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Abstract

The authors of this research project developed a survey to gather information from graduate students about the experiences using a virtual synchronous platform, called Adobe Connect. While the format of the virtual classroom should encourage robust discussion, the authors found this not to be the case in the online virtual synchronous courses in education. Curious as to why the quality of discussion was poorer than expected, the authors surveyed graduate students enrolled in their virtual, hybrid (combination of face-to-face and virtual), and face-to-face classes over four semesters. Analysis of respondents' Likert Scale ratings and answers to open-ended questions about various aspects of virtual synchronous, hybrid, and face-to-face course presentations were conducted, with a major focus on virtual synchronous online experiences. Results indicated that a learning curve exists when taking virtual synchronous course delivery. In other words, the more courses the students took the more competent and satisfied they became.

Introduction

In higher education, the importance of classroom discussion should not be underestimated. Learner participation in the discussion of ideas, concepts, and facts leads to processing at the more advanced levels of Bloom's Taxonomy. This is particularly true for graduate students in the field of teacher education. Discussion helps masters and doctoral students, who often are simultaneously teaching in prek-12 programs while working on advanced degrees, to operationalize and implement strategies presented in their university classroom. These working teachers bring with them rich experiences to share and explore with one another. Building regular and frequent periods for discussion within university course delivery provides the means to do this and encourages the students to incorporate theory and research into their teaching practice.

Designing university programs for working professionals is a challenge increasingly met with online course offerings. In the United States alone, over 6 million university students were enrolled in online courses during the 2012-2013 academic year (Allen & Seaman, 2012). In 2015 it was reported that more than one quarter of all students enrolled in institutions of higher education were enrolled in at least one online course (Allen & Seaman, 2016) and although there was a significant drop in overall postsecondary enrollment in 2017, the percentage of students taking at least one online course rose to 33.1% (Lederman, 2018). Asynchronous courses delivered

through platforms such as Moodle, Blackboard, and Canvas provide busy students with the ability to "attend" classes and complete assignments around their own schedules. Discussion occurs in forums or discussion boards. This type of discussion allows students to take time to flush out their ideas, reactions and questions before engaging in the discussion. Unfortunately, these discussions in asynchronous learning management systems (LMS) can become stilted because they lack the spontaneity of face-to-face conversations.

Virtual synchronous online course delivery involves the use of interactive virtual classroom platforms such as those offered by Zoom, Adobe Connect, and Collaborate. While particular features differ among synchronous platforms, all attempt to mirror traditional, face-to-face, brick and mortar classroom experiences. Virtual synchronous classrooms promote a sense of community often missing in an asynchronous LMS (Parker & Martin, 2010). Over the years, these synchronous videoconferencing systems have become more sophisticated and increasingly offer experiences that previously could only be achieved when students physically gathered in a campus classroom. Early attempts at virtual synchronous classrooms were clumsy and did not easily allow for group discussion. Martin, Parker, & Deale (2012) point out that when natural voice interactivity was added to virtual synchronous online classrooms, student-to-student and student-to-instructor conversations increased significantly. Some older virtual synchronous systems limited the number of students that could access the classroom; others were very limited in the types of teaching materials (e.g., PowerPoint, Word documents, web pages) that could be uploaded to the platform. One of the first virtual synchronous platforms that allowed students to talk and see one another and the instructor while accessing online material is the now defunct Marratech system. Along with Cisco's WebEx platform, new software opened the door to the much more robust systems used today.

Course Delivery and Online Discussion Formats

The increasing number of courses offered using videoconferencing learning systems, has prompted researchers to investigate this trend. During the 2011 and 2013 academic years, Martin and Parker (2014) surveyed 79 university and college professors who were either teaching virtual synchronous courses completely online or in a hybrid format. They found that 57.7% of the respondents decided to offer their courses online in synchronous videoconferencing formats to promote students' social presence. Professors strongly agreed that virtual synchronous classrooms enhanced student learning (74.7%) and improved their instructional abilities (63.3%). While early online asynchronous environments primarily promoted individualized learning and enhanced reflective thinking, Kock (2005) believed that they, unfortunately, hampered interactive learning. He developed the Media Naturalness Hypothesis (MNH). This theory states that the naturalness of the media and the interactive nature of the virtual synchronous communication environment is a crucial factor in decreasing ambiguity in communication and thus increasing ease of learning. Hrastinski (2008) investigated the effect of synchronous communication on participation in discussions. He found that virtual synchronous communication "induced personal participation" and that "e-learners felt that they worked together and were not only restricted to course content" (p. 499). He concluded that this would most probably increase learner motivation especially if these virtual synchronous conversations took place in small rather than large groups. Nilsen, Almås, & Krumsvik (2013) agreed, writing that the 56 students they surveyed reported that the synchronous video

environment made it easier to voice their question than a large lecture hall environment. However, 69.9% of respondents said they preferred the text-based chat function rather than talking in the online synchronous class. The authors reported that, "Some respondents noted that the idea of communicating during the session is sometimes intimidating. 39.3% felt they did not ask as many questions in online sessions compared to campus sessions, but 25% said that they asked more questions in online meetings and 30.4% said here was no difference" (p.96).

Al-Samarraie (2019) reviewed 31 research studies published between 1997 and 2018 that focused on the use of virtual synchronous learning instruction. He categorized the studies into three platforms groups: desktop videoconferencing (DVC), interactive videoconferencing (IVC), and web videoconferencing (WVC). The first two platforms, DVC and IVC require the participants to join the online meetings from a fixed location with specialized technology and equipment or from a desktop location with the addition of specialized equipment and advanced proprietary software packages. The WVC, the most commonly used platform today, allows anyone given the web address and permission to join the meeting to do so from any internet connected device. Zoom and Adobe Connect platforms are examples of WVC. Al-Samarraie found that the authors of the studies he reviewed who focused on WVC platforms reported that while WVC platforms "encourage dynamic cooperative efforts among group members, even though students who are technology-oriented may be confronted with technical hitches. Meanwhile, the constant monitoring of students' progress throughout the session is the key for ensuring a meaningful learning experience in WVC" (p. 134).

Delello, McWhorter, and Lawrence (2019) in their article entitled, "Fostering a community of inquiry" reviewed the myriad of ways to conduct class discussions online and, using examples from the literature, highlighted the advantages and disadvantages of each format. Asynchronous discussion forums such as Facebook, YouTube, and those employed in Learning Management Systems (e.g., Blackboard and Moodle), while allowing participants time for thoughtful reflection before constructing their posts and responses, produced a higher incidence of reader misinterpretation and lacked the interactivity and immediate feedback of real-time discussions. Some of the literature on asynchronous discussion reviewed by the authors suggested that the participant's sense of belonging was diminished in this format. The second type of online discussion environment discussed by Delello, McWhorter, and Lawrence used via real-time text messaging and/or interactive video. Examples of these types of formats are Adobe Connect, Zoom, and Google Hangouts. Several of the articles they reviewed highlighted synchronous discussion's potential to more fully engage participants and promote social interaction and collaborative learning, However, there were drawbacks noted including technical glitches such as video and audio latency, freezing communication interruptions, time zone mismatches, and the significant costs for universities to acquire and run video conferencing systems.

When comparing student participation in face-to-face and synchronous online discussion, Zhoa, Shen, Hwang, and Shih (2020) looked at the interfering factors that diminish the quantity and quality of classroom discussion using the Spiral of Silence (SOS) theoretical framework proposed by Noelle-Neumann in 1974. This theory posits that two factors are affecting an individual participant's decision to participate in discussion. First, a group member is more likely to offer their opinion when they agree with the majority view. Participants in a

discussion who hold an opinion that mirrors the majority opinion have less apprehension and fear of isolation and tend to be more forthcoming in discussions. Members who hold an opposing positions exhibit a greater fear of being isolated by the group and are more likely to remain silent or switch a previously held minority view to the mainstream opinion and only then express themselves more freely. Applying the SOS framework, Shen, Hwang, and Shih compared two discussion formats, oral in-class face-to-face discussion, and synchronous written online discussion. Their subjects were 184 undergraduate students majoring in Communication in a Chinese university. The participants engaged in discussions on controversial topics in two 90 minute in-class face-2-faces class meetings and then in two WeChat online synchronous discussions. After each of the experimental conditions, the students completed a Likert-Scale questionnaire assessing their perception of their willingness to participate in discussion and willingness to express their true opinions. The researchers found that, "[t]he willingness to participate in online discussion is significantly higher than in face-to-face discussion" (p 191). Additionally, the fear of isolation produced by expressing a non-mainstream opinion was apparent in both scenarios but it did not differ in degree between the two experimental conditions. However, students expressed they had more participation apprehension in face-to-face discussions than in synchronous written online discussions.

Clark, Strudler, and Grove (2015) explored students' perception of engagement, their perception of the presence of the instructor, their feelings of social presence, social interaction, and their ease of sociability when participating in two distinct online interactive discussion formats. The researchers posed the following research questions: "1) What differences in social presence, if any, did students perceive between communications with video versus text-based communications? and, 2) What differences in teaching presence, if any, did students perceive between communications with video versus text-based communications?" (p. 49). Preservice undergraduate majors in education alternately participated in discussions on an asynchronous threaded discussion forum (text-based discussion -TBD), and in asynchronous video recorded discussion group (video enhanced discussion - VED). Synchronous videoconferencing was also available to students in the VED scenario in order to meet with discussion partners and the instructor, if desired. Analyzing the responses from questionnaires about their 16 students' experiences in the two course discussion paradigms, in addition to information provided by the students during individual personal interviews, the researchers found that the VED ratings were higher for all social scale areas the students had experienced - sociability, social presence, social space, and teaching presence. Clark, Strudler, and Grove report that. " The findings suggest that the participants felt greater teaching and social presence when discussions occurred with video posts and synchronous videoconferencing as compared to text based discussions" (p. 62).

Our Research Project

After years of delivering asynchronous coursework via Blackboard in two areas of special education (Early Intervention and Deaf Education), and informed by Kock's theory of media naturalness of communication, in 2008 the authors began exploring online virtual classroom systems. By that point the authors had taught courses using five different delivery platforms: a traditional brick and mortar semester long face-to-face class, an asynchronous online Blackboard course, a compressed video presentation with remote sites, a one-week

summer face-to-face intensive course, and lastly an online synchronous videoconferencing semester long class. Students who had taken courses via multiple platforms were asked their opinions of their experiences. This data was gathered and motivated the authors to further investigate student's responses related to virtual synchronous, hybrid, and face-to-face course delivery.

In the past 11 years, the authors have taught online virtual synchronous courses using the Marratech system, then the Microsoft Live Meeting system, followed by the Adobe Connect system, and now the Zoom virtual synchronous online classroom. As early adopters of online virtual synchronous instruction, the authors noticed that the graduate students' willingness to engage in discussion and the depth of discussion in online virtual synchronous classrooms had declined when compared to the same courses previously offered face-to-face on campus. Initially, we thought that the difference between the more robust discussions in our brick and mortar classrooms and the less engaging discussions in our online virtual synchronous classrooms was due to limitations in the software that was being used. However, as the software became more sophisticated we did not see a concurrent increase in our students' willingness to engage in discussion nor an increase in the richness of discussion in our classes.

For the past four semesters, the authors asked students enrolled in virtual synchronous online classes about their experiences taking these courses. The authors were particularly interested in the students' enjoyment of the courses, their preference for course delivery (brick and mortar versus virtual synchronous delivery versus hybrid delivery) and their perceptions of their involvement in discussion within the virtual synchronous online platform, Adobe Connect. Because students enrolled in disability-related courses in early intervention and deaf education do not comprise a large population, there are not large numbers of teachers interested in becoming certified to teach these students. This naturally limited the number of graduate students we could query which affected our ability to generalize the results we obtained from the small sample.

Methodology

For the purposes of this study, the authors created a short 2-page survey. We asked students in our fall 2017 through fall 2019 semester classes taught in virtual synchronous online classrooms, either partially or fully, to respond to a number of questions. The questions focused upon the online environment, the ease of use and the fidelity of the technology, their satisfaction with the environment, and their perceptions about their own discussion participation and the level of discussion quality. At the completion of each of the authors' courses that were taught via Adobe Connect or a combination of Adobe Connect and on-campus face-to-face sessions (hybrid delivery), the students were given the survey and asked to rate four aspects of their virtual classroom e-learning experience. They rated these aspects on a 1-10 Likert Scale with 1 being a "poor experience" and 10 being a "very good experience." We also included a question asking respondents to quantify their preferences of learning environments, and ended with several open-ended questions on the subject. We received and analyzed 45 completed surveys focusing on our graduate students' perceptions of their experiences using our Adobe Connect synchronous video conferencing learning platform. The respondents included 24 students who were enrolled in their first video synchronous online course, 15 students enrolled in their second virtual synchronous

course, and 6 students who had completed at least three virtual synchronous online courses.

Results

Four Aspects of Virtual Synchronous Courses

Via the Likert scale with a range of 1-10, the students' rated four aspects of their virtual synchronous platform experiences: (1) the quality of their audio and video experience, (2) their ability to participate in discussion, (3) the quality of discussion conducted in the virtual synchronous platform and (4) the convenience of use of the virtual synchronous platform. Surveys were separated by the number of virtual synchronous courses taken by the graduate students. Table 1 presents data from the surveys of students who had taken only one virtual synchronous course. Table 2 displays data of respondents who had taken two virtual synchronous courses and Table 3 presents data from those students who had enrolled in three or more virtual synchronous courses.

Table 1. Students Who Took 1 Virtual Synchronous Course (N=24)

Aspect	Range of responses	Average response
Quality of audio and video	4-10	7.90
Ability to participate in discussions	2-10	8.31
Quality of discussion content	6-10	8.24
Convenience of use	3-10	8.45

Table 2. Students Who Took 2 Virtual Synchronous Courses (N=15)

Aspect	Range of responses	Average response
Quality of audio and video	5-9	8.35
Ability to participate in discussions	5-10	8.41
Quality of discussion content	5-10	8.62
Convenience of use	5-10	9.09

Table 3. Students Who Took 3 or More Virtual Synchronous Courses (N=6)

Aspect	Range of responses	Average response
Quality of audio and video	2-9	7.40
Ability to participate in discussions	2-10	9.60
Quality of discussion content	2-10	9.00
Convenience of use	9-10	9.66

When comparing responses from those who had taken only one course via virtual synchronous delivery with the responses from students who took three or more virtual synchronous courses, the authors found that the group with more experience with virtual synchronous coursework indicated a greater ability to participate in discussion and an increased perception of discussion as being of higher quality. The mean rating for the "Quality of discussion content" was 8.24 with those who had taken only one course compared to 9.00 for those

who had taken three or more courses. In fact, as the number of virtual synchronous courses taken by students increased, so did their ratings of all on all of the four aspects. However, the quality of audio and video maintained the lowest mean scores among all three groups of student.

The authors then combined all 45 submitted surveys to determine the aggregated range of ratings and the means for each of the four aspects regardless of the number of virtual synchronous courses a student completed. Table 4 displays the aggregated data for all respondents. A significant range of responses was apparent on all of the four aspects. However, the lowest average response was 7.88 which indicates that technical issues were commonly reported as negatively affecting the respondents' experience. Conversely, the convenience of taking class wherever the students wished (typically home or work) was seen as a definite advantage of the videoconferencing system with a score of 9.06, the highest score on all four aspects.

Table 4. Ratings of All Students Who Took Virtual Synchronous Courses (N=45)

Aspect	Range of responses	Average response
Quality of audio and video	2-10	7.88
Ability to participate in discussions	2-10	8.77
Quality of discussion content	2-10	8.62
Convenience of use	3-10	9.06

Since the authors perceived a decline in the quantity and quality of discussion which prompted this research, data from "Ability to participate in discussions" and "Quality of discussion" was examined. (See Table 5.) The data indicates that an increase in the average scores occurred when the students had more experience with virtual synchronous courses. Even though the rating on these two aspects increased when students had more virtual synchronous courses, the authors would have thought that the scores would have been lower overall given their observations and reactions as instructors.

Table 5. Overall Ratings of Content related to Discussions (N=45)

Number of virtual synchronous courses	Ability to participate in discussions	Discussion quality
Students with 1 virtual synchronous course (N=24)	8.31	8.24
Students with 2 virtual synchronous courses (N=15)	8.41	8.62
Students with 3 or more virtual synchronous courses (N=6)	9.60	9.00
All students regardless of the number of virtual synchronous courses taken (N=45)	8.51	8.47

Course Delivery Preference

An additional survey question asked respondents to quantify their preference for three different learning environments: on-campus face-to-face only courses, virtual synchronous courses only, and hybrid (a combination of the two) course delivery. Respondents were 'given' 100 points and asked to assign points to

each of the delivery methods adding up to a total of 100 points. Table 6 shows the percentage of students in each group and their course delivery preference. Students with one or two virtual synchronous courses had the same preferences with on-campus courses (36%) and hybrid courses (39%). However, that preference became weaker as the number of virtual synchronous classes the students had taken increased. The respondents with three or more virtual synchronous online courses preferred hybrid courses (50%), followed by virtual synchronous only courses (34%) and finally face-to-face courses (16%). Again, the more courses students took using a virtual synchronous platform, the greater was their preference for that form of delivery. One student commented that, "Our first face-to-face class helped me feel comfortable with everyone in class. It was not awkward when we were on Adobe Connect."

Table 6. Course Delivery Preference (N=45)

Number of Virtual Synchronous Course	On-campus only	Hybrid on-campus and virtual synchronous	Virtual synchronous only
Students with 1 virtual synchronous course	36%	36%	28%
Students with 2 virtual synchronous courses	39%	39%	22%
Students with 3 or more virtual synchronous courses	16%	50%	34%

Open-Ended Responses

Students were asked four open-ended questions: (1) what they liked about Adobe Connect courses, (2) what they disliked about Adobe Connect courses, and (3) Did you talk less or answer fewer questions in Adobe Connect courses as compared to face-to-face, and (4) what their recommendations would be. In response to the first question, almost all of the students commented on their ability to take the class from home or another setting. They frequently said, "I did not have to drive to class" or "it was very convenient." Many indicated that virtual synchronous (Adobe Connect) was better than 100% online, meaning the asynchronous platform of Blackboard or Moodle. Even though the survey did not seek their perspective about the asynchronous courses they took, they still made comments about this. Other fewer, but noteworthy comments about Adobe Connect were, "it's easier to talk and discuss, can see everyone on the screen, can see documents being discussed."

Responses to the second question about what they disliked about Adobe Connect related almost totally to technical issues. The problems that they identified were related to microphone issues (too soft or too loud), noise feedback, disconnected and have to reenter class, and frozen screen. One student remarked, "There seemed to always be a delay and some people never really could participate much in the discussions because of technical issues." A few respondents indicated that video synchronous was not as engaging as face-to-face. However, approximately 1/3 of the students said "NA" (Not Applicable). In other words, they liked using Adobe Connect and reported no concerns.

The third question was related to the authors' original belief that students talked less or answered fewer questions in Adobe Connect. A majority of students indicated that the professor teaching the course made a significant difference in the type and amount of discussion that occurred. A typical comment was "Some professors are better than others at including everyone in discussions." Other common responses were "yes, I talked less due to...technology issues…easier not to talk (and just sit back and listen)…face-to-face was more meaningful because more comments, questions, and engagement." A few students indicated that they talked the same amount.

The last open-ended question asked students if they had any recommendations for faculty when teaching via Adobe Connect. The vast majority of responses were "NA" (Not Applicable) or the question was left blank with no response. Several indicated a need for "professors who are better prepared to teach this platform." Other ideas were related to the professor talking more about assignments, splitting students into small groups for discussions, communicating with students when microphone is too loud or noise feedback is occurring. And again, comments were made about Adobe Connect being better than 100% Moodle or Blackboard.

Conclusions and Discussion

Clearly, a learning curve exists for students when taking virtual synchronous courses. The more courses they take, the more comfortable and confident they are. Positive perceptions of participation in discussions and quality of discussions increased with additional synchronous virtual course enrollment. Overall, these graduate students rated their ability to participate in discussions and the quality of discussions as high which was encouraging information for faculty teaching the virtual synchronous courses. This finding was similar to the results of the study by Zhoa, Shen, Hwang, and Shih (2020) in which undergraduate students from a Chinese university were significantly more willing to participate in online discussions and had less participation apprehension than in a face-to-face environment. However, the aspect of culture may have been a factor in these students' responses as well as the age range of most undergraduate students.

Generally, courses that were hybrid in design were the type of delivery students preferred – if they had the opportunity – once they were comfortable with taking virtual synchronous classes. The hybrid courses at the university in which the investigation took place do not have mandated formats or frequency of face-to-face versus online. Thus, the professor determines the use and frequency. Even so, students preferred the hybrid delivery model which leads the authors to believe that universities should consider the use of mixed methods/platforms as much as possible in the delivery of courses. In the current state of many universities who are struggling with low enrollment, the use of hybrid courses may motivate students to enroll in their university.

Overwhelmingly, as busy professionals, students reported enjoying the convenience of virtual synchronous courses. Most of the students took the class in their home environment, but some were in coffee shops, on treadmills, in the back of their car, or wherever they could participate. Most indicated that not driving to campus was a bonus.

Technology issues were a major concern of the students. The lagging internet connection, microphone malfunctions, and poor student-end equipment were problems. These same issues were found in the study by Al-Samarraie (2019) in which technical issues were barriers to virtual synchronous learning. In our study, even though students were provided written and video instructions prior to the class starting, some students did not follow the directions as far as the type of equipment that they needed to use in order to efficiently participate in Adobe Connect. Because of this, some students experienced more technical issues than others. But those issues frequently impacted the whole class.

The professors' ability to use Adobe Connect and to facilitate discussions was critical. Two professors taught the majority of the classes, but occasionally an adjunct faculty taught a virtual synchronous course. More technical problems seem to occur when professors were not full-time faculty. Thus, the skill of the professor with using the platform was crucial to student enjoyment, participation, and discussion.

Lastly, even though not prompted, the students expressed a significant preference for virtual synchronous over asynchronous online course delivery. Other studies (Delello, McWhorter, and Lawrence, 2019 ; Clark, Strudler, and Grove, 2015) found similar results related to greater satisfaction, interactivity, and a teaching presence via synchronous platform as compared to asynchronous online course delivery. Thus, clearly, in our study and others, satisfaction with delivery of course content and interaction among students and faculty was significantly more positive with the synchronous platform. In our study, that level of satisfaction increased as students took more courses. This concept needs further exploration as universities move into new ways to delivery courses to both undergraduate and graduate students.

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