event to induce a sense of puzzlement. An example would be: how can a researcher set up a study to examine the question -- “Is bullying more of a problem in suburban or city schools?” The weekly video discussion forums along with office hours held through videoconferencing are utilized to explore how the research question can be studied using the steps of hypothesis testing. Critical thinking and back and forth exchange is at the center of discourse which results in the integration of ideas to resolve the problem. Garrison and Arbaugh [5] stressed the importance of “progressive development of inquiry” (p.162) as issues for further investigation in the domain of cognitive presence. Careful instructor facilitation ensures a cycle of practical inquiry whereby students move through the different stages of cognitive presence, namely exploration to resolution and application.

### **Sustainable Management-SMGT 325**

Cognitive presence in the classroom (online or face-to-face) is exhibited when students connect with the subject matter, and are able to synthesize meaning through interaction and reflection thereof. In an online course that focuses on natural resource management, students have several opportunities (assignments) in which the phases of cognitive presence can be explored. The Natural Resources Management course is organized into 5 units, each with its own introduction video. Each unit offers an activity designed to give the student access to instructor-created videos tailored to specific hands-on applications. These assignments require students to work outdoors, where they would perform activities such as dig soil pits or collect vegetation data along a transect line. Instructor created instructional videos help students participate in classroom activities. For example, in the unit focused on soils, students can watch a video where the instructor shows them how to use field tools to collect soil, and then watch another video that explains how to analyze the soil in the lab for simple characteristics such as texture, organic matter, and structure. These videos allow the student to learn through direct observation and participation.

Likewise, in the unit focused on forests, students can view videos in which the instructor describes how to extract a core from a tree, or how to use methods in the field to measure diversity indexes. In this scenario, the instructor created videos help simulate the experience of a field trip, thereby enabling students to learn about aspects of the the particular forest that was explored.

Other types of video-related activities are links to webpages with embedded videos that provide instructions on how to download applications (apps) onto mobile devices and use them. These apps relate to “how to live a more sustainable life” and provide help on issues ranging from learning about how to track one’s electric usage, to learning about renewable usage, to learning about the processing of a particular grocery item. While these types of videos are not created by the instructor, they are valuable to the course learning objectives.

Additional types of videos are informational and are used to encourage student reflection. Examples of this type of learning include TED talk discussions on wetlands as a natural resource, web-based action plans to learn about wetland planning, and a full hour video explaining the the negative ecological impacts that emanated from the channeling of the Los Angeles River.

These are but a few examples of how students can connect with the subject matter and resonate their ideas in a meaningful way.

As students learn about natural resource management and participate in assignments, the four phases of cognitive presence can be identified. The example of soil assignments illustrates this: First, the video which introduces the concern for soil integrity triggers students’ curiosity. Students then view informational and instructional videos to explore how to appropriately collect and assess soil samples. Once their

assignment is complete, students can reflect and provide thoughtful comments on the work of their peers, which may include soil photos, delineation maps, and perhaps videos of themselves collecting the samples. When students consider their own experience, and use critical thinking skills to align their own work with that of their peers, they see how by integrating their own ideas, they can more effectively work toward a resolution of the problem related to protection of soil by promoting education and encouraging a concerted effort from the community.

Some student reflections on their learning through video interaction bear this out:

*“...as I listened to (other student), I realized how much I was learning from what she was sharing. I was engaged in my favorite learning style, but I found that I wanted to stop her and say, “Hang on a second. Tell me more about...”*”

*“By using video recording, I had to get my thoughts organized before hand. This methodology really helped me to narrow down the items I felt were important and to be focused. This is an important skill that I struggle with and this methodology will help me improve in that area.”*

*“While I have a preferred learning style, I will learn more if I am willing to engage in different methodologies. Overcoming my own anxiety about video recording, will also help me to be more empathetic with my students when I ask them to stretch outside their comfort zones and grow academically.”*

### **Business & Health information-MBA: 720, 781; HIMT 380**

In MBA 720, 781 and HIMT 380, the instructor creates a number of videos: (a) unit introduction videos discussing the key concepts that are covered in the unit; (b) step-by-step video tutorials indicating how to utilize healthcare technologies (e.g. Electronic Health Records systems, chargemasters etc.), and how to apply healthcare reimbursement techniques to practical scenarios; and (c) video feedback. Unit introduction videos are intended to introduce the “sense of puzzlement” to students on why they should study the unit. Step-by-step video tutorials help students with the integration of concepts. For example, one video walks the student through the application of Medicare reimbursement process for an inpatient hospital admission for a cardiac event; this helps students understand concepts such as diagnosis-related codes, hospital admissions, federal process steps for reimbursements, patient and hospital characteristics and how these concepts should be integrated to arrive at a reimbursement amount. Feedback videos are provided by the instructor post grading of assignments/exams, and help with integration of knowledge and also resolution, as students understand how to apply the integrated knowledge to new scenarios.

Table : Examples of Cognitive Presence.

Elements	Categories	Indicators	Video Presence	Program/Courses/Examples
Cognitive Presence	Triggering Event	Sense of Puzzlement	<ul style="list-style-type: none"> <li>Module/Unit Introduction Videos</li> </ul>	SOCA 250 MBA 720
	Exploration	Information Exchange	<ul style="list-style-type: none"> <li>Module/Unit Introduction Videos</li> <li>Video discussion forum</li> <li>Video Office hours</li> </ul>	Weekly discussion and Office Hours via Blackboard Collaborate (SOCA 250)  Office Hours via Blackboard Collaborate/Zoom (MBA 720)
	Integration	Connecting Ideas	<ul style="list-style-type: none"> <li>Module/Unit Introduction Videos</li> <li>Video discussion forum</li> <li>Video Office hours</li> <li>Summary Videos</li> </ul>	Weekly discussion and Office Hours via Blackboard Collaborate (SOCA 250)  Office Hours via Blackboard Collaborate/Zoom (MBA 720)
	Resolution	Apply Ideas for Problem Solving & New Scenarios	<ul style="list-style-type: none"> <li>Video feedback explaining common mistakes in exam/quiz</li> </ul>	SOCA 250 HIMT 380: <a href="https://youtu.be/TEPgfl_BOhQ">https://youtu.be/TEPgfl_BOhQ</a>

### STUDENT RESPONSES

Student responses in the courses demonstrated high levels of cognitive presence. In SOCA 250, videos are used for lectures, to show step by step problem solving, and to demonstrate how to run statistical techniques using SPSS software. Student feedback indicates broad satisfaction with the use of videos and their impact on learning. In SMGT 325, student responses are typically positive. Of particular interest is that student reflections are well-received regarding technology and use of videos in the course environment. In MBA 781, which covers healthcare technologies, students felt that videos that show how to use healthcare technologies enhanced their learning.

#### Student Responses: SOCA 250 (Statistics for the Social Sciences)

*“The professor made sure I understood the material. Her dedication encouraged me to keep trying harder.”*

*“The organization was great and for being an online class, the instructions and weekly outline was one of the best I have seen as a student and I have taken several online courses”*

*“For an online course it didn’t seem to feel like an online course due to the lecture videos. The step by step calculations felt like I was sitting in class but within the comforts of my home”*

#### Student Responses: SMGT 325 (Natural Resource Management)

*“The professor is nothing less than awesome. ...Clear instructions and objectives made this class a lot easier than my other online experiences. Also, her lectures and videos were helpful and very well done.”*

*“The content is important to me and has practical implication. The engagement and passion for the material as conveyed by the professor made this an enjoyable experience”*

*“The multimedia formats (lecture videos, narrated PowerPoints, linked YouTube videos, etc.) used in the course assisted my learning”*

#### Student Responses: MBA 781 (Introduction to Health Information Technology and Management)

*“Application exercises and video lectures by the professor were excellent.”*

*“His videos and explanations were very useful and helped to explain the content in recognizable terms.”*

*“The videos and hands on application exercises along with step by step tutorials helped the learning process tremendously”*

### CHALLENGES WITH VIDEOS

This paper explores how innovative uses of video material in the classroom can impact both faculty and student experiences in online class formats. From the perspective of the CoI model, video material facilitates social presence for faculty and students, cognitive presence for students and teaching presence for faculty. As discussed in the Student Responses section, access to video materials strengthens students’ learning experience. Yet, incorporating video material into an online course can pose challenges that may be grouped into two main categories: (a) Technical

Challenges (for both faculty and students), and (b) Teaching Challenges for faculty.

Technical challenges that students face include accessing videos embedded in lectures where some videos created in PowerPoint may be incompatible with the version of the program students have on their computers. In addition, the browser that the student is using may display the course materials differently, making it difficult to read, watch, or participate in video activities. One strategy that has been adopted is to present the entire lecture as a video file. This solution has minimized challenges in accessing the information. It should be noted that the success of this mode of delivery is dependent on students having access to fast enough internet service that allows for downloading or playing of such video files.

Other video challenges students experience stem from assignments which require students to create their own videos. Once mastered, students appreciate and enjoy the opportunity to use high-end video production software to express their creativity. However, some students struggle with the instructions and consequently, in creating their own videos. Deploying personnel from the Instructional Technology department to serve as point persons who help students with such technical challenges can help alleviate student anxiety and facilitate successful task completion.

Technical challenges for faculty who create and use their own videos in online classes consists of learning how to use equipment to capture quality video, especially for faculty who want to describe the outside environment to students from the confines of a computer. Managing settings with respect to volume control for faculty voice and background noise reduction, and with respect to lighting is crucial to preparation of such videos. In addition, once videos are recorded, there may be challenges in uploading the same to the system server.

Faculty members who create videos for use in their classrooms need to carefully choose which types of videos to create, and what would work best for the students in a new semester when lesson themes may shift focus. Faculty members also need to be cognizant of the time and schedule related challenges arising from the need to create all the course related videos prior to the beginning of the semester. This, coupled with the possible technical challenges involved in creating such videos necessitates careful planning and organization on the part of faculty.

Additionally, technical challenges that students and faculty may encounter also include learning how to navigate and use learning management systems (LMS) that house instructional materials including videos. With newer LMS formats being available over time, the transition to new systems, specifically, the efficacy of the implementation and transition plans can pose additional challenges related to learning and acclimation.

For instance, at UWP, transition between LMS systems - from Blackboard to D2L (DesiretoLearn) and subsequently from D2L to CANVAS - have shown that planning and

implementation of such transitions can have an impact on the technical challenges encountered by students and faculty in acclimating to the new LMS. Within the realm of aforesaid transitions, a semester long transition period resulted in a sharp learning curve for faculty and students. In contrast, an extended transition period of two years whereby training had been provided to faculty and students early on, was less effective due to the significant lag between training and final system implementation and subsequent transition. However, a balanced transition plan that spanned a year, and consisted of timely training sessions followed by easy to comprehend refresher training modules closer to implementation and transition timelines significantly reduced the learning challenges.

Teaching challenge can vary by subject matter. For example, in a statistics course where students not only have to grasp the steps needed to work through a numerical problem but also understand the logic behind such steps, developing targeted but short feedback videos that address the specific gaps in understanding are effective even as such endeavor is time consuming. However, such time intensive endeavors are worthwhile for courses such as statistics that require progressive scaffolding of knowledge. This is supported by student evaluations which indicate that instructor videos addressing specific test problems greatly aided student understanding.

## DISCUSSION AND CONCLUSION

Over a specified time period, online courses can be evaluated for their design aspects based on certifications such as Quality Matters. For example, the Quality Matters rubric standards enumerated below allude to multimedia content and their quality:

QM 4.5 - A variety of instructional materials is used in the course.

QM 6.3 - A variety of technology is used in the course.

QM 8.5 - Course multimedia facilitate ease of use.

QM 8.4 - The course provides alternative means of access to multimedia content in formats that meet the needs of diverse learners.

As indicated by the standards referenced above, online courses that use multiple formats can provide a richer learning experience. This paper addresses how video usage can enhance cognitive presence. Although this study set out to demonstrate cognitive presence through video usage, the role of the social and teaching presence in achieving cognitive presence also indicates the interconnectedness between the three, consistent with the CoI model.

Use of real-life examples in module introductory videos boost students' sense of puzzlement and adds relevance to the problem solving process. Information exchange with guidance from instructor in videoconferencing allows for connection of ideas, leads to integration of knowledge and a consequent "aha" moment. The accomplishment of learning objectives, as evidenced by such moments is rewarding for faculty.

Videos can also be helpful for faculty, as they do not have to repeat the same concepts. For example, an assignment with instructions delivered in the video format can facilitate better comprehension and thereby help set the context better for the student as compared to instructions delivered in text format. This then also helps limit student inquiries that tend to arise from not fully comprehending the text-based instructions.

There appears to be a misperception among students who never enroll in an online course that they would miss out on the student-faculty interaction aspect of a course in an online environment [11]. This study shows that videos can facilitate high level interaction and engage students in their learning process.

Overall, the data indicates that both the synchronous and asynchronous video applications add to cognitive presence and allow for improved student learning in a virtual environment.

However, developing quality videos come with its own challenges. Sometimes, the many iterations needed to produce a video or to produce outdoor videos can be onerous. Another challenge with videos is the time it takes to revise the videos if the course is revised in minor or major ways. Training faculty in technologies that help produce quality videos can be time-consuming as well. In order to comply with federal regulations on course content accessibility, closed captioning and/or transcripts need to be provided for each video in the course. All these requirements imply that quality instructional design and media teams are absolutely necessary for faculty to design, develop, and integrate videos in their online courses. Administrators need to provide adequate support in funding of technology to address issues of video production and be cognizant of the time commitment that go into planning and delivering a quality online course. Institutions must recognize the diversity of learner-faculty interaction with different learning tasks requiring different environments, support structures, and technological tools [12], and therefore, make suitable provisions for faculty to sustain their efforts.

It should be noted that our study is limited to qualitative evaluation of videos and their benefits for improving cognitive presence and student learning. Further research is needed to determine the benefits quantitatively. This can, for example, be conducted by comparing student learning in courses with and without videos. Conducting such a study through well-designed methodology can be a worthwhile research topic for the future.

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