Students' Satisfaction with Quality of Synchronous Online Learning Under the COVID 19 Pandemic: Perceptions from Liberal Arts and Science Undergraduates

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Abstract
COVID-19 imposed dramatic changes on educational practices worldwide with American institutions of higher learning moving a significant number of their courses and educational programs to electronic online modes. In the post-pandemic world, the same institutions and educational programs recognize the need to incorporate technological components into their courses. Yet, some disciplines and areas of study may be better equipped for this change than others. The liberal arts are believed to be more reliant on face-to-face interaction and thus can be argued to have been more negatively affected by the required move to synchronous online learning during the pandemic Instructors have the option of teaching online courses either synchronously or asynchronously. As synchronous online learning requires course delivery in real-time via online video conferencing, the hope is that some of the drawbacks associated with teaching liberal arts online can be mitigated with technology-based, face-to-face interaction. In the spirit of exploring the relationship between liberal arts education and synchronous online learning, this research aimed at gauging Jacksonville liberal arts students' levels of satisfaction with the quality of instruction in synchronously delivered courses during the spring semester of 2021. Informed by the Community of Inquiry theory, of special interest were aspects of synchronous online learning like interaction with the virtual platform (video conferencing), interaction with content, interaction with instructor, and interaction with peers. Three local institutions participated in this study, yielding a sample of 141 students who participated in an anonymous Qualtrics survey pertaining to their learning experiences in the synchronous mode. Using a mixed-methods approach, results show positive perceptions, challenges, and recommendations for synchronous online learning.

Keywords: Synchronous online learning, student satisfaction, quality of instruction, Covid-19 instruction

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The COVID-19 pandemic has had profound consequences on all aspects of life. These have been seen nowhere as clearly as in education, as the traditional face-to-face learning environment was replaced by a virtual one. With different strands of the virus continuing to circle the globe and state restrictions varying by location, instructors have become increasingly aware of the need to rely on technology to supplement their teaching. Consequently, online education at colleges and universities has become the new norm, giving students the choice of enrolling in either asynchronous or synchronous courses. Asynchronous learning, a student-centered learning mode, occurs in different times and spaces particular to each learner (Gómez-Rey, et al., 2017). Instructors usually set up a learning path which students engage with at their own pace (2017). On the other hand, synchronous online learning allows simultaneous group interaction despite physical distance (Wang, et al., 2018). Put simply, this is a model where the people teaching and the people learning have some form of live interaction, usually through videoconferencing software, meaning they engage in education-related activities at the exact same time, despite physical separation (2018). Synchronous online learning usually takes place if there is a specific need for live discussion or interaction, or as a strategy to build community among learners and faculty (2018). This community building and shared learning experience through the exchange of ideas is an especially important concept in the teaching and learning of liberal arts (Tang & Dang, 2019). While necessity dictates that liberal arts education embrace technology, the exact impacts of synchronous online learning involving videoconferencing in the discipline during the pandemic have not been adequately explored.

The world is an unpredictable place, and global emergencies like the recent COVID-19 pandemic are inevitable. During such times, higher education, and especially those disciplines more reliant on face-to-face interaction like liberal arts, should not become completely paralyzed due to lack of access to traditional brick-and-mortar learning environments. Creating an optimal online learning environment, whether synchronous or asynchronous, takes time, work, and planning under the best of circumstances. But providing pupils with the highest quality of instruction is still paramount for institutions of higher learning even in times of worldwide emergencies, and researchers should at least learn from this global disaster.

According to Sogunro (2017), quality of instruction refers to "the degree to which an instruction is adequately delivered, meets students' learning needs, learning styles, interests, expectations, and is well aligned to standards (2017, p.174). Without quality instruction, student motivation to learn recedes (2017). Assessing the relationship between student satisfaction and quality of instruction during the COVID-19 pandemic can provide higher education professionals with both theoretical and practical lessons for the future when the world is faced with similar situations that would call for synchronous online learning. In our research, quality of instruction is the composite of the integration of course materials into the synchronous online learning platform, supplemental material, thought-provoking videoconference sessions, and various teaching methods used to enhance student learning. We further test the relationship between student perceptions of interaction with peers, instructors, and the virtual platform with satisfaction of quality of instruction to determine the association and suggest implications for synchronous online education.

As educators, our main role is to disseminate knowledge to our pupils in a fashion that is both appealing to them and has been proved to be effective in the learning process. While the overwhelming determinant of learning effectiveness is instructional design, the extent to which students enjoy the course is not inconsequential. Enjoyment and attitude speak to student engagement and willingness to stick to the course which, in turn, relates to persistence in

learning. Consequently, the exploratory data collected in this research are intended to gauge student satisfaction with online synchronous learning in order to provide educators with a clearer understanding of what the students desire from such courses and what most effectively aids their learning experience. Such knowledge of present-day emergency instruction is invaluable to creating a more enjoyable, and thus more effective, educational experience now and when other crises arise.

Research Gap

A review of existing literature reveals limited research that has empirically investigated the interaction between students and synchronous learning environments, (e.g., Allen et al., 2004; Bernard et al.,2009). Similarly, little literature exists to date about the perceived quality of liberal arts instruction from students who have taken synchronous online classes (Bernard, 2019; Einfeld, 2016; McGinn, 2019). Furthermore, most available research data on synchronous online learning as evidenced by the studies mentioned above, was collected before COVID-19 pandemic, and thus do not address the present realities of synchronous online learning and student satisfaction with its quality under the present worldwide pandemic conditions. Only two previous studies with similar parameters were found, but with important differences. Li (2021) investigated factors that affect learning engagement in home-based synchronous online courses from the perspective of educational environments Wichanpricha (2021) analyzed student perceptions and difficulties of synchronous learning in Academic English courses through Microsoft Teams. However, both studies took place outside of the United States, the former in China and latter in Thailand.

As there is a significant lack of data on this exact topic of research, this study is exploratory in nature and intends to fill a gap in the literature by providing empirical evidence on the relationship between American liberal arts students' interaction with the virtual platform, peers, and instructor, and their satisfaction with quality of instruction during COVID-19.

Theoretical Framework

This research is guided by the Community of Inquiry (CoI) theory, which was developed by Garrison, Anderson, and Archer (2000). The Community of Inquiry (CoI) theoretical framework is a popular model for online and blended courses, tailored for high interaction among instructors and students by means of tools such as videoconferencing, discussion boards, and wikis. According to Garrison et al., 2000b, online learning involves the engagement of community in a course of inquiry, and the construction of knowledge based on cognitive, social, and teaching "presences." Although these three "presences" have specific characteristics, they are ultimately interdependent. "Presence" in online learning environments is displayed through student and instructor interactions.

Cognitive presence is the degree to which learners can construct and find meaning through course activities, thought, and communication in online learning environments (Garrison, Anderson, & Archer, 2001). In the CoI framework, cognitive presence considers the social interactions that influence cognition which best works when there is a sense of community (Rovai & Wighting, 2005). Cognitive presence includes identifying the important concepts that students should learn and instructors then design the course activities that are aligned with the assessment of those activities. Cognitive presence allows for constant testing and feedback through assignments and other interactive simulations that stimulate the development of skills and solutions to problems (Garrison, 2011). In addition, instructors encourage experimentation

and diverse views through engaging online discussions, open-ended questions, and debates. Student interaction creates an active learning environment and help students develop (Rovai, 2004). Another important factor of the CoI is that it produces a sense of mutual presence, where students can connect, intellectually and emotionally, with the teacher and peers, which ultimately fosters an inclusive learning environment (Hufford, 2014). For online learning to be successful, there needs to be interaction and teaching support that sustains social and cognitive presence (Miller et al., 2014).

The third component of the CoI is teaching presence, involving the design, facilitation, and direction of cognitive and social processes, which together make the learning process meaningful to students and help them to achieve the learning outcomes (Anderson, Rourke, Garrison, & Archer, 2001). When educators design online courses, they pay attention to instructional design and organization, curriculum development, course delivery method, netiquette, and learning activities. Teaching presence includes direct instruction, developing curriculum for the online course, content, learning activities, and assessment (Garrison, 2011). If done correctly, this supports student learning needs, engagement, and collaboration. It also provides students with the autonomy to work as individuals and groups (Falloon, 2011; Garrison et al., 2010). This dimension applies to our research because virtual learning involves designing the course and materials that facilitate interaction between learner and teacher (feedback), learner and learner (learning activities), and learner and content (learning activities and assessments).

Social presence relates to the ability of learners to communicate within a trusting environment and develop interpersonal relationships with peers (Garrison, 2009). With social presence, learners showcase their personal characteristics into the community of inquiry as "actual people" (Anderson, Rourke, Garrison & Archer, 2001). Learners demonstrate social presence through open communication and collaborative group work. Communication occurs when learners engage with other learners, ask questions, contribute to discussions, and share and express support to other learners (Garrison, 2011; Palloff & Pratt, 2007). Synchronous communication positively impacts on the level of social presence for students who use it. For example, synchronous audio and chats promote social presence and social interaction. The chats help to maintain regular contact, discussions, and immediate feedback. Synchronous online learning, which has become a norm since COVID-19 pandemic began, provides a platform where learners build relationships with their peers and acquire knowledge in the same way they would in a face-to-face environment. Considering how CoI concentrates on high interaction among instructors and students by means of various tools as mentioned, we believe this theoretical framework to be more than adequate for this research, the concentration of which is the synchronous aspects of online learning.

Literature Review

When the COVID-19 pandemic began, colleges and universities transitioned from regular face-to-face mode of instruction to synchronous online learning. This type of online learning was designed to emulate the traditional face-to-face instructional method to provide continuity of instruction. According to Stephens and Mottet (2008), the use of audio and videos in synchronous online learning such as WebEx and Zoom increases the quality of online learning experience (2006). Synchronous online learning plays an integral role in the teaching of liberal arts as based on the nature of the discipline. Considering that the scholarly literature on the topic of this research is limited to studies conducted abroad where the institutional culture is much different from the one in the United States**,** the literature review that follows provides a

discussion of the nature of American liberal arts and its connections to, and perceived level of instructional success in, online instruction, hindrances to high quality online instruction, and predictors of high-quality online instruction.

Liberal Arts and Online Education

The Association of American Colleges and Universities (2021) defines liberal education as a philosophy of education that empowers individuals with broad knowledge and transferable skills, and a strong sense of values, ethics, and civic engagement characterized by challenging encounters with important issues, and more a way of studying than a specific course or field of study. Renowned institutions of higher learning such as NYU (associate such education with academic and research activities that enable students to develop skills, think critically and creatively, communicate clearly, work collaboratively, solve complex problems, and contribute fully to society as engaged and informed global citizens and leaders. Similarly, Tang et al. (2021) believe that such education depends on the concept of a dynamic learning community, featuring liberal teacher-student interactions and a pedagogic environment, learner-centered formative assessment, effective student services for strategic university articulation, and dynamic student activities and engagement. While the term is used in multiple ways, it is clear from the above-mentioned definitions that liberal arts education strives to deliver an academic experience that fosters intellectual curiosity, a critical thought process, self-reflection, leadership and teamwork skills, a sense of commitment and professionalism and a heightened sensitivity to one's socio-cultural environment (2019). It puts emphasis on the creation of a learning environment where the student takes the responsibility of learning, and the teacher facilitates the learning process. In essence, liberal arts education inculcates the following: (1) lifelong learning, (2) academic freedom, (3) importance of practice and experience, (4) critical thinking and civic competence, (5) competency development instead of knowledge accumulation, (6) priority of general education over specialized education, (7) the concept of learning to learn, (8) self-directed learning effort, (9) political neutrality, and (10) interaction and Socratic dialogue (Kurennoy, 2020).

Shreaves, et al. (2020), conducted a mixed-methods study of faculty perceptions of online teaching at a midsized liberal arts university to better understand faculty acceptance and participation in online teaching. While study participants perceived online learning as attractive to students, they wanted online courses carefully regulated, in part because online learning was seen as contrary to their teaching values. Similarly, the study stakeholder groups, both faculty and students, in Einfeld's (2016) research expressed the belief that a traditional liberal arts education is not compatible with a fully online degree. Faculty members felt that moving liberal education to the online mode would undermine the essential nature and core purposes of a liberal arts education such as a) multi-disciplinary approach, b) liberal arts skills, c) embodied learning, d) faculty to student interaction, and e) student to student interaction (2016). Believing that liberal arts education ought to address the whole person—mind, body, heart, and spirit—human bodies must be physically present together or as close to that as possible (2016). The students claimed that since online learning was less personal, it would undermine the opportunity to develop close relationships and to pursue wholistic formation (2016).

Nonetheless, each stakeholder group in Einfeld's (2016) study identified means by which online and hybrid learning might be incorporated in ways that are compatible with the essential nature and core purposes of liberal arts education, thus, proving there is value to be found in online liberal arts education. Similarly, Pazich, Kurzweil, and Rossman (2021) posit that even

during a pandemic, technology can create more opportunities for discussion and application of concepts in liberal arts. In their study, faculty members teaching in the Teagle program, a hybrid model in which students learned foundational concepts primarily online and on their own, reported their students having more opportunity during class for in-depth discussion and application (2021). Some reported that student participation in online discussions allowed less-outgoing students greater opportunities to participate, and better-enabled faculty members to get to know them as individuals as compared to a traditional face-to-face setting. In addition to student engagement, most faculty members were satisfied with the level of student learning, reporting that the depth and breadth of student learning were either greater than, or about the same as, the depth and breadth of student learning in analogous, traditionally taught courses (2021). Notably, however, faculty members who worked on fully online courses felt that important aspects of the liberal arts learning experience were not replicable, noting that it was easier for students to become disengaged. Most indicated they would pursue a hybrid model that included more personal interaction if they were to attempt another course re-design (2021).

Hindrances to High Quality of Online Instruction

Dhawan (2020) explored the growth of EdTech Start-ups and online learning to offer some suggestions and recommendations for the success of online mode of learning during a crisis-like situation. The author posits that successful technology integration is dependent on administration and faculty members staying mindful of the difficulties and problems associated with modern technology (2020), including downloading errors, issues with installation, login problems, and problems with audio and video (Hussein et al., 2020). In Bernard et al. (2019) about a third of students indicated that the video conferencing was what they least liked about the course because if internet disconnects either at the beginning or throughout the entirety of the courses it leaves a lasting negative impression of the learning experience. Sometimes students find online teaching to be boring and unengaging as students want a two-way interaction which sometimes is difficult to implement (Darby, 2019). Maintaining personal attention is a big hindrance for students who already have short attention spans (Dhawan, 2020). For others, online learning has so much time flexibility that students never find time to do it (Sabri, 2021). Lack of attention may also be the result of mediocre course content (Ariani & Tawali, 2021). For those kinesthetic learners for whom the learning process cannot reach its full potential until they practice what they learn, online content is all theoretical and does not let students learn by doing (Song & Hill, 2007). Students also feel that lack of community, technical problems, and difficulties in understanding instructional goals are the major barriers for online learning (Song et al., 2004). Balancing their work, family, and social lives with their study lives in an online learning environment proved to be too challenging (Hung et al., 2010). Students were also found to be lacking in several e-learning competencies and academic-type competencies such as their knowledge of navigating various Learning Management Systems (Parkes et al., 2015).

Predictors of High-Quality Online Instruction

Good communication and information sharing for both instructors and students to cope with the change is believed to be critical for the success of online learning during COVID-19. Duplicating the face-to-face experience in a video-conference format is difficult and takes intentionality, course redesign, and proper use of the best available technology, including personal devices (Bernard, 2019). Through their research, Tsang et al. (2021) proved that student/student dialogue, instructor/student dialogue, and course design were significant factors

that predicted perceived learning. In the context of learning during the pandemic, student interaction was indicative of a successful outcome, as social support is a crucial coping mechanism for students. Student/student interaction is vital to building community in an online environment, which supports productive learning by enhancing the development of problem-solving and critical thinking skills (2021). Interactions among students allow the cohort to build a virtual community to compensate for the sudden loss of face-to-face communication (Rapanta et. al., 2020). Furthermore, interactions between instructors and students enhance students' understanding of course materials which stimulates learning interest (2020).

Outside of emergency remote instruction, Oztok, Zingaro, Brett and Hewitt (2013) address the importance of dialogue among the various actors in a classroom environment in the context of social presence. Constructive dialogue in any online learning environment has been linked to several desirable aspects of student perception and learning in online courses. For example, high levels of social presence can lead to student perceptions of increased learning, course satisfaction, and emotional satisfaction (Nippard & Murphy, 2008). Social presence fosters critical thinking and makes interaction intrinsically rewarding (Rourke et al.2001). More so, it is necessary for effective online instruction, the construction and negotiation of knowledge, and the establishment of a community of learners (Rockinson-Szapkiw, 2009). Oztok et al. (2013) agree that social presence is more easily fostered in a synchronous online learning environment, where teachers and students can be seen as more immediate, the media is rich in carrying social presence indicators, and some elements of face-to-face social presence are restored.

If higher education is to rely more on online learning because of the COVID-19 pandemic, then it is imperative for institutions of higher learning to make synchronous online courses more dynamic, interesting, and interactive. Considering the lack of physical face-to-face interaction in asynchronous online courses and the need to communicate among members of the classroom learning community, all efforts should be made to humanize the learning process to the best extent possible (Wang, 2017). Personal attention should be provided to students so that they can easily adapt to this learning environment (Divayana, 2021). Social media and various group forums can be used to communicate with students (Huang, 2018). Communication is the key when it gets difficult to reach students via texts, various messaging apps, video calls, and so on, so content should be such that it enables students to practice and hone their skills (2018). Teachers should also use these features to set time limits and reminders for students to make them alert and attentive (Wang, 2017). Students can easily interact with the instructor and classmates through the chat feature, voice communication using a microphone, polls, and whiteboard tools (Stephens & Mottet, 2008).

Research Hypotheses

Based on the above-mentioned literature connecting our three independent variables (*Interaction with the Virtual Platform, Interaction with Instructor,* and *Interaction with Peers*) and our dependent variable (*Quality of Instruction*), the following research hypotheses were proposed and tested:

H1: There is a positive relationship between students' perceptions of *Interaction on the Virtual Platform* (video conferencing) and satisfaction with *Quality of Instruction*.

H2: There is a positive relationship between students' perceptions of *Interaction with Instructor* and satisfaction with *Quality of Instruction.*

H3: There is a positive relationship between students' perceptions *of Interaction with Peer*s and satisfaction with *Quality of Instruction.*

Data and Methodology

This study involved human subjects from non-protected populations. IRB approval was obtained from all three participating institutions. The research survey link was emailed to each of the institutions' Schools of Liberal Arts and Sciences faculty members, who were asked to disseminate the survey among their students (Appendix A). The study sample consisted of students enrolled in one or more synchronous online learning courses in the 6 months prior to completion of the survey. They must have participated in one or more synchronous online classes that utilized Zoom, WebEx, Canvas Conference/Chat, or any other video conferencing computer software to learn the course material. By clicking on the email link, potential participants were taken to the informed consent document. After participants agreed on the informed consent document, they were directed to the anonymous Qualtrics survey designed by the researchers. The survey consisted of six elements. The first element gathered data on student perceptions of *Interaction with the virtual platform* (video conferencing), the second element requested data on satisfaction with *Quality of Instruction*, the third element of the survey requested data on perceptions of *Interaction with Instructors*, the fourth component asked questions about perceptions of *Interaction with Peers*. The survey also contained two open-ended questions and demographic data. Participants had 6 weeks to complete the online survey. Students chose their own date, time, space, and technology equipment to complete the survey. Upon data collection completion, a mixed-method approach using regression analysis and thematic analysis was used to determine student satisfaction with quality of instruction of synchronous online learning during the pandemic.

While Community of Inquiry theory does have an available 35-question survey, the data collection instrument was not used in this study. Based on research that examines student time constraints and length of surveys as reasons for low student response rates on student educational satisfaction surveys (Duncan, 2008; Anderson et al.,2005), this research utilized a shorter, self-designed survey instrument with 25 Likert-Scale type questions and 2 optional open-ended questions. The instrument used did, however, stay within the parameters of CoI theory as our survey categories incorporated the 3 "presences" of teaching, social, and cognitive in online education.

Research Measures

Dependent Variable

The dependent variable (satisfaction with *Quality of Instruction*) was measured by students' overall perceptions of the interactions with peers, students, and virtual platform. The term "quality of instruction" ought not to be confused with "effectiveness of learning." "Effectiveness of learning" implies students meeting measurable educational benchmarks in

synchronous online learning. Instead, our data strictly represent student opinions on their experiences in synchronous online learning.

The following items were used to measure this quality of instruction: a) The synchronous online communications are integrated well with other course materials (ex. e-textbooks, supplemental course materials; b) The content of supplemental material outside of video conferencing is well put together and easy to understand; c) The video conferencing sessions are thought provoking; d) The supplemental materials outside of video conferencing sessions are thought provoking; e) The instructor uses additional learning methods to enhance the learning experience during the video conferencing sessions (ex. videos, games, educational online simulations). Each item was measured on a Likert scale of 1-5, with 5 being "strongly agree" to 1 being "strongly disagree." The Cronbach alpha for the items used to measure quality of instruction was 0.9.

Independent Variables

Three independent variables were used in this research. The first was *Interaction with the Virtual Platform* (Videoconferencing). Seven items were used to measure this variable: a) It is easy to access the video conferencing software used in the course (Zoom, Canvas Conference, Microsoft Teams, Cisco WebEx, etc.,); b) It is easy to share my screen in the video conferencing; c) It is easy to enable the video and or audio in video conferencing; d) It is easy to use the chat feature in video conferencing; e) The video conferencing sessions are too long for my attention span; f) It is easy to use emoticons to indicate my engagement in the video conferencing sessions; g) It is easy to use emoticons to express my understanding of the material being covered in the video conferencing sessions. Each item was measured on a Likert scale of 1-5, with 5 being "strongly agree"' to 1 being "strongly disagree." The Cronbach alpha for the items was 0.8.

The second independent variable was *Interaction with Instructors.* Questions used to measure this item were as follows: a) The instructor provides adequate feedback to my questions/ comments in virtual conferencing; b) The instructor is available for virtual conferencing office hours; c) The instructor periodically asks for feedback from students on content comprehension; d) The instructor provides aid to students struggling with navigating the virtual conferencing software; e) The instructor maintains the easy flow of the video conferencing sessions (ex. no awkward silent moments); f) The instructor provides a conducive learning environment where students feel comfortable to express their views and opinions; g) The instructor provides a conducive learning environment where students feel comfortable to ask him/her questions. Each item was measured on a Likert scale of 1-5, with 5 being "strongly agree" to 1 being "strongly disagree." The Cronbach alpha for these items was 0.92.

The third independent variable was *Interaction with Peers.* The following items were used to measure this variable: a) The instructor encourages group discussions and debates in the video conferencing sessions in breakout rooms; b) The instructor allows for individual and/or group presentations in the video conferencing sessions; c) The instructors establish and maintains video conferencing netiquette by telling students to turn on their cameras; d) The instructors establish and maintains video conferencing netiquette by encouraging students to maintain eye contact with the camera when talking; e) The instructors establish and maintain video conferencing netiquette by telling students to mute their microphones when they are not contributing; f) The instructors establish and maintains video conferencing netiquette by telling students to use the chat feature for constructive comments and relevant questions. Each item was

measured on a Likert scale of 1-5, with 5 being "strongly agree" to 1 being "strongly disagree." The Cronbach alpha was 0.8.

Control Variables

Control variables such as age, gender, education, and tenure are paramount to properly understand the relationship between independent and dependent variables. The main control variable in this research was gender. Education and age were not used as control variables because the respondents were all undergraduate students within the age range of 18-25.

As this research controlled for gender, a dummy variable was created that would differentiate between male and female respondents. Male was coded as 1 and 0 if otherwise to see if there was a significant difference between males and females in satisfaction with quality of instruction. Previous research on the effects of gender on online learning outcomes has shown that females achieve higher learning outcomes than men because they exhibit more persistence, engagement, and commitment than males (Richardson & Woodley, 2003). In addition, Alghamdi et al., (2020) concluded that females had stronger self-regulation than males which contributed to better achievement of online learning outcomes. Gender was used as a control variable as similar international studies investigated it as a factor affecting academic success in online liberal courses during COVID-19 (Choi, 2021) and online distance learning (Mohamad, 2020).

Data Analysis

For the quantitative data, we used Ordinary Least Squares regression with robust standard errors to examine the relationship between our dependent and independent variables, and Pearson correlation was also used to assess the strength of the linear association among the variables. The survey was administered to 250 students and 141 completed the survey, thus providing a response rate of 56%. To analyze the open-ended data, we employed thematic analysis which is a flexible approach to analyzing qualitative data. This method allows researchers to identify descriptive themes from data and develop explanations useful for research. To familiarize ourselves with the data, we went through the open-ended responses to questions and noted potential themes.

Results

Table 1 provides the descriptive statistics. About 40% of the respondents were male.

Table 1
Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Quality of Instruction	141	3.42	0.9432	1	5
Video Conferencing	141	3.86	0.6892	1	5
Interaction with Instructors	141	3.93	0.8664	1	5
Interaction with Peers	141	3.12	0.8666	1	5
Gender (Male)	141	0.397	0.4911	0	1

On average, *Quality of Instruction* was 3.42 suggesting a tendency towards agreement. *Interaction with Virtual Platform* (*Video conferencing)* mean was 3.86. *Interaction with Instructors* had a mean of 3.93. Although, on average, there was agreement among the respondents concerning the relevance of *Interaction with Peers*, their responses were close to neutral as shown by the mean of 3.12.

Table 2
Correlation Table

Variables	1. (QoI)	2. (VC)	3. (II)	4. (IP)	5. Male
1. Index for Quality of Instruction (QoI)	1				
2. Index for Video Conferencing (VC)	0.4433*	1			
3. Index for Interaction with Instructors (II)	0.6956*	0.5428*	1		
4. Index for Interaction with Peers (IP)	-0.1511	-0.0920	-0.1681*	1	
5. Male	-0.1942*	0.0495	-0.0024	-0.1374	1

As shown on Table 2 above, there is a positive correlation between perceptions of *video conferencing* and satisfaction with *quality of instruction* (0.44). Perceptions of *Interaction with Instructors* and satisfaction with *Quality of Instruction* are also positively correlated (0.7). Similarly, there is a positive correlation between *Interaction with Instructors* and *Video Conferencing* (0.54). There is a negative correlation between *Interaction with Peers* and *Interaction with Instructors* (-0.17), and Male and satisfaction with *Quality of Instruction* (-0.19).

Table 3
Regression Results

Variables	Index Quality of Instruction
Index Video Conferencing	0.148
	(0.0910)
Index Interaction with Instructors	0.681***
	(0.0826)
Index Interaction with Peers	-0.0701
	(0.0686)
Male	-0.397***
	(0.116)
Constant	0.550
	(0.403)
Observations	141
R-squared	0.533
Degrees of freedom	4

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From the regression results, student perceptions of *Interaction with Instructors* were associated with a significant increase of (0.68***) in satisfaction with *Quality of Instruction.* Therefore, an increase in satisfaction with quality of instruction was due to the influence of the perceptions of *Interaction with Instructors.* Thus, Hypothesis 2, which predicted a positive relationship between student perceptions of *Interaction with Instructors* and *Quality of Instruction*, was supported. Another significant result was the control variable (gender). The results showed that being Male was associated with a 40% (0.4) reduction in satisfaction with quality of instruction. In other words, compared to females, males were less satisfied with quality of instruction.

Perceptions of *Interaction with the Virtual Platform* (video conferencing*)* were not significantly associated with satisfaction of *Quality of Instruction*; therefore Hypothesis 1 was not supported, and lastly, students' perceptions of *Interaction with Peers* were not significantly associated with satisfaction of *Quality of Instruction*; therefore, Hypothesis 3 was not supported. A discussion of the results is presented in the next section.

Discussion on Empirical Results

This study examined satisfaction with quality of instruction for synchronous online learning among liberal arts students. More specifically, respondents provided their perceptions of interaction with instructors, peers, and the virtual platform. Our research was guided by the CoI framework which states that the construction of knowledge depends on social, teaching, and cognitive presences. Teaching presence, which relates to feedback, learning activities, and assessments, was incorporated into the research variables *interaction with instructors* and *quality of instruction*, which included questions on feedback and content. Social presence, which relates to communication and collaboration, was incorporated into our research variable *instructor with peers*, which included questions regarding group presentations, group discussions, and netiquette. Cognitive presence is an aggregate of feedback, learning activities, communication, student interaction, and course design, and questions on these were included in our research questions. Student interaction as part of cognitive presence was also incorporated into the variable (interaction on virtual platform), as the ease of use of technology facilitates effective interaction.

Based on the results, student perceptions of *Interaction with Instructors* were positively associated with satisfaction with *Quality of Instruction*. Based on our research measures, when instructors provide adequate feedback on the virtual platform, regularly meet on virtual office hours, periodically ask for feedback from students on content comprehension, and provide a conducive learning environment where students are free to express their views and opinions, satisfaction with quality of instruction increases. This result confirms literature which suggests that successful online learning requires interaction and teaching support that sustains social and cognitive presence (Miller et al., 2014).

The results showed that compared to females, males tend to have lower perceptions of quality of instruction. Previous research on the effects of gender on online learning outcomes has shown that females achieve higher learning outcomes than men because they exhibit more persistence and commitment than males (Richardson & Woodley, 2003). In addition, Alghamdi et al., (2020) concluded that females had stronger self-regulation than males which contributed to better achievement in online learning outcomes.

Hypothesis 1, which predicted a positive relationship between student perceptions of *Interaction with the Virtual Platform* (video conferencing) and satisfaction *Quality of Instruction* was not supported. This result is supported by previous research on video conferencing in synchronous online learning, that has shown both positives and negatives of this mode of instruction. While videoconferencing has been used as an alternative to face-to-face communication during the COVID-19 pandemic, research has found that interpersonal communication behaviors that are shown through video conferencing are unnatural and unsettling for many users (Massner, 2021). In addition, video conferencing platforms have been described by students as exhausting or bringing intense feelings of tiredness. Videoconferencing requires more energy than in-person classes and can affect learning outcomes (Massner, 2021). In their research, Ghazal and Aldowah (2015) note that their students mentioned that virtual conferencing tools could not replace the traditional mode of instruction because of technical problems, including internet connection issues, resulting in the preference of face-to-face classes.

Hypothesis 3 which predicted a positive relationship between students' perceptions of *Interaction with Peers* and *satisfaction with Quality of Instruction* was not supported. This result is contrary to research and theory which have suggested that peer interaction is an essential part of learning (Aghaee & Keller, 2016). According to Rapanta, Botturi, Goodyear, and Koole (2021) student interaction on online platforms predicts successful learning outcomes, as social support is a crucial coping mechanism for students and student interaction creates an active learning environment and helps students develop (Rovai, 2004). Ascough (2002) noted that delivering effective online instruction requires an interactive, collaborative, and multidimensional thinking and learning environment. However, other research has found that student-to-student interaction may be affected because videoconferencing lacks the aspect of personal interaction, and students may miss important facial expressions and body language which are important cues to determine learning effectiveness (Correia et al., 2020; Vandenberg & Magnuson, 2021).

Results From Open-Ended Questions

The survey had two open-ended questions; the first question was, "To what extent do you think synchronous online learning is an effective replacement for the traditional face-to-face instruction?" Of 141 participants, 132 (94%) responded to this question. Responses were categorized under three themes: *effective, not effective, somewhat effective.* A total of 52 of 132 (39%) noted that synchronous online learning was an effective replacement for traditional face-to-face instruction. One participant explained that "It is very effective, because more interaction with the class as a whole is possible via chat and when the board is open for writing." Another indicated the convenience of synchronous online learning by explaining that "It is quick and easy like on the go, and it is easy to work around schedules easier. It also makes it convenient for people who can't travel to the school." Interestingly, another student explained the effectiveness of synchronous online learning by noting that "I feel like I am just as connected in the virtual platform as the actual classroom." Furthermore, another student pointed out that synchronous online learning was so effective that it should remain post COVID-19. It was also noted that effectiveness was dependent on the type of class. For example, one student wrote, "In the classes that don't require a bunch of memorizations or studying, it's great." Overall, students who agreed that synchronous online learning was effective cited reasons of convenience, type of class, and a sense of connectedness with teacher and peers.

Some students (44 of 132, 33%) believed that synchronous online learning was ineffective. For some, it seems a matter of preference for face-to-face instruction and ability to grasp information in a classroom setting, as one student wrote "It is not effective, I prefer learning face-to-face, as it's easier for me to retain information that way." Another issue raised as a reason for ineffectiveness was the inability of faculty members to effectively teach via synchronous online platforms; one student wrote that "Most professors aren't equipped to teach online." Another reason given was the distractions at home, as one student explained that "… at home or in a dorm there are a lot more distractions that you would not have in a classroom. For me personally, even though I tell my family that I am in class, they still try to come in my room and talk to me, it is so much easier not to pay attention when we can control our audio and video." Similarly, another student noted that "it is way easier to zone out and lose focus from the computer screen." Other explanations were that with synchronous online learning, students miss out on hands-on learning, which is provided in a physical classroom. Health concerns were also cited as other reasons; for example, one participant explained that "I have ADHD, bad anxiety, OCD tendencies, and some depression, therefore online learning for me isn't an option." Another concern was missing the college experience; as a student explained, "For me and others I know it has ruined the college experience and replaced motivation with thoughts of just getting the semester over, with not caring if we learn or not." Another student indicated that "The engagement between professor and student is not and cannot be as good via virtual platforms as it is in person. There are student facial and body expressions indicative of confusion or questions, that are identified in a classroom setting but not perceived by professors via Zoom." These explanations shed light on the perceptions of synchronous online learning during the COVID-19 pandemic.

The perceptions of the remaining students (36 of 132, 23%) were that synchronous online learning is *somewhat effective*. Some of the responses were: "It is better for those that can get work done at their pace"; "I think synchronous online learning has the potential to be an effective replacement to traditional face to face. However, many instructors lack the knowledge on how to run a virtual platforms and still make content in the class understood to students"; "I think it helps when you're a visual learner, however, nothing will replace that need for face-to-face learning"; It is a safe option, but it is definitely not a replacement for face-to-face class"; "I don't think it's a great replacement; it hinders learning and group discussion"; "It is an adequate replacement until we can use in person"; "It's a decent replacement, but it still lacks the intimacy of a classroom"; and "I think synchronous online learning is a moderate substitute for in person learning."

The second survey question was, "What kind of recommendations would you make to improve your virtual learning experience in synchronous online courses?" Out of the 141 survey participants, 122 (87%) responded to this question. The responses were categorized under three themes: R*ecommendations*, *No recommendations/changes*, and *End synchronous online learning.* A total of 75 of 122 (61%) students provided recommendations for improving the virtual learning experience. The common recommendation provided by most students was the need for more interaction and engaging classes on the virtual platform. For example, it was noted that, "I think that lectures should be more interactive, since lack of paying attention in an online setting is clearly an issue. For example, I think that most lectures should enforce breakout rooms for students to review the discussed material by themselves and then discuss their review in the main room." Similarly, other students indicated that "Instructors should make class time more fun rather than just lecturing"; "Encourage the use of the chat features and interact with students

via chat, professors do not keep an eye on the chat and ask that students just speak if they have a question. This often leads to crosstalk and disorganization"; "Professors need to learn how to make synchronous online classes more engaging and less monotonous"; "I think it is best to be as interactive as possible while keeping the actual video lectures shorter than typical lectures. Incorporating other interactive sites, quizzes, games etc... is also helpful for student attention span and mental well-being."

Another recommendation was about the length of time spent on the virtual platform. Students noted that it is important to reduce the time spent because their attention span is diminished on a virtual platform. The following responses were recorded: "Reduce the amount of time dedicated to zoom conferences"; "do not have four-hour long classes, students cannot stay focused in their home environment with distractions"; "I noticed around an hour and a half to two hours, my mind would start to stray off and I found it hard to maintain focus throughout the whole lecture, due to any distractions at home"; and "Shorten video conference lengths (it doesn't make sense that a class that is usually an hour long in person goes for 2 hours online)." Some students recommended the need for training about how to use the technology and how to teach on the virtual platform. The following responses were given: "Proper training for professors on how to use Zoom and Canvas, have set office hours that students can pop in to chat with the professor"; "Some teachers aren't ready or built for virtual learning so those instructors need training or to stay in the face to face environment"; and "I do believe the University needs to provide training for professors on the technology used, though it has gotten better there are some instructors who still have challenges. Some students also face challenges with the technology, and it disrupts the flow of the class." It was also recommended that instructors make supplemental resources, such as study materials, PowerPoints, and other documents, available.

Forty-one of 122 (34%) either did not have any recommendations or were content with the synchronous online learning experience. Finally, 6 of 122 (5%) of the participants noted that there should be an end to synchronous online learning. For instance, some students advised the following: "Do not try to compensate with zoom, simply continue like other online only classes"; "Return to face to face"; "bring back in person classes"; "I would recommend everyone to wear their masks and social distance, so we don't have to remain in synchronous online courses." Based on the responses noted above, while synchronous online learning is a good substitute to face-to-face instruction, particularly during the pandemic, it also contains challenges that can impact effective learning and satisfaction with quality of instruction.

Discussion and Implications

Most online learning research has focused on asynchronous learning effectiveness in general terms. This research expands on previous studies and investigates student perceptions of synchronous online learning and satisfaction with quality of instruction specifically in the field of liberal arts. This was the mode of learning widely adopted by educational institutions during the COVID-19 pandemic. As indicated by the literature, taking a deeper look at synchronous online learning in that discipline is especially important considering the nature and mission of liberal arts. Calling for a dynamic learning community featuring liberal teacher-student interactions and a pedagogic environment that is learner centered and filled with vibrant student activities and engagement, and as liberal arts professors ourselves, we felt especially compelled to address the research gap in online learning. The findings from the open-ended questions indicate varied responses concerning student perceptions of synchronous online learning. Besides the positive perceptions and experiences regarding synchronous online learning

noted by students, others noted various challenges or disadvantages. These include faculty preparedness to teach online, time spent on virtual learning platforms, distractions, and technology. Moving forward with synchronous online learning and to fulfill the liberal arts mission, it is important for institutions to ensure that faculty members receive adequate training on the use of technology and effective delivery of classes on a virtual platform, including engaging and interacting with students. When faculty members receive adequate training and learn the skills to teach online it will benefit institutions in the future whenever there is need to transition to synchronous online learning. Another important takeaway from the open-ended responses and recommendations in this study was related to health concerns. Synchronous online learning places all students in one box, disregarding specific health concerns that can affect students from effectively learning. One student noted that because of anxiety and ADHD (a disorder of performance typified by dysfunction and poor self-regulation), online learning is not an option. Since synchronous online learning is affected by distractions and possible technological malfunctions, students with ADHD may be affected. It is recommended that institutions make provisions for students with health concerns, which may deter them from effectively learning on virtual platforms. An example of such an accommodation would be more one-on-one time, like extra tutoring services.

The empirical results showed that interacting with instructors increases satisfaction with quality of instruction. It is therefore important that instructors come up with various strategies to ensure that they interact well with students on the synchronous online platform. Lowenthal, Dunlap, and Snelson (2017) suggested interactive activities such as starting the synchronous online sessions with ice breakers, providing both informal and structured time, and opportunities for students to interact with each other through presentations and discussions.

Limitations and Future Research

The current study is not without limitations. This research focused on undergraduate Liberal Arts and Science students from three Universities in Florida; therefore, the results cannot be generalized to a greater population of students nationwide. In addition, the low response rate limits our analysis and ability to draw causal inferences regarding the relationships among variables. Given the smaller sample size, future research should be conducted with a larger sample of students from a wider geographical scale.

Conclusion

The COVID-19 pandemic saw many institutions of higher learning using synchronous virtual learning as a new platform for disseminating knowledge. The present study examined Liberal Art and Science students' perceptions of synchronous virtual quality of instruction during the pandemic. This study provides valuable information for both researchers and educators in the field by identifying the challenges and making recommendations for virtual classes to ensure a superior learning experience. As discussed in this research, synchronous learning allows students to access instruction from their computers using web conferencing tools and to engage with peers and instructor the same way they would in a traditional classroom setting. In addition, it allows real time sharing of information and learning, and students can instantly communicate with the instructor. From the findings, students noted several advantages of synchronous virtual learning, including convenience, immediate feedback, health safety during the pandemic, and for some, it was a good substitute to face-to-face classes. Recommendations include shortening video conferencing time, providing more faculty training opportunities with instruction on effective

online teaching and interactive and engaging classes, and providing students with more partner or group projects.

Declarations

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

All three participating higher education institutions approved the study. Applicable national and institutional guidelines for the care of use of human subjects in research were followed.

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Appendix A

Data Collection Instrument, Qualtrics Survey Questions

I. Closed Ended Questions (Scale 1-5; 5 = 'strongly agree' =1 being 'strongly disagree'

Category 1: Interaction with the virtual platform (video conferencing)

1. It is easy to access the video conferencing software used in the course (Zoom, Canvas Conference, Microsoft Teams, Cisco WebEx, etc.)
2. It is easy to share my screen in the video conferencing.
3. It is easy to enable the video and/or audio in video conferencing.
4. It is easy to use the chat feature in video conferencing.
5. The video conferencing sessions are too long for my attention span.
6. It is easy to use emoticons to indicate my engagement in the video conferencing sessions.
7. It is easy to use emoticons to express my understanding of the material being covered in the video conferencing sessions.

Category 2: Interaction with content

1. The synchronous communications are integrated well with other course materials (ex. e-textbooks, supplemental course materials)?
2. The supplemental materials outside of video conferencing sessions are thought provoking.
3. The video conferencing sessions are thought provoking.
4. The content of supplemental material outside of video conferencing is well put together and easy to understand.
5. The instructor uses additional learning methods to enhance the learning experience during the video conferencing sessions (ex. videos, games, educational online simulations).

Category 3: Interaction with instructor

1. The instructor provides adequate feedback to my questions/ comments in virtual conferencing?
2. The instructor is available for virtual conferencing office hours.
3. The instructor periodically asks for feedback from students on content comprehension.
4. The instructor provides aid to students struggling with navigating the virtual conferencing software.
5. The instructor maintains the easy flow of the video conferencing sessions (ex. no awkward silent moments)
6. The instructor provides a conducive learning environment where students feel comfortable to express their views and opinions.
7. The instructor provides a conducive learning environment where students feel comfortable to ask him/her questions.

Category 4: Interaction with peers

1. The instructor encourages group discussions and debates in the video conferencing sessions in breakout rooms.
2. The instructor allows for individual and / or group presentations in the video conferencing sessions.
3. The instructor establishes and maintains video conferencing netiquette by telling students to turn on their cameras.
4. The instructor establishes and maintains video conferencing netiquette by telling students to make eye contact with the camera when talking.
5. The instructor establishes and maintains video conferencing netiquette by telling students to mute their microphones when they are not contributing.
6. The instructor establishes and maintains video conferencing netiquette by telling students to use the chat feature for constructive comments and relevant questions.

II. Open-ended questions

1. To what extent do you think virtual synchronous learning is an effective replacement for the traditional face-to-face instruction?
2. What kind of recommendations would you make to improve your virtual learning experience in synchronous courses?