Perceived Effectiveness of Web Conferencing Software in the Digital Environment to Deliver a Graduate Course in Applied Behavior Analysis

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Abstract
This article provides an overview of the planning and instructional delivery of a course in Applied Behavior Analysis using Adobe Connect Pro™. A description of software features used by course instructors is provided along with how each feature compares to resources found to deliver instruction in a traditional classroom setting. In addition, the article describes the results and implications from instructional delivery designed to increase student participation, correct responding, and levels of satisfaction with various features of the software. Outcome from instruction suggest high rates of student participation, correct student responding, and high levels of student satisfaction with the various features of Adobe Connect Pro™.

Keywords: Adobe Connect Pro™, synchronous learning, online instruction, participation

The rapid development of computer-mediated communication technologies, such as email, real-time chat, and web conferencing discussion systems, continues to facilitate distance education in all disciplines. Distance education includes, but is not limited to, online instruction formats, audio, video, and Internet technologies used for course delivery, training, or correspondence studies (Bower & Hardy, 2004; Kanuka & Conrad, 2003). Online instruction refers to one specific distance education format that involves courses and degree programs accessed through means of audio and/or video Internet technologies (Johnson, 2004; Ludlow, Collins, & Menlove, 2006). One commonly used format is web conferencing, which has become widely popular in higher education due to its convenience and ability to provide equal opportunities for students in need of classes and training programs that may be otherwise unattainable in rural geographical locations (Chen, Pedersen, & Murphy, 2011; Ludlow et al., 2006). As a result of rapidly expanding growth in online instructional technology, institutions of higher education in the United States and around the globe now offer online courses ranging from one class to fulfill a single course requirement to entire online degree programs (Butner, Smith, & Murray, 1999). According to Fernandez (2007), online instruction has been especially promising for those in the teaching profession who are seeking convenient, cost-effective access for continuing their education.

Despite the increase in the number of children with disabilities served in rural areas, a significant shortage of highly qualified special education teachers remains (McLeskey, Tyler, & Flippin, 2004). In response to this shortage, various institutions of higher education (IHEs) have made efforts to provide opportunities for special education pre-service and veteran teachers, who may live in rural areas, to access training, preparation, and supervision courses (Canter, Voytecki, & Rodriguez, 2007; Dudding, 2009; Hager, 2011; Jameson & McDonnell, 2007). Online instruction programs have used a variety of instructional technologies to provide coursework and training to teacher candidates, with synchronous learning becoming a common method of course delivery (Falloon, 2011; Skylar, 2009; Yuping, Nian-Shing, & Levy, 2010).

Synchronous learning is comprised of two-way interactive television or videoconferencing technology that allows the real-time presentation of content by the
instructor to the students, who then can exchange ideas and receive immediate instructor and peer feedback (Bullock, Gable, & Mohr; 2008; Doherty-Sneddon et al., 1997; McDonnell et al., 2011; Waggoner, 1992). Students may communicate and interact in either an asynchronous or synchronous learning environment. Asynchronous formats (e.g., archived or previously recorded material and media) allow students to access their course content, class syllabi, homework assignments, and lecture presentations at their own convenience; in contrast, synchronous formats require students to access lectures and communicate with their peers simultaneously in a real time environment (Ludlow et al., 2006). The synchronous format of online instruction includes technologies such as text chats (e.g., sending and receiving messages/chatting in real time), webcasting (e.g., real time, live streaming), and conferencing in an audio/video or virtual classroom. Synchronous formats can be used to instruct small groups or to conduct larger meetings or workshops with groups of up to 100 participants (Boettcher, 2005).

Delivery of educational content through the use of synchronous online technologies is growing among institutions of higher education (Finkelstein, 2006; Hrastinski, 2008). Synchronous learning provides a tremendous advantage to learners who may be participating from a remote location due to the reduced need for investing in expensive equipment and increasing availability of broadband Internet access (Chen, Ko, Kinshuk & Lin, 2005; Latchman & Salzmann, 1999). Wasson (2007), however, has contended that a lack of bandwidth still exists to some degree in rural areas, making it difficult to download necessary files and access audio and video fields with clarity. Despite these technical challenges, web-conferencing technology can be surprisingly reliable, even in remote geographic locations (Rao, Eady, & Edelen-Smith, 2011). Access to the Internet and the unique benefits of synchronous environments (e.g., immediate clarification of meaning of instruction, feeling of immediate contact, motivation, immediate feedback, element of fun) are appealing to the distance learner (Ng, 2007). For example, results of a study conducted by Caywood and Duckett (2003) indicated no statistically significant differences between online and on-campus instruction on student learning. Beattie, Spooner, Jordan, Algozzine, and Spooner (2002) found that students’ course evaluations were similar between the two formats; however, the major disadvantage of synchronous online learning is having to set a specific date and time for meetings, which, according to Skylar (2009), “...contradicts the promise of ‘anytime, anywhere’ learning that online courses have traditionally promoted” (p.71). In addition, the use of audio software or phones without the use of video for conferencing may increase erroneous perceptions because individuals cannot see or comprehend nonverbal and contextual cues; thus, establishing a reciprocal understanding with others within the environment can be challenging (Karpova, Correia, & Baran, 2009).

Although research primarily has focused on asynchronous learning environments, research on learning in real time synchronous environments is emerging (Dammers, 2009; Fernandez, 2007). Skylar (2009), for example, investigated student performance, perception, and satisfaction of 44 pre-service general and special education students receiving instruction in two different environments (i.e., asynchronous using WebCT and synchronous using Elluminate Live). Results indicated that 30 of the 41 participating students stated that they would rather take an online course that used synchronous web conferencing lectures than a text-based asynchronous lecture in their coursework. Research on the effects of synchronous learning has centered on contextual aspects of learning, such as (a) real-time social interaction among students (e.g., debates and negotiations), (b) facilitation of discussion, (c) the breakdown of social isolation that many students experience when working or studying at a distance, and (d) how the communication in a synchronous environment can further promote personal and cognitive participation (e.g., Dymond, Renzaglia, Halle, Chadssey, & Bentz, 2008). According to Falloon (2011), despite the fact that synchronous learning is a novel way of enhancing online instruction, institutions of higher education already have been exploring the potential of synchronous learning for the enhancement of student participation in a vast array of contexts.

Although computer conferencing is being adopted rapidly by a number of institutions, those invested in teaching through the use of online instructional technology are still left with many unanswered questions (Bonk & Wisher, 2000; Herring, 2003). There is a limited amount of data-driven research that measures student engagement in learning through interactive and collaborative discourse in the synchronous environment (Xin, 2002). So far, most research investigating the effects of synchronous learning on student achievement has centered on student interaction and participation in the real-time learning environment (e.g., Hewitt, 2005; Hrastinski, 2008). The suggestion that interaction in the synchronous environment should increase student learning is more theoretical than empirical in nature (Allen, Mabry, Bourhis, Tittsworth, & Burrell, 2005). For example, the work of Bloom (1965) and Carroll (1963) contends that all learning requires engagement in order for mastery to occur. Collaborative environments can promote individual self-reflection...
(Garrison, Anderson, & Archer, 2001) in addition to opportunities to advance the collective memory of the whole group (Feenberg, 1989).

Despite the benefits of collaborative environments, lack of student participation has been cited as a major problem in online instruction (Hewitt, 2005). Lack of engagement has been associated with the following disadvantages: (a) failure to provide reflective contributions from the text reading requirements, (b) production of inadequate critical analyses of peers’ ideas, and (c) an overall lack of commitment to the coursework.

Common web-conferencing software, such as Elluminate Live®, Wimba Live™, HorizonLive®, Adobe Connect Pro and Skype®, can provide flexibility and functionality for instructors and students with the ability to (a) communicate orally through audio/video exchange, (b) chat live using messages through typing, (c) upload and share PowerPoint presentations, and (d) simultaneously surf, upload, and share common websites together (McBrien, Jones, & Cheng, 2009). Although the use of synchronous learning tools (e.g., web conferencing software) continues to expand, there is limited knowledge about use of these technologies to facilitate learning and determine student participation. Certainly, the effects of participation on student learning also are unknown (Skylar, 2009).

Although the debate continues among students and researchers over whether or not online courses promote interaction, there is still a need for improved teaching and learning strategies. Strategies that continue to provide the convenience of online instruction in combination with access to real-time interaction that simulate the traditional classroom are essential (West & Jones, 2007).

In response to the need for further examination of web-conferencing software in general and the specific need to examine effective software features affecting student participation in the online environment, the purpose of this article is to provide an overview of (a) the planning and training involved in teaching a course using the Adobe Connect Pro software, (b) the delivery of course content using software features implemented to enhance student participation, (c) the benefits and disadvantages of utilized features, (d) the results and implications of student participation over time, (e) the results of a student social validity questionnaire, and (e) future research needs.

**Course Description**

The following section describes the planning and delivery of a graduate course at the University of Kentucky (UK) offered through online instruction using the web conferencing software, Adobe Connect Pro™. A description of course planning, instructor training, course content (with an overview of software features), analysis of data collected, and recommendations for instructors are provided.

**Course Planning**

A course entitled Applied Behavior Analysis is required for graduate students in the special education master’s and doctoral programs in the Department of Early Childhood, Special Education, and Rehabilitation Counseling at the University Kentucky (EDSRC). Students taking the course typically have 1 of 3 areas of focus: (a) Interdisciplinary Early Childhood Education (IECE), (b) Learning and Behavior Disorders (LBD), or (c) Moderate and Severe Disabilities (MSD). The course is offered every fall in a traditional on-campus format. In the summer, the course is offered via online instructional technology so that it is accessible to both urban and rural special education teachers in various regions of the state. The purpose of the course is to provide advanced study in applied behavior analysis (ABA) and to demonstrate how interventions and strategies derived from using this approach can be used to improve socially significant behaviors of students with disabilities. The course prerequisites require students to enter with a previous understanding of basic ABA and how to apply its behavioral concepts.

During the summer session of 2011, the participants in the ABA course included 14 students (i.e., 2 students in the doctoral program and 12 students in the master’s program). Students were located in rural locations of Northern Kentucky as well as in urban regions that were in the surrounding local area or an average distance of 77 miles from UK. The master’s degree students were employed in teaching positions across several school districts.

An assistant professor and a full-time doctoral student in the EDSRC co-taught the course. The doctoral student was fulfilling requirements for a college teaching practicum as part of her Ph.D. program, field hours toward to become a Board Certified Behavior Analyst (BCBA), and coursework for a Graduate Certificate in Distance Education. During the planning of the course, the instructors prepared the required content and materials (e.g., textbooks, syllabus), communicated to the students that the course would be taught via web-conferencing, and described specific technological requirements that would be necessary for successful completion. The instructors sent out several emails asking students to check their computers for appropriate requirements: (a) updated applications (e.g., Java and Flash), (b) links to websites to check for adequate Internet connection speed (e.g., DSL, cable, or high-speed), (c) access to the Adobe Connect Pro™ login page, (d) an operating system and browser to work with the Blackboard course management system, and (e)
peripherals, such as headsets with a microphone and a webcam.

**Instructor training.** Prior to using Adobe Connect Pro™, both instructors attended two training sessions led by a UK Adobe Connect Pro™ Coordinator. Sessions took place in a small computer lab, allowing both instructors to learn simultaneously and practice role-playing as a guest, presenter, and host. In the training sessions, the instructors learned how to create and host an Adobe Acrobat Connect Pro™ class meeting as well as other techniques, such as scheduling meetings, displaying content (e.g., websites, PowerPoint), using audio and video settings during meetings, customizing the meeting room for instructional needs, and interacting with student participants. The instructors also learned how to record and download meetings, use break-out rooms for small group activities, and create whole-group questions using the polling feature.

**Course content.** The course required students to login to Adobe Connect Pro™ four times per week for 4 weeks from 4:30 to 7:00 p.m. The instructors delivered course content via Adobe Connect Pro™, which allowed for the use of PowerPoint, websites, video, and various documents related to each of the behavioral principles taught. The instructors developed assignments and activities that encouraged the application of the principles and concepts of ABA. This allowed students to learn the concepts within the context of their own research interests, as well as apply them in current and future teaching situations. Student assignments included daily study guides, online quizzes, Say All Fast a Minute Every Day Shuffled (SAFMEDS; i.e., oral assessment of identification and fluency of vocabulary), and a behavior change project (BCP). The BCP required the development, real-life implementation, data collection, and analysis of a research-based behavioral intervention. The instructors required students to discuss the results of their studies with classmates through PowerPoint presentations delivered through Adobe Connect Pro™. These assignments required students to give explanations of the theoretical and philosophical assumptions of ABA, describe behaviors in operational terms, and explain and describe how the principles of ABA can improve social, academic, and behavioral outcomes for students with disabilities. Most important, the BCP required students to apply the information to develop a comprehensive written proposal for a behavior intervention plan.

**Adobe Connect Pro™.** The instructors taught the course using the university-recommended web-conferencing software, Adobe Connect Pro™. Adobe Connect Pro™ allowed the instructors to create a classroom environment specifically suited to the needs of the students in the class. It also allowed the instructors to have a virtual meeting space. Similar to other group meeting and conferencing software, Adobe Connect Pro™ has unique features, such as secure socket layers (SSL), which contain a dual network of servers. Only registered students are allowed to enter "the virtual space" and have to be invited and subsequently accepted into the room, increasing security. The Connect Pro application secures the HTTP connection while the Flash media allows for the real-time meeting connection. Connect Pro is accessible to students who have either Mac or PC operating systems (Adobe Systems Inc., 2010).

Several features were available to the instructors through Adobe Connect Pro™. First, each instructor and student (when promoted to presenter status) had access to a virtual whiteboard, allowing for the demonstration of ideas in addition to the PowerPoint presentation. Second, instructors and students had the ability to communicate through the use of an instant messaging tool for the purpose of whole group or private chats. Third, all participants had access to a universal voice for use with most any telephone device for a webcast for up to 80,000 participants, including complete audio, video, and a space for sharing PowerPoint (PPTX) and websites, while synchronously watching and conversing with everyone in the class. The software also included additional features, such as question and answer polls for reports of attendance, participation, and evaluation of learning content, and file sharing (Falloon, 2011). Further, the Adobe Connect Pro™ web conferencing software included a PDF collaboration tool for real time use within sharing pods or for asynchronous use for viewing purposes only (e.g., watching pre-recorded classes). With these recently added features, students in this course could share their desktop screens, including PowerPoint slides, PDF documents, and websites, with their classmates and instructors. This allowed students to share and collaboratively edit in real time, either within a whole or small group (i.e., break-out sessions). In addition to Adobe Connect Pro™, students used the Blackboard course management system, which acted as a supplemental support and allowed students to discuss video clips using the discussion board, download important documents (e.g., syllabus, study guide questions), and take quizzes.

Each of the features in Adobe Connect Pro™ can be compared to various pedagogical techniques used in traditional classrooms to enhance teaching and promote student collaboration and participation. The following sections describe the supplemental technology and various Adobe Connect Pro™ software features used by the instructors to deliver course content and enhance student participation. Table 1 provides an overview of how each of these described features compare to instructional techniques used in a traditional classroom environment.
Sharing. One of the instructors uploaded each session's PowerPoint presentation into a file sharing pod for student download in case some students did not have the time or were unable to access it earlier. The instructors also posted files, such as study guide questions, prior to and during lectures for students to download quickly. This was similar to the traditional on-campus classroom situation in which students are gathered in the same physical location and benefit from being able to form groups and share documents and copies brought to them by the instructor; however, it was both more cost effective and required less planning than traditional photocopies. The instructor or a student promoted to the status of presenter could share Word/Excel documents, PowerPoint presentations, and web pages by sharing his or her screen.

Table 1.

Comparison of Instructional Features of Adobe Connect Pro™ and Blackboard with Traditional Classroom Pedagogical Techniques

<table>
<thead>
<tr>
<th>Adobe Connect Pro™ Instructional Features</th>
<th>Traditional Classroom</th>
<th>Blackboard Instructional Features</th>
<th>Traditional Classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whiteboard</td>
<td>Chalkboard or marker board to assist with communication of content during a lecture</td>
<td>Announcements</td>
<td>Announcements given in class through hard-copy notes, syllabi or on classroom marker or chalkboard</td>
</tr>
<tr>
<td>Live chat</td>
<td>Student-to-Instructor and student-to-student discussion and interaction</td>
<td>Chat</td>
<td>Independent small group discussion to develop and share ideas and receive feedback</td>
</tr>
<tr>
<td>Break-out rooms</td>
<td>Small group discussion and activities; students can work on given task in small groups and come back to the whole group to discuss findings</td>
<td>Discussions</td>
<td>In class discussions with peer groups and with instructor participation and facilitation.</td>
</tr>
<tr>
<td>Polling feature</td>
<td>Formalized assessments to measure content knowledge as well as course evaluations</td>
<td>Grade Book and Assessments</td>
<td>Instructors averaging and documenting grades in a grade-book or their own spreadsheet. Developing tests and quizzes in hard copy and administering them in a designated time period</td>
</tr>
<tr>
<td>Reporting feature</td>
<td>Evidence of student work, attendance and participation</td>
<td>Media library</td>
<td>Presenting content in an on-campus class session using television, DVD players, or computers</td>
</tr>
<tr>
<td>File Sharing</td>
<td>Materials provided in a typical classroom such as articles, syllabi and Power Point slides.</td>
<td>Journal, Blogs and Wikis</td>
<td>Instructors talking one-to-one with students to help with self-reflection and provide feedback. Reviewing material each week in class or allowing students to receive peer feedback and summarize collaborative efforts</td>
</tr>
</tbody>
</table>
Virtual whiteboard. Both instructors and students could access and use an on-screen whiteboard to convey messages, interact, and collaborate on activities. A blank screen allowed for drawing, text, or the annotation of slides within a meeting room. Whiteboard overlays could be saved after a class meeting ended so materials could be reviewed. Similar to a traditional classroom, in which the instructor and students can communicate supplemental content on a white marker-board facing the students, the virtual whiteboard on Adobe Connect Pro™ also allowed for the presentation of messages prior to or during a lecture. The instructors in this course used the virtual whiteboard to allow students to practice course concepts. For example, students used the whiteboard feature to develop operationally defined targeted behaviors and brainstorm examples of various behavioral principles, such as positive and negative reinforcement.

Live chat. Within the chat pod, the instructors had the option to conduct whole group or private chats with specific students during the lecture. Whole group chats allowed students to respond to instructor questions, ask questions, and interact with peers regarding the relevant lecture topic, all without having to interrupt the instructor. Since two instructors taught the course, one instructor often responded to student chat messages while the other continued teaching, allowing for questions to be answered and student comments to be recorded for future reference later in the lecture. Students could ask about technical issues without disrupting the class lecture. For example, the instructor who was not engaged in leading the discussion could save time and reduce disruptions by talking to students through the chat about technical issues. In addition, some students responded to content-related questions from the instructors using the chat feature.

Break-out rooms. In the traditional classroom, instructors often divide students into small groups in order to promote collaboration and discussion about the lecture topic. The instructors in this course used the break-out room feature of Adobe Connect Pro™ to simulate small group discussion during lectures in order to facilitate collaboration and share ideas regarding the topic or answer study guide questions. The break-out rooms are small sub-rooms that can be created within a class session or meeting. They allow the instructor to split the larger group into smaller groups in class sessions that have 50 or fewer people. The instructors in this course were able to create up to five break-out rooms for a single meeting or training session. A unique feature of break-out rooms, similar to that of a small group in a traditional classroom, is that the instructor has the option of visiting each of the groups separately, going from room to room to promote student-instructor interaction and answer student questions. When the designated time allotted for break-out rooms has ended, the instructor can end the break-out session and return students to the main room. The instructors in this course encouraged their students to share what happened in the break-out rooms with their other classmates. A break-out room can be custom-created (e.g., the instructor can pre- decide who goes in what room, clicking and pulling names into designated groups manually) or can be random, with the software automatically distributing names into groups. It was more beneficial in this course to do the preparatory work of assigning students to groups before sending content and people to break-out rooms. Although not used in this course, break-out rooms can give an instructor the option to allow students to be presenters within each group, sharing documents and PowerPoint slides with one another. Students also can use the virtual whiteboard option to brainstorm and later share with the whole group ideas they have put together on the virtual whiteboard.

Polling feature. With the intention of increasing participation and as a way of formally assessing student learning throughout the course, the instructors used the polling feature of Adobe Connect Pro™. The polling feature is a new tool that allows the instructor to ask multiple choice, true/false, and multiple answer questions, as well as track the results in real time. The instructor has the option to broadcast the results of the poll questions to all students or keep the results private, depending on course objectives. The instructors of this course used the polls as a formative assessment at various times during the virtual class session (e.g., “What is the controlling variable for an imitative behavior?” with four responses from which to choose). They developed questions in multiple-choice format with four answer choices. Instructors may choose to use the polling feature to add survey questions to a presentation, prompting students for feedback at key points in given presentations. The polling feature provides instructors with more assessment options. Much like a traditional classroom in which the instructor hands out paper quizzes and conducts questionnaires for course evaluations, the poll feature allows use of a combination of surveys and quizzes to create pre- and post-training assessments before, during, and at the end of a class. Students may be more likely to use a poll than raise their hands in a classroom because the answers are confidential and students do not have to be embarrassed in front of their classmates for getting an answer wrong. This also allows teachers to provide immediate remediation/ error correction if the majority of students do not answer the poll question correctly.
Reports. Just as the traditional classroom instructor has access to artifacts of student work for assessment and attendance records, an instructor using Adobe Connect Pro™ software can access reports that provide detailed information on course and meeting attendance and polling results. These reports can provide instructors with valuable assessment data from which to evaluate various aspects of the course. The instructors of the course created poll questions and online quizzes mapped directly to the learning objectives of the course in order to measure results provided by the reports of student performance immediately following course sessions.

Blackboard. As a supplement to the course, the instructors used Blackboard, a web-based course-management system that is designed to allow students to participate in either whole classes delivered completely asynchronously or, as in this case, to use online materials and activities to complement face-to-face teaching. Blackboard is commonly chosen as a course management system for IHEs due to its ability to reach rural students who may have limited access to high bandwidth (Hahn, Lehman, & Dupras, 2006). The degree to which Blackboard may be used in a course varies, depending on the needs and objectives of a course. In this course, Blackboard enabled the instructors to provide their students with course materials (e.g., syllabus, study guides, assignment rubrics), discussion boards, online quizzes, blogs, wikis, virtual chats, access to library tools, and an academic resource center (Bradford, Porciello, Balkon, & Backus, 2007). Like Adobe Connect Pro™, the features of Blackboard can be compared to traditional face-to-face teaching (see Table 1).

Data Collection and Analysis

The following sections describe an examination conducted by instructors of the ABA course to assess the effectiveness of the polling feature of Adobe Connect Pro™. A description of participant recruitment and results from the data collected on participation, responding, and social validity are provided.

Participant Recruitment and Participation

The instructors recruited students on the first day of the ABA course during the summer session to participate in an evaluation of the features of Adobe Connect Pro™. The instructors told the students about the project, its purpose, and possible risks and benefits. They also informed them of their right not to participate, explained that it would have no effect on their grades if they chose not to participate, and explained that they had the option to stop participating in the investigation at any time. All students returned the permission forms, resulting in a total of 14 participants.

Participation and responding. In order to determine the effect of the polling feature of Adobe Connect Pro™ on the level of student participation, the instructors collected data through the use of reports that allowed them to view the number of students who responded to each poll question along with the accuracy of their responding. Data indicated that, although the average number of participants in class polls increased over time, there was no effect on the accuracy of responses over time. The instructors collected data for one session before introduction of the polling feature. During this session, an average of 4 students responded to questions from the instructor. After the introduction of the polling feature, the average number of student participants responding to instructor questions across six class sessions was 11, with a range of 10 to 13 (see Figure 1). When presented with 40 poll questions, students answered an average of 84.8% (n = 33.92) of the questions, with a range of 22 to 39 questions. Correct responses averaged 86%, with a range of 82% to 92% over six class sessions and an error rate of .13% (see Figure 1). One reason there was no effect on accuracy over time may have been that the difficulty of the questions remained similar over time. Another reason may have been that it did not take the students time to master how to use the poll questions; they may have been comfortable with the feature from the beginning.

Latency. The instructors recorded response latency from one class session video in order to determine the average response time to questions posed to students throughout the duration of the class session before and after the implementation of the poll questions. Before the introduction of the poll questions, most students responded verbally or through the chat feature. Instructors recorded response latency as the amount of time from when the question ended to when the first student responded to the question. For the first class session, students responded using the chat feature, and the average response time to instructor-initiated questions was 5 seconds. Following the introduction of the polls, student average response time was 2 seconds. Students continued to respond using the chat feature following the introduction of the polls; however, students responded with an average of 10 seconds using the chat feature.

Social validity survey questionnaire. Following the last class session in the course, the instructors asked students to complete a social validity questionnaire regarding their perceptions of the features of the Adobe Connect Pro™ software. Four questions displayed in a Likert scale format allowed...
students to respond to the degree to which they agreed with statements regarding overall satisfaction with the extent to which the software enabled them to participate and engage in activities to enhance learning of course material. The overall average response for all four questions was 4.45, with a range of 4 (agree) to 5 (strongly agree). Table 2 displays the percentage of response rate on the degree to which students agreed with each of the four statements.

In addition to responding to Likert scale statements, the instructors also asked students to respond to four open-ended questions regarding their motivation for using the features of Adobe Connect Pro™: (a) What was your preferred method of participation during whole group settings? (b) What specifically about the polls made you want to use them for participation? (c) Did you have any suggestions for improving participation in the distance-delivered EDS 601 course? and (d) Do you have any additional comments? The instructors coded and subsequently analyzed comments made in response to the open-ended questions using deductive thematic analysis (Braun & Clark, 2006; Fereday & Muir-Cochrane, 2006). The deductive thematic analysis method involves identifying, analyzing, and reporting patterns or themes found within qualitative data. As suggested by Braun and Clark, the instructors identified themes that helped to capture important patterns found within the data that related to the research questions. The first author of this study identified three themes against which she coded the data as follows:

1. Methods—Answers relating to methods indicated student preference on any of the software methods used during the EDS 601 course. Keywords, such as polls, chat, break-out sessions, or the whiteboard, were indicators of responses leading to the theme of methods.

2. Motivation—Answers relating to the extent to which features of the Adobe Connect Pro™ software promoted task engagement and motivation to participate in class activities. Keywords, such as fun, game-like, and focused, were indicators of responses relating to the theme of motivation.

3. Learning—Answers relating to the extent to which the features of Adobe Connect Pro™ affected student access and learning of course content. Keywords, such as tests, quizzes, material, and study, were indicators of responses relating to the theme of learning.
# Results

Four students specifically indicated that they preferred the poll questions, with four others indicating an equal preference for both the chat and polling features. One student indicated that she preferred the whiteboard feature, one preferred the break-out rooms, and one expressed that she preferred verbally expressing communication to questions as a preferred method of participation. Students commented that they enjoyed using the polling feature (n = 4) as it was “game-like” in nature and provided anonymity (n = 5), allowing them to practice and assess their knowledge of the topic without fear of peer or instructor judgment prior to quizzes. Eleven students reported positive feedback in terms of how the software features increased motivation in learning the content (e.g., receiving immediate feedback, gauging knowledge prior to quizzes, increasing engagement in the material). Overall, a total of 25 positive comments related to the extent to which the features of Adobe Connect Pro™ affected learning and participation.

The instructors noted only six negative comments regarding the features of Adobe Connect Pro™. One student indicated that he had difficulty paying attention in the Adobe environment in general due to distractions at his home, and another student communicated that she thought the length of time to upload videos into the screen share was too long. Table 3 displays a sampling of both positive and negative student comments under the three themes of (a) methods, (b) motivation, and (c) learning.

# Discussion

The purpose of this program description was to provide faculty and practitioners in the preparation or process of delivering online instruction with an overview of the software features of a web conferencing software and a method for increasing student participation in the synchronous environment. Given the limited research on the effects of web conferencing software on learning in synchronous communication, the experiences and data collected by the instructors of EDS 601 may provide insight to those in higher education on student perspectives, effective instructional supports, and different synchronous tools and features. Social validity data collected by the instructors of EDS 601 showed that, overall, the students had positive perceptions of their experiences in using the web conferencing software, Adobe Connect Pro™. Overall, the use of polling questions was beneficial. Students and instructors felt that they increased participation, provided opportunities for immediate instructor feedback, and may have increased motivation due to the anonymity and “game-like” qualities of the feature. Most students also felt that the polls were their preferred method of participation and wanted to use them in future distance-delivered courses. Some students felt that the polls helped to increase their overall grade in the course. The results of this questionnaire are similar to those found in a study by Park and Bonk (2007), who examined the experiences of 22 master’s and doctoral level students in a synchronous graduate course and found that learners valued access to spontaneous feedback, meaningful interactions, multiple perspectives, and instructor supports.

### Recommendations for Instructors

Instructors considering Adobe Connect Pro™ for the delivery of a course or supervision should be aware of the potential benefits and challenges of using the software. First, a co-teaching arrangement should be considered, as one instructor may be able to provide quick feedback and support to students through live
chat and upload materials (e.g., PowerPoint presentations) while the other instructor delivers the lecture and guides activities. Second, instructors should be aware of the opportunities to provide on-going formative assessment through features, such as polls and break-out rooms that can be used to assess students’ present levels of knowledge. Third, instructors should take advantage of the capacity to have text-based chats, allowing for interactions that are available to all participants, providing opportunities for questions and comments and opportunities to gauge the current mood of the students and to gather feedback.

In addition to taking advantage of the beneficial technical features, those who are delivering a course to or conducting supervision with a student population from rural areas may find using web conferencing software as a way to reduce travel costs and increase time efficacy. Recent research has pointed out that significant challenges faced by rural school districts include hiring and retaining highly qualified special education teachers (Brownell, Bishop, & Sindelar,

Table 3.
Sample of Student Responses to Open-ended Question Items from Questionnaire

<table>
<thead>
<tr>
<th>Theme</th>
<th>Positive</th>
<th>#</th>
<th>Negative</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>“Verbally answering the poll questions.”</td>
<td>1</td>
<td>“I preferred the chat as it gets confusing when people tried to talk at the same time (mic feedback).”</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>“Definitely poll questions.”</td>
<td>1</td>
<td>“The topics are interesting, but things like videos from YouTube can take up too much time.”</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>“Although I liked the polls, I preferred writing on the whiteboard. I liked giving my input and seeing others’ input.”</td>
<td>1</td>
<td>“Switching between the hosts’ and students’ mic was often awkward.”</td>
<td>1</td>
</tr>
<tr>
<td>Motivation</td>
<td>“Game-like nature and anonymity for all to participate.”</td>
<td>2</td>
<td>“I felt that Adobe was very hard to pay attention to with all the distractions of being at home.”</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>“Answering poll questions correctly provides a form of reinforcement for participation and provides a source of feedback on understanding of the content.”</td>
<td>2</td>
<td>“I didn’t like it when we could see the percentage of answers that everyone put. I felt like it swayed the answers.”</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>“Anonymity, not getting put on the spot, they were helpful questions about material we just went over, so it helped to solidify concepts, and it kept me on my toes and paying attention!”</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>“I liked the game-like feature and that they allowed me to test what I knew or what material I needed to further study.”</td>
<td>2</td>
<td>“I had a lot of trouble with the [flashcards], getting them done in time allowed me to think due to the technology in addition to my just being nervous.”</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>“This is good because it can gauge your knowledge of the material based on yourself as well as your class.”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Evidence from research has suggested that synchronously delivered instruction also can be beneficial for student participants in both special and general education teacher preparation programs. Synchronous environments can be used to deliver courses as well as provide opportunities for advising and teacher supervision that may otherwise be unattainable or limited in rural and remote areas. For example, in a study by Hager (2011), five students enrolled in an alternate certification program who were teaching in rural school districts in the area of Moderate to Severe Disabilities (MSD) participated in regularly scheduled meetings with their college supervisor through an individual schedule of web conferences using Skype®. At the end of the semester, students responded to a questionnaire and indicated overall positive responses with specific reference to how the conferences assisted them in completing their student teaching requirements.

Limitations and Practical Considerations

Despite the benefits and practical implications of delivering a course through web conferencing, there are also several challenges that occurred during course delivery and data collection that are worth noting. First, the most critical issue faced by the authors was the lack of latency data collected on the polling feature due to the inability to retrieve the data from the server. Latency data could have provided further evidence of increased student participation by indicating the amount of time lapsed from the onset of routine questions provided by the instructors to student-initiated answers in the form of a verbal or text response in comparison to response time to poll questions. When evaluating synchronous technologies, a primary disadvantage may be the inability to retrieve pre-recorded video sessions of the class for the purposes of data collection. Other challenges related to technical issues include possible network connection problems (e.g., loss of Internet connection or slow connection speed) sometimes forcing students to be disconnected during the discussion and reducing access to various software features. Although the instructors in this course gave students a list of computer and technical requirements prior to each class, problems with connecting audio and video due to unstable connections presented interruptions and a loss of instruction and interaction time.

The authors of this article recommend having backup methods of communication, such as cell phones and email, to relay technical problems to the university's teaching and academic support center. Additional desktop recording methods also may be useful (e.g., Camtasia™) to archive the videos.

Future Implications

Synchronous communication has been shown to potentially increase individual student participation and collaboration in the field of higher education; yet, limited research has been conducted on the variables impacting learning (Bonk & Wisher, 2000; Herring, 2003; Xin, 2002). In the field of special education, online instruction using Adobe Connect Pro™, as well as other web conferencing software, may be effective in collecting data on the impact of graduates' work in their professional placements in the K-12 level. Assignments, such as the BCP, which required students to conduct their own research on improving a specific behavior, could provide educators with multiple opportunities to incorporate mentoring through virtual office hours or live supervision, as well as a means of allowing students to demonstrate the impact of their studies with real-time feedback from peers and instructors. The use of blogs, wikis, and message boards through course management systems, such as Blackboard, could serve as a means of providing ongoing support for students in the research process.

Adobe Connect Pro™ with its various features has the potential to provide increased student participation; however, Davidson-Shivers, Muilenburg, and Tanner (2001) cautioned instructors against assuming that one communication mode is more useful than another. According to Davison-Shivers et al., these features “clearly can be used for different purposes and provide different, but useful, means for students to engage in discussion and learning” (p. 365).
Moreover, Ahern and El-Hindi (2000) contended that selection of proper tools and software has an important impact not only on accomplishing student interaction goals but also on maintaining a learning community. Further studies are warranted to determine what features can enhance student participation, motivation, and achievement in real time, synchronous environments.

References


