

## Use of the Webinar Tool (Elluminate) to Support Training: The Effects of Webinar-Learning Implementation from Student-Trainers' Perspective

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### *Abstract*

*Recently, webinar (web seminar) tools (e.g., [Elluminate](#), [Adobe Acrobat Connect](#), [Live Meeting](#)) have been attracting more and more attention with the advancement of online learning technologies because webinar tools facilitate real-time communication and enrich the interactivity in an online learning environment. Corporations have long adopted webinar tools for real-time meetings; however, we need research-based data to understand how webinar tools can be successfully integrated into an online learning environment. To strengthen our understanding of appropriate webinar training and teaching strategies, this qualitative study investigates the perceptions of student-trainers who use webinar tools. The results show that student-trainers are satisfied with their webinar-facilitated delivery of conceptual knowledge. Webinar provides a nearly face-to-face environment that increases participants' social presence and facilitates multi-level interaction. This paper presents suggestions regarding webinar-session implementation strategies.*

### **Introduction**

Computer-mediated communication (CMC) systems (Kerr & Hiltz, 1982, p. 2) have been an important support to online learning. The forms of CMC are usually defined in two categories: asynchronous (delayed time) communication and synchronous (real-time) communication (Romiszowski & Mason, 2004). Synchronous-communication technologies include voice-over-internet protocol (VoIP), instant messaging, and video conferencing, whereas asynchronous-communication technologies rely mainly on e-mails, bulletin boards, and blogs. Many CMC tools combine more than two of the above technologies: for example, the courseware management system Blackboard and WebCT. The webinar (web seminar) tool is one of the most advanced CMC systems. Most CMC-system research focuses on asynchronous CMC networks (Jeong & Joung, 2007; Knowlton, 2005; Pena-Shaff, Altman, & Stephenson, 2005); therefore, educators need more research on the implementation of synchronous CMS systems (Chou, 2001).

### **Literature Review**

CMC systems such as Blackboard and WebCT have been widely adopted in higher education, mostly as asynchronous discussion tools. Asynchronous discussion supports online learning in many ways: for instance, it provides participants the flexibility they need to manage learning time; it provides students more time to read, reflect, and respond (Meyer, 2003); and it

facilitates structured and mandated discussion (Johnson, 2006). However, it is difficult to replace or to imitate face-to-face interaction with asynchronous communication (Wang & Woo, 2007) because it lacks immediate feedback (Gao & Lehman, 2003) and involves less social presence (Stodel, Thompson, & MacDonald, 2006). Both of the formats have their own advantages and disadvantages. After surveying instructors who had online teaching experience, Branon and Essex (2001) reported that the instructors used synchronous tools mainly to hold virtual office hours, to facilitate team decision-making, to engage in community building, and to deal with technical issues and that the instructors used asynchronous tools mainly to facilitate in-depth and ongoing discussion. Past studies' focus on asynchronous learning environments is due to the limitations of network bandwidth and to the lack of synchronous learning tools; in other words, there have been few studies whose aim is to identify and to analyze either the learning effects or the associated pedagogies of synchronous learning environments. In recent years, Internet technologies have advanced significantly and the development of computer technologies has yielded applications of greater sophistication. Owing to the prevalence of broadband Internet access, educators and trainers have adopted more technologies to support synchronous online learning. Researchers have initiated studies on the implementation of synchronous learning environments. For instance, Pan and Sullivan (2005) adopted VoIP (Skype) to facilitate online chat sessions and suggested that the tool facilitates synchronous interaction and provides just-in-time clarification and information for students. Duemer, Fontenot, Gumforty, Kallus, Larsen, and Schafer (2002) found that chat tools effectively develop a sense of learning community. Wang (2008) suggested strategies to develop learners' sense of community with chat tool for teaching hands-on skills online. Locatis, Fontelo, Sneiderman, Ackerman, Uijtdehaage, and Candler (2003) used videoconferencing to broadcast instructions to audiences at various U.S. locations and reported that technical issues delayed the synchronous communication. Most studies on synchronous-communication tools available for literature review focus on the tools' ability to facilitate interaction between instructors and students.

Among many CMC systems, the webinar tool is one of the latest developments. Able to transmit video, audio, and images, webinar also enables users to share applications and to use whiteboard, the objective being to exchange information in a real-time and two-way format. Webinar creates opportunities for both educators and learners to experience different levels of interaction online, and these opportunities are essentially different from other communication approaches such as discussion-board postings and e-mails, as we mentioned earlier. There are three formats for webinar-session delivery: (a) presenter vs. multiple participants from one site; (b) presenter vs. multiple participants from multiple sites; and (c) multiple participants from one site vs. multiple participants from one or multiple sites. Apart from studies on videoconferencing and chat tools, few studies investigate how webinar tools can facilitate interaction in online learning. Cheng, Ko, Kinshuk, and Lin (2005) implemented a webinar system (Anicam-Live) at the Cyber University in Taiwan ( $n = 70$ ) to facilitate synchronous communication (regarding instruction and office hours) between the instructor and the students. The results reveal that students were satisfied with the interactions among the instructor and students. The paper did not discuss the instructor's webinar-use experiences. Ng (2007) adopted a webinar system (Interwise) at the Open University of Hong Kong. He divided 200 students into 6 groups and had tutors deliver the course through both a face-to-face mode and a synchronous mode. The findings suggest that synchronous learning promotes tutor-student interaction better than student-student interaction. Kohorst and Cox (2007) used Elluminate to facilitate both virtual office hours and the communication of course-related information to students. Elluminate effectively facilitated

interaction between the instructor and individual students who had questions regarding the course materials. The three abovementioned studies adopted the webinar delivery format in which the presenter and multiple participants from multiple sites interact with one another. Negative experiences regarding the use of Elluminate received mention in de Gara and Boora's article (2006). They implemented Elluminate to facilitate a seminar that connected two hospitals to each other (site vs. site) and found that Elluminate did not effectively facilitate the seminar owing to the content's irrelevance to participants' learning.

There are five advantages of using the webinar tool to facilitate communication between two sites: (1) Webinar tool is affordable (de Gara & Boora, 2006). Users can participate in a webinar session with a computer, video/audio capture devices, and broadband network connections. (2) Webinar tool enables synchronous communication. Instructors can communicate with the learners in a synchronous format to provide immediate feedback to learners (Hotcomm, 2003). (3) Webinar tool facilitates real-time multimedia demonstrations. Instructors can share the application on the presenter's site with all participants. (4) Webinar tool facilitates multi-level interaction. Instructors can lecture, interact with the audience, facilitate participant group collaboration in a real-time format (Marjanovic, 1999), and designate certain participants to be in charge of the sessions. (5) Webinar tool provides an environment in which participants can archive seminar content for personal review or for people who missed the real-time session.

Corporations have widely adopted the webinar tool because it can reduce corporations' travel expenses and travel time (Britt, 2006), yet the webinar tool is relatively new for online learning and needs to be tested for pedagogical merits. Anderson et al. (2006) suggested practical webinar-session guidelines for instructors, but educators and trainers need literature that emphasizes research and examines the selection of appropriate webinar-related pedagogies. Therefore, the purpose of our study is to investigate pedagogical issues underlying the use of the webinar tool in online learning and training. The following four research questions guided this study: (1) What are the perceptions that student-trainers have regarding their use of webinar tools for the development and the implementation of an instructional session? (2) What are the issues that characterize the development and the implementation of a webinar-based course? (3) What strategies effectively support webinar-based learning? (4) Which learning domains are appropriate for webinar-tool use?

## Research Method

This is qualitative research in which four chief techniques are observation, open-ended survey, focus group, and recorded Elluminate training sessions. Marshall (1985) identifies situations that suit qualitative research and include in-depth research on complex processes and research on innovative systems. Qualitative research is also ideal for understanding how participants perceive their roles or tasks in an organization (Merriam, 1995). We adopted qualitative research because we want to analyze not only student-trainers' lived experience and perceptions of adopting a new technology but also their use of a new technology. We adopted qualitative research also because we examine complex training-based processes. And we adopted qualitative research because it can maximize our understanding of each student-trainer's background, expertise, technology skills, and training experiences which will help us understand the student-trainer's perceptions of the new training technology.

### ***Validity and Reliability (Consistency)***

To strengthen the validity of this study, we triangulated data by using multiple data sources, mixed methodologies, and peer examination on data and theme analysis (Mathison, 1988). The generalization of results is not the purpose of a qualitative study, especially in a study involving only a few participants. However, we intend to carefully present the context and the participants' backgrounds so that other educators and researchers can decide the extent to which they should apply the findings to other settings (Merriam, 1995). The format we use to deliver the webinar session is "presenter vs. multiple participants from multiple sites."

### ***Researchers' Role***

Two researchers undertook this study: One researcher was the instructor; the other researcher was the semi-independent researcher. In this way, we adopted the "participant observation" approach (Emerson, Fretz, & Shaw, 2001; Savenye & Robinson, 2004). The proximity of the instructor to "the field" enabled the instructor to experience themes and events participants described. The semi-independent researcher conducted observations and analyzed data. The instructor used the webinar tool to conduct a software demonstration at the first session.

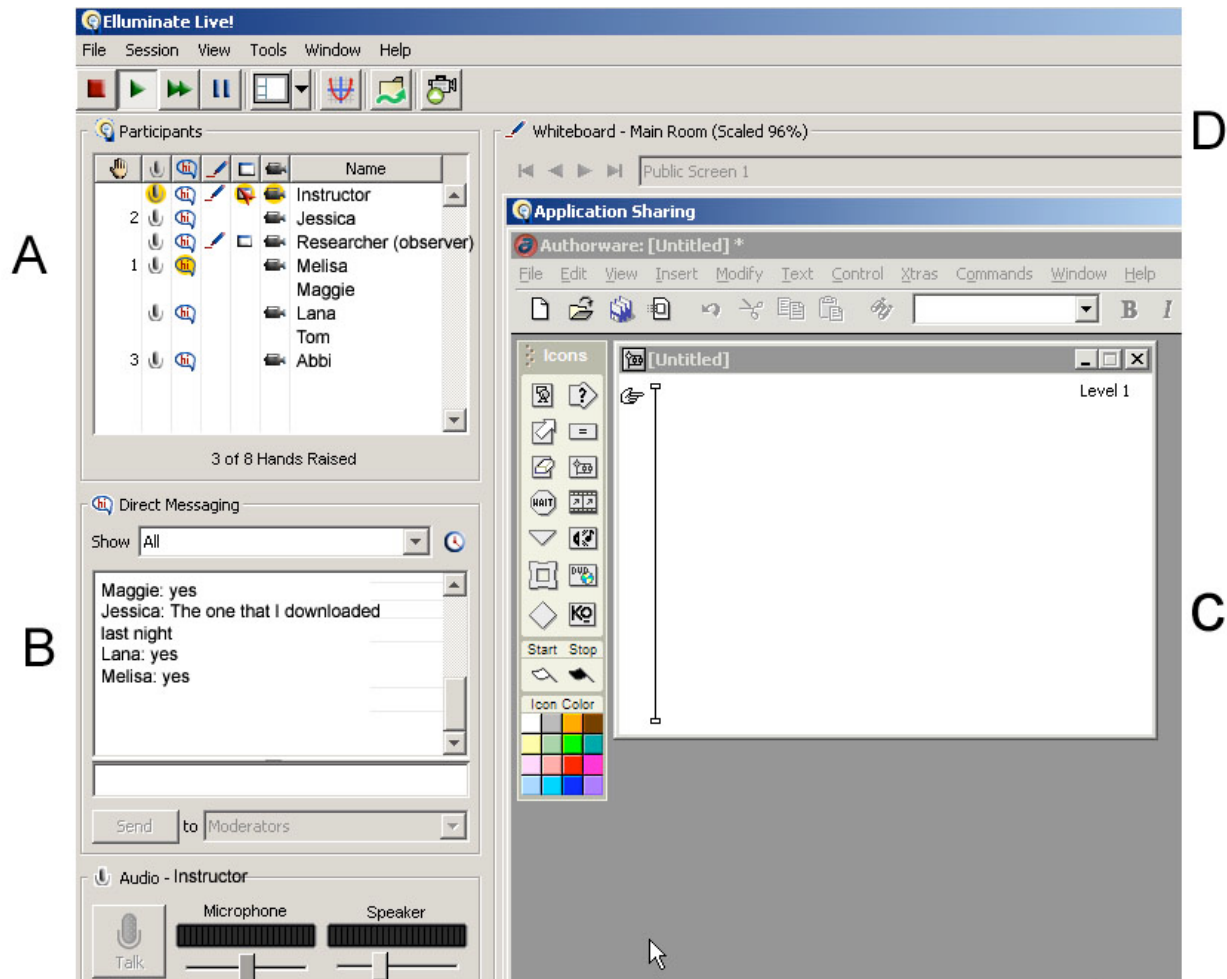
### ***Setting and Procedures***

We implemented this study in a graduate-level course at an instructional-technology training program at a northeastern university in the United States. Most of the enrolled students were experienced trainers; few were planning to become trainers. The purpose of this course was to survey the emerging learning-technology for training. The study sample comprised a small group of part-time students who volunteered to participate in the research project. All six participants (student-trainers) had prior experience with face-to-face training or with face-to-face teaching, and two of the participants had prior experience with webinar-tool use.

We chose the "teach-back" method so that participants could use Elluminate to teach others, including us, the researchers. This approach can reveal how student-trainers' understanding is linked to this computer-assisted learning system (Phillips, Brian, McNaught, Rice, & Tipp, 2000, p. 24). One week prior to the webinar session, the instructor briefly explained the purpose of using Elluminate and advised participants to use the Elluminate demo room to practice the facilitating tools in advance. The instructor led a six-hour webinar session to demonstrate the use of Authorware software—a professional multimedia authoring tool. At the following session, each student chose a topic in his or her specialty and then moderated a forty-minute webinar training session. Each host student had to prepare training materials, facilitate the learning process, and evaluate learning outcomes. Out of the six participants, one did not conduct the webinar session but completed a survey and a focus-group interview. There was a total of six webinar training sessions, including the instructor's session and the five participants' sessions. Three sessions focused on *conceptual* knowledge (topics ranging from *essentials of successful synchronous learning* and *podcasting* to *how to form a limited-liability company in New York State*), and three sessions focused on *procedural* knowledge (*Authorware*, *how to use Google search engine*, and *how to use PowerPoint to develop a Jeopardy game*). All participants had previously presented all these topics in a face-to-face format.

Figure 1 is the screen shot from an Elluminate session. Figure 1 shows both the use of embedded tools and the interaction among the participants. Participants had to install a Java application before using Elluminate (<http://www.illuminate.com/support>.) In a typical

Elluminate session, the instructor can monitor learners' status from the participants' Status Window (A), which shows the participants' audio-video connection, the participants' hand-raise status and order, and the participants' message-typing status. The Direct-messaging Window (B) enables participants to communicate through real-time text chatting. The message is archived, so the instructor can scroll back to read the texts. The instructor can use either the Application-sharing Window (C) to share the application with participants or the Whiteboard Window (D) to illustrate ideas or concepts.



**Figure 1.** This is the screen shot from an Elluminate session illustrating the use of embedded tools and the interaction among the participants.

### *Descriptions of Participants*

Table 1 lists the characteristics of each participant. In summary, participants were part-time students who differed from one another in terms of their training experience and their areas of specialization. They excelled at MS Office skills and had above-average skills in training-related technologies such as video conferencing, audio conferencing, and multimedia presentation. Two participants (Maggie and Abbi) had experience with use of videoconferencing

tools for the delivery of training materials, and only one participant (D) had used webinar tools before. Participant Melisa hosted no webinar session but completed the survey and the focus-group interview. The instructor evaluated participants' skills on the basis of observation and assignment completion. Pseudonyms are used to protect participants' privacy.

**Table 1**

*Characteristics of Participants*

	Gender	Office skills	Overall training-related technology skills	Online learning experience at this program	Training experience	Online training experience	Expertise
Instructor	F	****	****	Blackboard	4 yrs	Asynchronous format	Educational technology
Jessica	F	****	**	Blackboard	3 yrs	No	Legal studies
Melisa	F	**	*	Blackboard	3 yrs	No	Library science
Maggie	F	****	****	Blackboard, Elluminate	6 yrs	Synchronous videoconferencing	Multimedia authoring
Lana	F	****	****	Blackboard, Elluminate	0 yrs	No	Management information systems
Tom	M	****	****	Blackboard	2 yrs	No	Multimedia authoring
Abbi	F	****	***	Blackboard	8 yrs	Synchronous videoconferencing / webinar	Human resource management

\*\*\*\* = Excellent, \*\*\* = Good, \*\* = Average, \* = Weak

*Data Collection and Analysis*

*Student-opinion surveys.* Three sets of open-ended questions were administered in this study (See Appendices A, B, and C). The students responded to the first set after the instructor had conducted the first Elluminate session. The purpose of the first set was to capture participants' first impression of using Elluminate. The students responded to the second set after each host student had conducted the webinar session. The purpose of the second set was to capture participants' feedback regarding the effects of this particular webinar session toward their learning. All participants also had to identify the effective strategies the host had employed during the webinar sessions. Students responded to the third set of open-ended questions at the end of the semester. The purpose of the third set was to capture host students' reflections on the webinar-session hosting experience.

*Observation logs.* We created an observation log (See Appendix D) to study three themes: (1) host-learner interactions, (2) participants' uses of webinar functions, and (3) effectiveness of the teaching. We recorded Elluminate sessions in order to repeatedly observe the session details.

*Student focus-group interview.* We conducted a focus-group interview at the end of the semester to investigate participants' overall impressions about the webinar experiences. For the triangulation of the survey results, the interview questions derived from the three student-opinion surveys.

The semi-independent researcher analyzed observation logs, open-ended questions, and surveys to generate pattern codes and to identify themes (Miles & Huberman, 1994). We both (the instructor and the semi-independent researcher) carefully examined the generated codes and themes to ensure consistency.

## Discussion of Findings

The following are the general themes emerging from the data collected.

### 1. *Presenters' Use of the Webinar Tool*

All host presenters chose to do one-way video broadcasting, so the learners could sense the presence of the instructor. All presenters decided to allow two-way audio transmission, so users could ask questions or clarify details at any time with audio or text chatting. This study's presentation topics fall into one of two categories: topics related to *conceptual* knowledge and topics related to *procedural* knowledge. Presenters addressing conceptual knowledge tended to use Elluminate-embedded tools such as polling features and an electronic whiteboard to interact with learners, whereas presenters addressing procedural knowledge tended to use merely the software that they were introducing. Presenters based their choice of tools, perhaps, on a desire to avoid heavy cognitive load imposed on the learners caused by the complicated interactivity (Paas, Renkl, & Sweller, 2003). One host presenter required learners to complete tasks with a partner by facilitating real-time collaborative group work through break room. Table 2 describes each webinar session.

Table 2

*Description of Each Webinar Session Extracted from the Observation Notes*

	Abbi	Maggie	Jessica	Instructor	Lana	Tom
Topics	Essentials of successful synchronous learning	Introduction to Podcasting	How to form a limited-liability company in New York State	Basic Authorware skills	How to use Google search engine	How to use PowerPoint to develop a <i>Jeopardy</i> game
Knowledge	Conceptual	Conceptual	Conceptual	Procedural	Conceptual/procedural	Procedural
Assessment	Multiple questions, T/F	Multiple questions	Multiple questions, T/F	Hands-on assignment	Multiple questions, hands-on assignment	Hands-on assignment
Effectiveness	*****	*****	*****	**	****	***
Interaction	video/ two-way audio/ polling/ whiteboard/ chatting/ break room	video/ two-way audio/ polling/ whiteboard/ chatting	video/ two-way audio/ polling/ whiteboard/ chatting	video/ two-way audio/ chatting	video/ two-way audio/ polling/ chatting	video/ two-way audio/ chatting
PowerPoint slide	Yes	Yes	Yes	No	No	Yes
Real-time demonstration	No	No	No	Yes	Yes	Yes
Group work	Yes	No	No	No	No	No
Shared application	WWW Browser	WWW Browser	WWW Browser	WWW Browser, Authorware	WWW Browser	PowerPoint

\*\*\*\*\*=Most effective

## 2. Effectiveness of Teaching

Presenters focusing on *conceptual* knowledge chose to use the polling feature to conduct assessment, whereas presenters focusing on *procedural* knowledge chose to require participants to complete a task with the introduced tool. Participants' rating, researchers' observation notes, and the presenters' self-reflection reveal that topics focusing on *conceptual* knowledge or basic *procedural* skills were more effective than those focusing on hands-on skills. The assessment data substantiate the results. The following information concerns the assessment results:

- **Essentials of successful synchronous learning:** Out of six questions, four were accurately answered by at least four participants. The instructor divided the entire class into three groups and assigned real-time group work. To each group, the instructor assigned a set of online learning incidents, and the members of each group had to work collaboratively with one another to generate strategies in response to the problems. All three groups successfully presented strategies and solutions in response to the problems.



- **Introduction to podcasting:** Five out of five questions were accurately answered by at least four participants.
- **How to form a limited-liability company in New York State:** Seven out of eight questions were accurately answered by at least four participants.
- **Basic Authorware skills:** Three participants successfully completed the assignment, which required them to apply Authorware to their design of an interactive tutorial program. Of the three participants, two participants completed part of the assignment, and one participant did not complete the assignment. The instructor uploaded the recording of the hands-on demonstration to Blackboard, so participants could repeatedly practice the skills after completion of the webinar session. The learning effects would have been worse if no hands-on demonstration had been available.
- **How to use Google search engine:** Three out of three questions were accurately answered by at least four participants. Using the Google search engine, four participants accurately retrieved information requested by the instructor.
- **How to use PowerPoint to develop a Jeopardy game:** The instructor did not request that participants apply PowerPoint to their creation of a complete interactive Jeopardy game. Instead, the instructor let participants repeatedly practice the procedure until they all knew how to use the Action button, which is the key to developing a Jeopardy game on the basis of PowerPoint. Four participants successfully used the Action button to create an interactive effect.

With the polling tool, presenters could immediately ask questions and monitor their responses from the participant windows. The instructor could provide remedial instruction or further explanation based on learners' responses. Participants did not suggest that instructors or student-trainers should use the webinar tool to deliver lessons involving complicated procedural skills.

### 3. Host-Learner Interaction

Interactions of presentations focusing on *procedural* knowledge involved many confirmation types of questions. Instructors had to ensure that all learners could successfully complete the steps by asking questions, such as "Raise your hand if you did it right." Most of the learners' questions or comments constituted a request that the instructor repeat the last step. Rarely did interactions among the participants occur. In contrast, interactions that occurred during presentations focusing on *conceptual* knowledge ranged from topic-related questions and a sharing of experiences or of information to freely expressed comments. One instructor adopted the break-room tool and divided the entire class into three groups. Each group worked in an independent virtual room, each of which had an instructor-designated moderator. Each group had to use two-way audio communication and whiteboard to discuss the tasks. The interactions among participants were rich when the webinar sessions addressed *conceptual* knowledge and when the instructor promoted interaction among participants.

Both the instructor and the participants rated the Authorware webinar session the most ineffective session. Most participants had never before experienced either Authorware or Elluminate. They had to adjust to the interface and the operation of Elluminate, observe the hands-on demonstration, complete the same procedure on their computers, and pay attention to others' questions and the instructors' clarification. According to Gavora and Hannafin (1989), "interaction is an integrated process...which [is] influenced by both external and internal factors" (p. 29). In this case, learners were required to allocate both physical resources and cognitive

resources to the instruction. It was difficult for learners to process the received information, so the positive learning effect decreased greatly. Learners quite often missed a step, so the instructor had to go back to repeat the instructions. One of the participants described the difficulty in dealing with excessive information in student-opinion survey A:

It is hard to follow the instructions when you need to listen and observe what the teacher is doing on the screen and then switch back and forth between the applications to replicate the steps. If the students miss a step or two, the teacher needs to repeat the process. Students who were able to complete the instruction needed to wait for other students. As a result, a lot of time was wasted.

#### **4. Effective Webinar-Session Strategies**

Most participants used the polling and direct-message tools to realize or to monitor individual learning progress, and these tools enabled participants to express their opinion and to reveal their presence. Participants indicated their instructor's frequent efforts to check their learning progress and to provide them with constant feedback made them feel as though the instructor was attending to them. The break room was an effective tool for real-time group work and enabled the instructor to monitor the process of each group's consensus building. The instructor claimed that the combination of light hands-on activities and either break-room discussion or Internet research increased the participants' motivation to learn and helped learners to relate the activities to the lessons. Participants pointed out that the application of the electronic whiteboard to explanations of concepts was convenient and caught learners' attention.

#### **5. Advantages and Disadvantages of Conducting a Training Session with the Webinar Tool**

The Webinar tool connected instructors and learners to one another, even when they were located in different geographic areas. This feature saved time with fewer commutes to campus. Introverted learners and international students pointed out that webinar sessions indeed relieved their nervousness about learning because, during the learning process, they stayed at home or in a personalized learning environment in which they felt relaxed, as one participant expressed in the following comment in student-opinion survey C:

I love to attend a webinar session at home. We are able to practice along with the instructor on our own computers and use our own resources. It is also more comfortable to be at home. I HATE getting up at 5:30 am to go to class!

Real-time video and audio communication increased the social presence of all participants, making the interaction closer to that of a face-to-face session. The instructor used various strategies to motivate students in the webinar session, for example, by joking, encouraging participants to express opinions, and extending the discussion. Participants pointed out that many of the Elluminate-embedded tools greatly facilitated the training process.

Participants preferred to learn *conceptual* knowledge—not *procedural* knowledge—with the webinar tool. They claimed that a face-to-face environment or a demonstration video is a better environment for learning hands-on skills. Also, in a webinar session, the instructor could neither observe students' performance nor provide feedback to students.

Two participants pointed out that the webinar tool significantly decreased the time and the budget of the instruction because the trainees were remote and scattered in many locations.

As for the disadvantages of using webinar tool, participants reported that whenever the network speed was slow, they lost the connection with the instruction and had to catch up with

the lessons. They pointed out that they engaged in little peer interaction during the sessions that imposed heavy cognitive load to them.

### **6. Issues about the Webinar-Based Training**

In this study, we had seven participants total. Participants pointed out that it would be a challenge to conduct a webinar session with a larger group, particularly if the instructor were planning to adopt strategies other than lecturing for group interaction. It would be difficult, the participants noted, to monitor individual learning progress in a larger group. Moreover, technical issues affect the presentation flow in many ways. Transmission delay and audio or video disconnection halted the class until the problem could be resolved. Sometimes a two-way audio was not appropriate because the participants could interrupt the instruction at any time during the lecture or demonstration. Video transmission of the instructor became a distraction when participants were focusing on the demonstration.

Participants pointed out that the webinar tool is appropriate for the delivery of lessons in some domains. One participants' comment, collected in student-opinion survey C, gives some reasons for such a claim:

I think it is more difficult to conduct online courses for chemistry, biology, and math. The chemistry classes may require the students to carry out the experiments in the lab. I do not recommend teaching the procedural tasks online as I do not find them very effective.

Although synchronous communication can promote real-time interaction, participants could neither see each other's body language nor could the instructor's feedback take the form of body language. The learning atmosphere in a face-to-face environment is hard to replicate in a webinar session, even with synchronous communication tools. It might be better to incorporate a synchronous session into a blended learning environment, as one participant described in student-opinion survey C:

Of course it's convenient (and cheaper) not to have to travel to campus, but if you think about the premise of good training—you employ all of the senses. Yes, we see, hear, and interact, but it's "not the same as being there."

Another issue concerned a scenario in which several students simultaneously attempted to ask questions. In this case, the conversation in the chatting room could become tangled.

Some participants raised the concern that their particular group had above-average technology skills and above-average technology knowledge. If they had to implement a webinar session in a group (multiple participants from multiple sites) not familiar with technology, it might be difficult to achieve the desired learning or training goals. The participants stated that, in this case, the instructor would have to expend even more time and energy in dealing with individual learners' technical issues.

## **Conclusions and Implications**

Our study has implications for the use of synchronous webinar sessions. And as we mentioned earlier, we encourage others to draw conclusions from our findings even though our aim is not to present findings that are universally generalizable. To facilitate this process, we briefly review our findings and then outline tentative suggestions based on these findings. This study's collection and analysis of the data yield answers to the following research questions.

### **1. What were the perceptions that student-trainers had regarding their use of webinar tools for the development and the implementation of an instructional session?**

In this study, the findings show that participants who used webinar to conduct training were satisfied with the different levels of interaction that the embedded tools made possible. A webinar session provided participants nearly face-to-face interaction with the instructor and with other participants. The webinar tool approximated the face-to-face environment and strengthened the social presence of all participants. The interactions among participants were rich when the webinar sessions addressed conceptual knowledge and when the instructor promoted interaction among participants. Second, participants enjoyed attending a webinar session because it saved on commute time, an outcome that was a considerable material convenience. Third, the webinar form enabled the participants “to attend” sessions in a personalized environment, which considerably reduced anxiety levels. Fourth, our findings show that all student-trainers pointed out that the webinar sessions were appropriate for delivering those topics for which direct focus was conceptual knowledge or basic procedural knowledge or for which indirect focus was an augmentation of participants’ positive attitude toward the knowledge in question.

### **2. What were the issues that characterized the development and the implementation of a webinar-based course?**

Several issues emerged during the development and implementation of these hosted webinar sessions. First, instructors should try to avoid placing heavy cognitive loads on learners (such as teaching hands-on skills and conducting complicated activities), especially when the number of participants exceed a limit to which the instructor can pay attention to each individual. Highly interactive lessons should involve smaller numbers of participants, so the instructor can ensure that each participant follows the training session. Second, technical glitches hampered the instructional flow. If one participant encounters a technical problem, the instructor might need to stop the session to help the participant resolve the problem. Third, participants’ level of technology skills should be similar, otherwise the instructor might need to spend great amount of time to help individual while the rest of students waste time waiting. Lastly, webinar tool is not appropriate for students to learn hands-on skills. The instructor might want to consider using other approaches to teach hands-on skills, for example, in a face-to-face environment.

### **3. What strategies effectively supported webinar-based learning?**

Our suggestions fall in the following four categories: interaction, skill levels’ effect on both anxiety and learning, technical problems, and synchronous vs. asynchronous learning. First, interaction was a concept at the core of many of our findings. Participants noted that sessions required high levels of interaction and as this level increased, the sample size, or group size, should decrease. We suspect that for our type of study and perhaps for similar scenarios, the number of participants should be no more than ten if the instructor is planning to have participants work in groups, to promote discussion among peers, to promote other types of higher-level interaction, or to monitor individual learning progress. Also in this regard, the instructor might use various tools to promote interaction in a webinar session to ensure participants’ instructor-centered attentiveness (which is a particularly important type of interaction) and to increase participants’ motivation to learn (which is, in essence, the interaction between learners and their subjects). Many such tools are available herein. For instance, instructors might use either polling features to gauge participants’ opinions and attitudes or break rooms to facilitate group work. Either tool could yield information that promotes interaction.

Second, in our type of study and perhaps in similar scenarios, the instructor should ensure that participants who attend a webinar session have prerequisite skills. If the topics involve some type of procedural knowledge, instructors might try to reduce participants' cognitive load in a webinar session. Having participants practice Elluminate in conjunction with a demo room is a way to reduce their skill-related anxiety and skill-related cognitive load.

Our findings shed light on approaches to technical problems. In this regard, two approaches stand out. First, and in advance, the instructor should test the webinar environment to exclude any possible technical problems and should advise participants to download any supplemental materials. Second, we tentatively suggest that instructors consider always having a backup plan in case technical issues arise. The instructor could upload learning materials on a courseware management system and use them as a backup plan.

Our findings point to a fourth set of suggestions that, although not generalizable, merits wider consideration. The set concerns the relationship between asynchronous learning and synchronous learning. In a pure online learning environment, the instructor could host several webinar sessions to strengthen learners' social presence and learners' interaction. In a face-to-face environment, the instructor could adapt several sessions to the webinar format, which could reduce participants' commuting time and which could broaden participants' experience of different types of interactions and of learning activities. Let us be clear, however, about one underlying point: Synchronous communication does not mean "learning that is superior to asynchronous communication." The instructor should carefully examine the nature of the tasks and should choose the appropriate instruction-delivery format on the basis of his or her best understanding of both synchronous learning and asynchronous learning.

#### **4. Which learning domains were appropriate for webinar-tool use?**

Echoing the findings of the first research question, an appropriate domain delivered through the webinar was conceptual knowledge or basic procedural knowledge that involved either complex activities or heavy cognitive loads. On the whole, our contribution to the literature was to use a qualitative method to examine the role that a two-way synchronous tool—in this case, webinar sessions—would play in online learning. We identified appropriate topics that the instructor would deliver through the webinar tools, and we used a "teach-back" approach to report the perceptions that student-trainers had regarding their use of webinar tools. Many of these perceptions concerned effective strategies, advantages, and disadvantages.

Our recommendations regarding future research on this topic is that the research use larger samples to examine webinar sessions and that the research investigate the learning performance in such situations. We also recommend that future research use webinar to teach in various domains and that the research reports the domain-specific results, particularly regarding the implementation of domain-specific practical strategies. In the near future, more and more classes will be delivered online; therefore, studies in these domains can provide effective strategies for domain-appropriate teaching and for domain-appropriate learning. Another possible direction for future research is mobile synchronous training. While broadband network connections are gaining prevalence, so too are the related applications that consume resources. As this process continues, more and more training applications will take the form of mobile devices. Consequently, more research in this area can help trainers and educators understand the learning process as it applies to mobile synchronous training.

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## Appendix A

### *Student-Opinion Survey A*

(administered to participants after the instructor had conducted the first Elluminate session)

1. You will soon deliver a webinar lesson. How can you, acting as an instructor/trainer, benefit from delivering a lesson through a webinar tool (e.g., Elluminate)?
2. Do you prefer undertaking a lesson (for a hands-on skill) in a traditional face-to-face format, an asynchronous format (e.g., Blackboard), or a webinar format (e.g., Elluminate)? Why or why not?
3. What concerns might you have regarding the webinar-based delivery of your lesson?
4. We will have three more face-to-face sessions this semester. Do you prefer that we use the webinar format instead of the face-to-face format? Why or why not?
5. In your opinion, is webinar an appropriate format to learn procedural knowledge (e.g., to learn how to use Authorware)? How about learning conceptual knowledge? Why? Why not?
6. Describe the most difficult problem that you encountered in today's webinar session. Describe the advantages that you, as a learner, perceived regarding your use of Elluminate.

## Appendix B

***Student-Opinion Survey B***

(administered after each host student had conducted his or her webinar session)

- Presenter:
- Topic:
- Is this topic appropriate for webinar-based delivery? What other technology would be more appropriate as a delivery mechanism for this topic?
- How did the presenter use the webinar technology? What Elluminate functions did the presenter use? What other applications or tools did the presenter use?
- How much have you learned from this presenter's training session? Do you think that the webinar technology served his or her training needs?
- What motivators did the presenter use that would be a good idea for other trainers to employ when delivering webinar sessions (e.g., polling, examples, attention grabbers, encouragement, feedback)?
- What other thoughts do you want to share about this webinar training session?

## Appendix C

### *Student-Opinion Survey C*

(administered at the end of all the webinar sessions)

- Briefly introduce your training/teaching experiences (face-to-face or online) and the training technologies you have used before.
- What advantages or disadvantages did you perceive in relation to your webinar-based delivery of the training session?
- What topics are appropriate for webinar tools? What topics should the trainer avoid when using webinar tools for information delivery?
- In the future, will you consider using Elluminate to do training (if you have the budget)? Why or why not?
- What functions would you suggest Elluminate have so that it meets your training needs?
- What have you learned from hosting a training session with Elluminate?
- What other thoughts do you want to share regarding your training-oriented use of Elluminate technology?
- In what situation would you consider using either Elluminate or some other webinar tool)?

## Appendix D

### *Webinar Observation Log*

Date:

Time:

Title of the webinar session:

Presenters:

Number of participants:

Tools the presenter used:

Materials and resources the presenter used:

Interaction between the instructor and the participants:

Interaction among the participants:

Strategies the instructor used to encourage learning:

Type of assessment:

Assessment results:

Technical issues:

Other incidents: