ARTICLE

The Webinar Integration Tool: A Framework for Promoting Active Learning in Blended Environments

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This paper describes a three-stage process of developing a webinar integration tool to enhance the interaction of teaching and learning in blended environments. In the context of medical education, we emphasize three factors of effective webinar integration in blended learning: fostering better solutions for faculty and students to interact virtually; enhancing blended learning using webinars as flipped mini-lectures; and promoting the 4Es Learning Cycle (engagement, exploration, explanation, and extension) through webinars. With the development of a webinar integration tool, we propose an implementation framework based on four guiding principles: (1) technology considerations: matching the tool features with tasks, (2) planning with the perspective of participatory theories of learning, (3) promoting active learning with the 4Es Learning Cycle model, and (4) identifying factors for effective learning through webinar. The three-stage process includes: conducting a needs assessment and training sessions to ensure prerequisite skills for attending and hosting a webinar session, collecting baseline data on overall uses and perceptions of webinars, and applying the results of stages 1 and 2 to the development of a webinar integration tool. Our goal is to identify best practices for integrating webinar technologies in medical education, and assist faculty in aligning course objectives with appropriate webinar activities. Through formative evaluation and continuous improvement of our framework, our broader goal and contribution to the field is to encourage the development and sharing of domain-specific practical strategies for webinar integration, and strategies for designing compelling blended learning and teaching experiences.

Introduction

The infrastructure of modern technology has leveraged the power of digital connectivity. Increasing connectivity fosters information process and delivery, including emerging learning technologies that transform how students learn. As many educators are using online learning and teaching in various ways, the trend in curriculum development is experiencing a dramatic change. Some notable changes are the redesign of fully online and blended courses. This pedagogical transformation resulted, in part, from a study by the U.S. Department of Education, "Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies" (2009). Key findings in this study describe a stronger support for blended learning applications with additional collaboration opportunities and learning resources, as illustrated by these statements: "students in online conditions performed modestly better, on average, than those learning the same material through traditional face-to-face instruction"; "effect sizes were larger for studies in which the online instruction was collaborative or instructor-directed than in those studies where online learners worked independently"; "instruction combining online and face-to-face elements had a larger advantage relative to purely face-to-face instruction than did purely online instruction". (Means *et al.* Revised 2010, pp. xiv–xv).

Many institutions across the U.S. continue to augment blended learning curricula by utilizing educational technologies for both traditional instructor-led instruction and online interaction. Blended learning can both meet learning needs and allow instructors to maintain student-teacher collaboration through technology-driven and student-centered instruction. Blended learning is also popular among students, who express they improved study habit and learning due to the flexibility of additional opportunities for online engagement and collaboration across classroom boundaries (Means *et al.* 2014). With this increasing popularity, there is a need to ensure best practices for the blended learning approach, which means not simply adding technology to the current teaching, but transforming the interaction of teaching and learning in leveraging online resources and rich media in today's e-learning. That said, searching for the right technology can be challenging. Among thousands of advanced

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technologies available to enhance learning interaction and engagement, we suggest that webinar technology has the most potential to impact student learning in blended environments. It is a practical technology that provides face-to-face capability for students to interact with their instructor and peers through an enriched virtual medium which allows simultaneous participation of students and instructors in real-time. Webinars also provide just-in-time learning opportunities (Pan and Sullivan 2005). The recorded sessions can be used to enhance a flipped classroom and allow students to progress at their own pace. This technology is also cost-effective due to its ability to empower global collaboration among researchers and experts without time-consuming and costly travel involved (Rich *et al.* 2011). In the same regard, Wang and Hsu (2008) found that webinars can strengthen the social presence for all participants while reducing their anxiety levels by allowing them to attend sessions in their personalized environment. Nevertheless, results of their study indicated several challenges impeding the implementation of webinars such as heavy cognitive loads, group size, technical glitches, different levels of technology skills among participants, and using webinars to teach hands-on skills. The implications of their study suggest the importance of matching the desired level of interactivity with appropriate group size, task, and context, and the need to develop domain-specific practical strategies.

Within the context of this study, the Program in Occupational Therapy at Washington University School of Medicine in the U.S. aimed to explore how to reach beyond the scope of traditional teaching into the realm of blended learning. A primary goal was to identify best practices for integrating webinar technologies in medical education. In response, we conducted a pilot project to develop a webinar integration tool to guide the applications of webinar technology during the initial phases of developing our blended curricula. This project was conducted in three stages. The first stage was a needs assessment and training period to ensure participants' prerequisite skills for attending and hosting a webinar session. During the second stage, a survey was developed and administered to collect baseline data on overall uses and perceptions of webinars within the program. During the third stage, results obtained from previous stages were applied to the development of a webinar integration tool for promoting active learning in blended environments. During this process, our efforts were guided by the following research and development questions:

- Focus on webinars: what practices are associated with effective learning through webinars?
- Focus on blended learning: what conditions influence the effectiveness of using webinars in blended learning?

Methodology
In order to address our research questions, we employed both quantitative and qualitative approaches, including conducting a survey and ongoing informal interviews and dialogues with training participants. Considering the nature

of sensitivity and reflexivity in data collection, we adapted Corbin and Strauss' (2008) Interpretivist Methodological Recommendations as a guide for data generation and analysis. With their basis of analyzing qualitative data, we hope to "represent an analyst's impressionistic understandings of what is being described in the experiences, spoken words, actions, interactions, problems, and issues expressed by participants" (p. 51). Thus, we tried to interpret participants' experiences by sampling information across a variety of media. Our three-stage project is described below.

Stage 1: needs assessment and training
Effective use of webinar in education requires all participants to have prerequisite skills (Wang and Hsu 2008). For the webinar introduction and training, we have been offering one-on-one and small group sessions for faculty, staff, and students. The training has been ongoing for several years, meeting participants' just-in-time needs. Training activities consisted of online self-paced training and face-to-face training focusing on the use of Zoom and GoToMeeting. It was recommended that the faculty go through an overview of how to conduct a webinar meeting before scheduling their first webinar session. In order to host a webinar session successfully, they were required to do a technology check on their computing system to make sure they had the proper audio and video hardware and high speed Internet connection. After a couple of moderated webinar sessions with the assistance of the research team, instructors were given opportunities to conduct their virtual meetings on their own. As a result of ongoing Stage 1 training, program faculty and students have prerequisite skills either for Zoom, GoToMeeting, or both. During this stage, informal interviews in the form of ongoing conversations with training participants were conducted to understand various needs and types of webinar activities within the program.

Stage 2: baseline survey
To understand the overall use and perceptions of webinars within the Program in Occupational Therapy, an online survey was developed and distributed among faculty members and students in 2016. The survey consisted of 10 questions with two open-ended questions asking participants' strategies for engaging their audiences and features they deem important to the success of their webinar (see Appendix A). Thus, the survey provided both quantitative and qualitative data. We wanted to investigate if faculty members practised any techniques in teaching with webinars before developing webinar-based e-learning modules. The survey also served as a checkpoint for future reference as we move forward with webinar training plans.

The survey was distributed via email to 250 potential respondents (faculty and students). A total of 50 participants responded to the survey. Due to the different needs and types of webinar activities, respondents were not required to answer all survey questions. The salient findings from the survey include:

- Participants ranked the top four most used webinar software as Skype (35.53%), GoToMeeting (19.74%), Zoom (18.42%), and Google Hangouts (13.16%).

- Webinar was reported by 46 respondents as used primarily for learning (56.52%), research (21.74%), administrative work (13.04%), and teaching (8.70%).
- The important webinar features were ranked by 46 respondents as video face time (54.35%), screen sharing (50%), file download (50%), chat (47.83%), record feature (36.96%), and control of presenter's screen (30.43%), while they also ranked the top three "must have" features as screen sharing (47.83%), chat (32.61%), and video face time (30.43%).
- Of the 46 respondents, 32.61% reported that "*Mix groups (external and internal participants)*" was the most common type of meeting in their webinar participation.
- Of the 45 respondents, 57.78% felt webinars as "*Somewhat Convenient*", 33.33% reported webinars as "*Extremely Convenient*" while 8.89% indicated webinars as "*Not Convenient*".

Based upon qualitative analysis of results from open-ended questions, we gained deeper insight into competencies and interaction experiences with web conferencing. One particular importance of this baseline survey was to identify user experiences in webinar participation, and to compare the embedded features of various webinar technologies. The following responses to the open-ended questions were highlighted. With respect to those that listed other important features, the interactive polling feature, phone-in feature, and capability for multiple participants were identified. Participants' comments also revealed essential conditions for a successful webinar such as "good internet connection/bandwidth," "good audio/visual technology," and the importance of establishing rapport with attendees and engaging them with questions. The most reported challenge identified by the respondents included the lack of promised internet infrastructure and audio/visual technology. The overall feedback implies that a successful webinar must be dependent on the technology performance, particularly ease of use. The results of the baseline survey supplemented our findings obtained through observations and informal interviews during the training sessions.

Stage 3: development of a Webinar Integration Tool
Table 1 illustrates a framework developed in response to feedback faculty and students provided in the baseline survey and training sessions. The primary purpose of this framework is to help faculty members evaluate learning activities based on their content and format, as well as to offer various scenarios and options to guide them in the planning of effective learning activities for their synchronous live webinar or asynchronous flipped classroom. Secondarily, IT support staff can use this framework as a checklist to select the right webinar tool to meet specific learning objectives. Examples include: when the learning activity requires attendees to use whiteboard in GoTo-Meeting (or Zoom) to present their concept maps; or if a breakout session is needed for a small group discussion. This shared framework not only provides a convenient checklist for technical considerations, but also guides

best practices. The process of creating the framework is discussed below.

Development process and guiding principles
Webinar technologies enable the delivery of a web-based, interactive seminar through synchronous communication. Some key advantages of using webinars include affordability, ease of access, synchronous communication, online interaction, real-time dissemination of information, immediate feedback, and the ability to reach a remote quest presenter or participant without travel required (Rich *et al.* 2011). The integration of webinars provides an opportunity to expand content and learning activities in blended learning. For example, by providing webinar opportunities to collaborate with content experts in different fields, we can continuously improve and extend both the content and pedagogy. Therefore, we emphasize three factors of effective webinar integration in blended learning: fostering better solutions for faculty and students to interact virtually; enhancing blended learning using webinars (and webcasts) as flipped mini-lectures; and promoting the 4Es Learning Cycle (engagement, exploration, explanation, and extension) through webinars (Jenkins *et al.* 2009). From a pedagogical perspective, we propose an implementation framework based on four guiding principles:

1. Technology considerations: matching the tool features with tasks
2. Planning with the perspective of participatory theories of learning
3. Promoting active learning with the 4Es Learning Cycle model
4. Identifying factors for effective learning through webinar

Technology considerations: matching the tool features with tasks
In today's fast-paced telecommunications, many institutions provide students with access to e-learning modules and online resources. Students also require some sort of virtual learning format, especially with many expressing the need to be "connected" even more strongly. Irmer and Bordia (2003) found that students seek "...a clear and distinct preference for in-person meetings to resolve their communication needs" (p. 56). In virtual communication, one of the downsides is the lack of visual cues and immediate feedback. The concern for virtual presence is an even more pressing issue in online education. To address this challenge, we need to resolve pedagogical drawbacks to virtual learning, particularly in relation to asynchronicity and the lack of visual cues.

In responding to these challenges, we should consider computer conferencing for seminars and group activities to improve online communication and provide an "augmented environment for collaborative learning and teaching" (Harasim, 1989, p. 60). Scholars point out that computer conferencing has advantages over traditional classroom instruction and lecture recording formats, because using computer conferencing, along with the

Table 1: The Webinar Integration Tool: a Framework for Promoting Active Learning in Blended Environments.

Learning Experience Dimension (Jenkins, *et al.,* 2009)	Functionalities in Webinar	Synchronous Live Webinar (to encourage Participatory Competencies)	Asynchronous Blended Learning Module Enhancement (to encourage Contextual Competencies)	Preparation Notes
Engagement	· Polling · Raise hand · Video face time · Phone call-in · Private and group chat	· Enhance student engagement using webinar tools. · Live web conferencing with full learner control (e.g., polling, raise hand, private or group chat). · Students engage presenter while processing through materials. · Co-present, co-create learning modules on the whiteboard. · Allow group/team interaction.	· Let students view recorded web conferencing session to supplement in-class learning activities. · Use face-to-face meeting time to do a follow up for further discussions in a flipped class. · Allow group/team interaction.	· Review recycled learning objects & update curriculum resources. · Meet with IT Support Services to review the web conferencing tools. · Schedule for a technology check. · Schedule for a tutorial on hosting a webinar. · Schedule for a live webinar or to record the webcast. · Webinar invitation & learning objectives. · Assigning groups.
Exploration	· File sharing · Desktop and application sharing · Links to web resources	· Use open-ended questioning techniques and let students contribute or comment on content. · Assign students to lead and facilitate the webinar. · Led by remote guests that explore issues in specified topics. · Integrate webinar instruction.	· Let students self evaluate the recorded student-led webinar and then have follow-up discussions in the face to face class.	*Optional:* · Student's self & peer evaluation rubrics. · Multiple time zones for global students or guest speakers.
Explanation	· File sharing · Whiteboard · Change presenter role · Grant keyboard control	· Integrate webinar instruction. · Use whiteboard or live chat to present arguments or consult experts. · Encourage sharing of experiences among students. · Q&A to clarify or extend content	· Integrate webinar instruction; practice protocols or cases instruction. · Provide recorded modules on advanced topics made available as additional resources. · Practice protocols or knowledge base topics taught through recorded modules that students can access on their own schedule.	*Additional resources:* · Online discussion forum · Polling app · Resources in Blackboard Courses (LMS). · Curriculum web resources or Google sites. · Repository: Box or Google Docs. · Learning resources from social media (please specify).
Extension	· File sharing · Take keyboard control · Breakout rooms	· Mentor students using webinar tools. · An expert-led webinar through a case-based collaborative simulation that multiple students interact with at the same time. · Discuss topics identified by students. · Let students be the content expert and assign students to facilitate their group with different specified topics. · Allow co-construction of content. · Provide student peer support using webinar tools.	· Supplementing a lecture-based course through a collaborative webinar simulation. · Let students share problems, follow up, and monitor problem-based process "face-to-face". · Allow self and peer evaluation and take into account individual effort within the group.	*Students:* · Webinar technology check & tutorials. · Learning resources repository for files sharing (please specify). · Working on group activities. · Need to Phone-in. · Learning resources from social media (please specify).

proliferation of communications technologies, can promote interactivity (Barker *et al.* 1989). From increasing interaction efficiencies to providing different learning formats, computer conferencing or webinar technology can offer students dynamic ways for online learning. By its nature, online communication encourages learner contributions, and a sense of being "connected" with others.

With learner-centered attributes in mind and the choice of many available webinar tools and user preferences, the questions we consider here are: "how can we achieve best practices while balancing technical considerations and the needs of faculty and students?", "how exactly would any of these webinar tools fit into an engaging learning experience?", "what would be the best practices for faculty and students to interact with each other through webinars?", and "how do we facilitate webinar applications as a part of instructional design strategies?"

Table 2 provides a guide to answer each of these questions by considering the embedded functionalities of common webinar tools.

We found that Zoom and GoToMeeting had most of the features we considered. However, no webinar technology guaranteed HIPAA compliance without additional subscription fees. We felt it was important to highlight this finding, as HIPAA compliance may be an essential feature for medical education and effective professional collaboration.

Planning with the perspective of participatory theories of learning

This part of the framework describes using participatory theories of competency-based learning (CBL) to identify effective activities in webinars (Hickey, 2015). By framing these activities in a CBL approach, not only can we focus on participatory competencies (such as communication and collaboration), but we can also emphasize contextual competencies (such as declarative and procedural knowledge). As shown in **Table 1**, this portion of the framework provides a glance of which types of activities can best enhance synchronous communication and which ones can be recorded and distributed as asynchronous mini-lectures for blended learning. In other words, participatory learning theories help create the structure of the blended learning environment. They guide the instructor in determining which activities are best suited for synchronous communication and which can be distributed asynchronously.

Table 3 expands upon competency-based learning activities in the blended learning environment. Participatory competencies are divided into those requiring communication skills and those requiring collaborative skills. Communication-based activities may be enhanced by synchronous technology when immediate feedback is required such as discussions, Q&A or hands-on-training. Asynchronous communication-based activities may be best suited for learners wishing to process and respond to information at their own pace. Collaboration-technology can be enhanced by synchronous or asynchronous communication depending on the number of people in the group, the project objectives, or the complexity of the task. Contextual competencies are those that involve declarative components (i.e. learning objectives and rubrics) or procedural components (i.e. clinical cases and practice protocols). Each of the required competencies, skills, and components should be considered when deciding between synchronous and asynchronous webinar formats. By applying participatory learning theories to this framework, the instructor is able to design a learning experience that procures their desired form of participation.

Table 2: Embeded functionalities of common webinar tools.

Functionality	Zoom	GoTo Meeting	Adobe Connect	Blackboard Collaborate
HD video & audio	Yes	Yes	Yes	Yes
Telephone call-in	Yes	Yes	NA	NA
Desktop and application sharing	Yes	Yes	Yes	Yes
Recording	Yes	Yes	Yes	Yes
Private and group chat	Yes	Yes	Yes	Yes
Host or moderator control	Yes	Yes	Yes	Yes
Raise Hand	Yes	Yes	Yes	Yes
HIPAA compliant*	No	No	No	No
Group Collaboration				
Breakout rooms	Yes	Yes	NA	NA
Screen sharing	Yes	Yes	Yes	Yes
Keyboard control	Yes	Yes	No	No
Whiteboard	Yes	Yes	Yes	Yes

* HIPAA stands for the Health Insurance Portability and Accountability Act, which sets the standard for protecting sensitive patient data. This option can be used based on the needs and different subscription pricing.

Table 3: Learning activities based on competency-based learning (CBL).

Participatory Competencies		Contextual Competencies	
Communication	**Collaboration**	**Declarative**	**Procedural**
Discussions	Group assignment	Learning objectives	Clinical cases
Oral presentation	Peer review	Assignment and communication expectations/rubrics	Client assessment
Hands-on training	Divide/coordinate work, co-create content	Content materials/textbooks/assignments	Practice protocols
Q&A to clarify or extend content	Integrated multidiscipline role playing	Cases introduction	Cases assessment

Promoting active learning with the 4Es Learning Cycle model

The aim of this element is to provide opportunities to extend students' learning experience beyond the classroom and to reflect active 4 Es Learning Cycle in online collaboration. Adopting from Bybee's (1993) 5Es instructional model, the 4Es model includes the learning dimensions of engagement, exploration, explanation, and extension (Jenkins *et al.* 2009). As shown in **Table 1**, this part of the framework indexes activities for each learning dimension by leveraging specific functionalities in webinar. The main emphasis here is to assist instructors to align course objectives with appropriate activities in order to promote active learning and engagement in synchronous or asynchronous environments. When the 4E's are adequately supported in a blended learning environment, the webinar technology is able to become an extension of both the instructor and learner. The participatory elements of the webinar technology enhance the information exchange between the learner and instructor thereby creating synergy. To achieve these goals, it is essential to focus on the structures for webinar participation and provide instructors with a range of activity types and structures. By indexing learning activities in webinar, instructors can then create effective scaffoldings to guide the learning process.

Identifying factors for effective learning through webinars

As shown in **Table 1**, webinar learning applications can be characterized in terms of the kind of functionalities to promote active learning experience, learning activities in live webinars, and learning activities for the blended learning modules. Using this framework, instructors can identify pertinent learning factors in the light of webinar technology, particularly with respect to the following:

· *Enhancing student engagement using webinar tools:* Provide a virtual learning community and prompt students sharing and interaction with a sense of connectedness and motivation related to their learning activities.
· *Integrating webinar instruction:* Provide an authentic learning environment and include diverse content experts to improve relevance of learning materials.
· *Mentoring students using webinar tools:* Provide mentoring to add an emotional component to learning and enhance teaching and learning outcomes. It is essential to empower students and help students feel confident and competent.
· *Providing student peer support using webinar tools:* Provide various communication channels to address student needs and improve student support.

Formative evaluation of the framework

While ongoing informal formative evaluations have been conducted during the one-on-one and small group training sessions, we plan to improve the framework of our webinar integration tool with a formative evaluation study. Questions that need to be addressed include: What adjustments should we consider in order to improve the effectiveness of webinar interaction and its effectiveness in blended learning? How do we translate those checkpoints into a more user-friendly format to support the viability of webinar interactions and communication? How might this framework help faculty members devise more effective teaching methods and make adjustments to their e-learning components? In addition, challenges identified in the literature (e.g., Wang and Hsu 2008) which impede the implementation of webinars, such as heavy cognitive loads, group size, technical glitches, and different levels of technology skills among participants, must be addressed. In particular, how to match the desired level of interactivity with appropriate group size should be considered.

We designed the framework to customize and compile teaching needs into a workable checklist tool for each faculty interested in using webinar technology. With this framework, we have constructed a practical process guiding faculty to adopt blended learning and webinar integration. This study was premised on the importance of distributing the webinar integration tool based on the framework we have developed, and summarizing best practices and guidelines for implementation. However, we anticipate the need for an ongoing evaluation approach. Through a more in-depth, semi-structured interview, we can gather deeper perspectives to identify how this framework can work best with the integration of blended learning, from designing learning activities to long-term outcomes.

Discussion

In regards to the effectiveness of any instructional technologies, creating substantial learning resources plays a major role, especially when we emphasize using the modularized learning components in a blended learning approach. We started with a needs assessment and training together with a baseline survey study to gather feedback and analyze webinars' usage data for teaching and learning. We described why webinar technology is a great tool to add learning resources through modularizing the learning process, enhancing synchronous communication, and repurposing the recorded webcasts for asynchronous learning. Overall, the study results, as we expected, led to a practical effort to set parameters of support and best practices.

Despite the small scope of the study, our needs assessment results and baseline data showed positive attitudes toward using webinar technology in teaching and learning. In the context of this study, webinar use was affected by resource barriers, such as inadequate internet access and lack of technology resources, as reflected in participants' feedback pertaining to broadband issues and limited student account access. These drawbacks indicate the need to improve network infrastructures and resources for online communication and learning. Time constraints should also be considered as a resource barrier (Butzin 2001; Cuban *et al.* 2001; Karagiorgi 2005; O'Mahony, 2003). Since course redesign, assessment, and technology integration are intertwined and very complex, further research will be needed to investigate both short-term and long-term outcomes of effective integration of webinars in blended learning.

Conclusion

The best practice to engage students with webinar blended learning is to adopt more student-centered approaches to learning with technologies. After all, the bottom line of any technology integration is to encourage students to become autonomous learners and engage students as active participants in their learning. It was not in the scope of our paper to elaborate on blended learning development, design, implantation, and evaluation. Planning integration of webinar technology into blended learning can be time-consuming. Webinar integration in blended learning can be limited by lack of both technology and training resources. Further follow up studies should be conducted to address our research questions and identify conditions that increase the effectiveness of using webinars in blended learning.

In the future we hope to provide a pedagogical direction that we can anchor back to reinforce blended curriculum components. We need to have ongoing open dialogues to collect immediate feedback on effectiveness of any webinar session, usefulness of webinars for the e-learning modules, and the level of applications in the 4Es Learning Cycle during or after their webinar. We must provide opportunities for students and faculty members to familiarize with the pedagogy of webinar use.

This paper explores how students and faculty members use webinar technology to communicate. In the context of medical education, our goal is to focus not merely on technology issues, but also on promoting teaching and learning with webinars (Rogers 2000) and delivering effective synchronous communication that can provide the needed human touch in e-learning (Shotsberger 2000). Our broader goal and contribution is to encourage the development and sharing of domain-specific practical strategies for webinar integration (Wang and Hsu 2008), and to establish a professional learning community where faculty members can work closely with our technology support group to ensure robust integration and develop compelling blended learning and teaching experiences. As everyone contributes in this learning community, we can collaboratively identify some key markers, especially as related to blended learning integration strategies and support aspects. Such a learning community offers greater opportunities to promote the interdisciplinary, professional, and global collaborations which benefit the worldwide development of learning ecosystems.

Additional File

The additional file for this article can be found as follows:

- **Appendix A.** Survey Questionnaires and Survey Results. DOI: https://doi.org/10.5334/jime.453.s1

Competing Interests

The authors have no competing interests to declare.

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