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Integrating Webinar and Blogging Technologies into Chemistry Seminar

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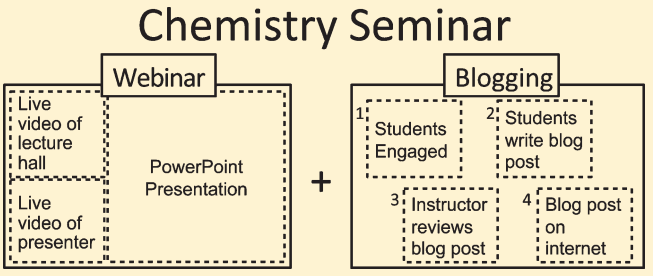
Supporting Information

ABSTRACT: We report successfully integrating webinar and blogging into an undergraduate chemistry and biochemistry seminar course. Commercial collaboration software linked speaker-operated slides with two-way voice and video effectively connecting the audience and presenter from different states. Student responses to the technology and seminar content were documented on an open, accessible blog site designed for the seminar course. Over 80% of student blog posts confirmed that the remote presenter had a strong presence in the lecture hall and that both the presentation technology and seminar content were well received compared to traditional "in-person" presentations. This low-cost, easily adaptable seminar format allows chemistry departments to greatly enhance the diversity of seminar speakers and learning experiences for their majors. Additionally, our successful experience of coupling webinar and blogging can serve as a template across disciplines and educational levels.



Chemistry seminar, though not specifically mandated by American Chemical Society (ACS) professional training guidelines,[1] continues to represent an important element of the college chemistry curriculum.[2−7] Traditionally, the undergraduate chemistry seminar course seeks to comply with broad ACS Committee on Professional Training goals of developing written and oral communication skills. It is often viewed as a "capstone experience" for upper-level chemistry and biochemistry majors.[8−10] A common feature of many traditional seminar programs involves exposing students, beyond their immediate academic environment and core curriculum, to a diversity of practitioners and presentations across the breadth of chemical sciences.[3,5,6]

A diverse speaker pool gives students first-hand insight into alternative postcollegiate opportunities by exposing them to broad career and employment options. It also provides learning opportunities in chemical and biochemical subspecialties that are not covered in coursework. Such a speaker pool provides students with invaluable opportunities to view, experience, and evaluate a spectrum of effective presentations by experienced presenters. The faculty benefits from exposure to fresh ideas and perspectives that can be incorporated into teaching as well as developed into research collaborations. In addition, writing exercises coupled to each presentation provide an opportunity for in-depth student reflection and development of transferable and marketable science communication skills. We augment the traditional seminar format by intentionally selecting and including a diversity of academic and nonacademic speakers, incorporating significant written communication exercises[11] for students in response to each seminar presentation and by requiring the students to give two technical oral seminar presentations.

One challenge for primarily undergraduate chemistry departments, with a limited seminar budget, is economically sustaining an active seminar program that incorporates speaker diversity. Many potential speakers, academic and nonacademic, are limited by time, travel costs, travel conditions (especially during winter), and have tightly booked schedules that can preclude participation. Webinar presentations as part of a seminar program can address these issues. Another challenge in seminars, both graduate and undergraduate, is capturing and maintaining active student attention and engagement. One general strategy used in our seminar program to encourage active student participation is requiring students to write descriptive essays about their seminar experience. A specific writing activity we recently introduced requires students to blog about each seminar presentation.

Blogging in science, from news and views to research and pedagogy, is growing rapidly and serving important functions beyond simple social networking.[12−18] Although its application to science communication poses several challenges, it also offers beneficial opportunities. For example, blogging provides (i) a

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- The event went on without a hitch, … She spoke very clearly and made sure to speak loud enough that everyone could hear. She answered all her questions with ease and pride. It was an amazing Seminar and the best presentation by far all year.
- [The seminar] was in a video conference style, with her doing the actual presentation in California. This actually turned out better than I anticipated because it was almost like the presenter was their[sic] as we were able to follow along with her PowerPoint slide as well as see her face.
- One of the things that made it interesting, certainly entertaining, was the fact that it was done via web conference. This being the first time I have ever been involved in a web conference, I kind of liked it.
- The use of this technology went by better than I had expected. I give this presentation a … 9/10 for student engagement.
- For our first video conference, the seminar went amazingly smooth. Since most of the students have experience with online video chatting I do not believe that any of us were particularly unfamiliar or uncomfortable with the format. … even without her physical presence, I found Kemsley one of the more interesting speakers we've had all semester.
- We were able to ask questions and get a response. I realize that the technology for a presentation like this has been around for some time, but this type of long distance learning and communication is still impressive to me.

Figure 1. Excerpts from student blogs describing the webinar format. Full text of each blog is available as Supporting Information and online.[24]

postpublication form of peer review; (ii) a venue for rapid dissemination of information; and (iii) communication on important nonresearch professional issues, such as career development, teaching resources, and safety. Several major science publications (e.g., *Science, Nature, Chemical & Engineering News, Discover*) now have blog sites. There are also many sites run by science educators, science education organizations, and research scientists including graduate students.[19] As far as we know, our ChemSemBlog[20] is unique in the blogosphere for capturing reflections of undergraduate students about science-based seminar presentations.

We report successfully linking a webinar and blogging to enhance the seminar experience for undergraduate chemistry and biochemistry majors. Coupling of these common collaboration technologies successfully facilitates (i) addressing the economic and "distance" challenges inherent to conducting an active, regular, and sustainable undergraduate seminar involving participation of a diversity of speakers; (ii) fostering active listening, vigorous questioning, and greater participation by students; (iii) engaging further with the speaker "online" *after* the seminar presentation; and (iv) creating a globally connected learning environment necessary to prepare 21st century scientists.[21]

DESCRIPTION AND RESULTS: WEBINAR

The video-conference format seminar used as example here was presented by a journalist−chemist using Adobe Acrobat Connect Pro[22] as a hosted service. The seminar content was delivered by audio and video from the presenter along with a PowerPoint presentation that was fully controlled by the presenter. The audience of departmental faculty and upper-level majors in our chemistry amphitheater, approximately 3500 km away from the presenter, provided instant feedback via audio and video. The presenter used a consumer-grade webcam and computer headset attached to a laptop computer in her office. The presenter's computer was connected to a residential-grade broadband Internet connection.

The audience heard the presenter from a permanently installed sound system in the amphitheater. The sound system, a hand-held wireless microphone, and video camera were connected to a laptop computer so that the presenter could see and hear the audience. Using the permanently installed video projector and screen in the amphitheater, the audience could see a video image of the presenter, a video image of themselves, and the PowerPoint presentation as shown in Figure S1 (in the Supporting Information). For logistics reasons, a separate computer was used for the video projection; however, the projector could have been connected to the computer that was used for the audio and the camera as shown in Figure S2 (in the Supporting Information). The computers in the amphitheater were connected to wired network ports.

About 30 min was spent several days before the seminar to test audio and video functionality and to acquaint the presenter with the tools used to navigate the on-screen presentation. Immediately before the seminar, another 15 min were used to revalidate these capabilities.

The seminar topic "Career Opportunities in Science Writing" was presented from Alameda County, California, by Dr. Jyllian N. Kemsley. She is a *Chemical and Engineering News* associate editor who completed a science-writing program following her doctorate. Dr. Kemsley was the ninth in a sequence of 10 guest presentations during the semester.[23] After the speaker's presentation, students actively participated in the normal question-and-answer session using the two-way audio−video system. Students were also required to write blog posts describing their reflections about this seminar, as they do for every guest presentation. Blog posts written about the Kemsley webinar are found at the ChemSemBlog, week 9[24] and in the Supporting Information. Figure 1 includes excerpts from several student blog posts and gives direct insight into their perceptions of the webinar format.

DESCRIPTION AND RESULTS: BLOG POSTS

Blogging is a newly introduced required writing activity in our seminar program.[20] It is designed to focus student attention on each seminar speaker's presentation; to foster student response and reflection about the seminar; to facilitate each student's own critical evaluating and writing skills; and to provide a platform for continued interaction with the seminar speaker after the seminar. This activity is structured to ensure that the quality of student writing is reviewed and evaluated prior to posting to the blog.

Students are given a seminar participation form on which they write notes and questions during the seminar presentation. These notes and questions are then used to help students

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- I was surprised that even professional writers, like her, get their papers revised by at least five other people.
- Our weekly blog posts of seminar presentations have really helped me appreciate the value of science writing and the gift that these writers have. With a topic so close to home, I believe it is safe to say that everyone was looking forward and interested in the presentation.
- Though I personally don't find myself drawn to the field of science writing, I do enjoy reading the material and learning about discoveries other people have made. I did find it valuable that [the speaker] pointed out the volatility of the field and the fact that quite a few science writers were recently laid off.
- Though they may not be active lab chemists, I can now see how instrumental science writers are in being the link between scientists and people with no scientific background.
- If one is thinking of becoming a science writer they can start by writing features for university publications, start a blog, take classes in journalism, read widely (Knight Science Journalism Tracker), join the National Association of Science Writers, or attend annual science writers meetings.
- I would describe the presentation to my 'non-science' friend or family as this: "Dr. Jyllian Kemsley's presentation on science writing is a must for those who are considering a career as a science writer."

Figure 2. Selected excerpts from student blogs describing the webinar content. Full text of the blog is available as Supporting Information and online.[24]

participate in a question-and-answer period immediately following the presentation. They also facilitate students writing and posting a 250-word minimum essay onto the blog site[20] within four days after the seminar. The blog posts are then reviewed by the seminar course instructor before they are published with full, open, and searchable access to the public. Anyone outside of the seminar class can also join and participate on the site after authorization from the course instructor. Seminar speakers are notified by the course instructor about the online publication of the blog posts.

Students are given specific instructions and guidance about the content of blog posts. Each blog post is required to address (i) new facts learned, (ii) why the presentation was personally interesting or not, and (iii) a one-sentence description of the seminar that the general public could understand. Additionally, students may include all or some of the following in their blog posts: speaker profile, presentation style, employment background, area of expertise, personal characteristics, presentation content, and audience reaction.

The overall student response to postseminar blogging has been positive and generally met the course goals for written communication. In fact, most student blog posts far exceed the course requirement of 250-word minimum. Excerpts from student blog posts about the content of the webinar are included in Figure 2.

DISCUSSION

The student blog posts indicate that webinar communication technology was well received and students were excited to use it. Each student's blog post mentioned the webinar presentation format and over 80% indicated that the seminar was "interesting" or "very interesting". Several students also volunteered their opinion that this presentation was one of the best of the semester. Although a few minor technical problems were noted by students, all regarded the presentation as a success and were pleased to be part of the first trial of using this audio and video connectivity technology in our departmental seminar program. The students' responses are consistent with the previous finding that students most appreciated video conference and teleconference presentation formats among a variety of nontraditional presentation approaches.[25]

During the presentation, the speaker had a commanding presence similar to what is observed for "in-person" presenters. Students were engaged at the same or better level during this seminar compared to in-person seminars as judged by their participation in the subsequent question-and-answer period and by their blog posts. A likely key to student-perceived success is to have an interesting talk in terms of content, presentation style, and seminar format. Student blog posts overwhelmingly demonstrate that they were fully engaged and thoroughly enjoyed the seminar content; impressed with the speaker's knowledge and command of the topic; and satisfied with the use of webinar presentation format and the overall lack of any distracting technical problems.

In our most recent use of the video webinar format, Dr. Kim Albizati, Chief Scientific Officer, Strategic Enzyme Applications, Inc., delivered a technical presentation on biomass transformations from his home office in San Diego, CA. Similar to the Kemsley webinar experience, students expressed positive responses to both the technology and the presentation content of the Albizati webinar.[26] During the speaker's talk and the subsequent question-and-answer section of the webinar, the audio connections worked well. Though not prohibitive, the biggest limitation of this approach, from the presenter's perspective, was the difficulty for the presenter to observe students' nonverbal expressions. Even with 1920 × 1080 (HDTV) resolution, each student's face would be 50−60 pixels across, hardly enough to discern subtle facial expressions that an in-person presenter might observe. One way to address this would to be to have a camera operator zoom and pan on individual students during the seminar.

During in-person seminars, especially in the question-and-answer session of technical and research-based presentations, a chalkboard can be an important communication tool to sketch structures or graphs. It is important to have this capability available in webinar-format seminars and most commercial videoconferencing programs have a whiteboard function where the presenter and audience have the ability to write interactively. The content of the meeting screen shown in Figure S1 (in the Supporting Information) can be modified during the question-and-answer section to incorporate a virtual "whiteboard" that enables the presenter and audience to communicate with structures, reaction schemes, or sketches as might be drawn on a physical

chalkboard. Other commercial programs (e.g., WebEx, GoTo Meeting) have similar capabilities.

It is also possible, with the presenter's permission, to capture the audio and video (that is, all participants' images and the presenter's slides) for possible future noncommercial pedagogical use internally. For the work presented here, permission to record and use was sought and granted before the presentation as part of preparation for the videoconference.

One could also implement a similar event using no-cost collaboration software. For example, communication software like Skype could be used to project the audio and video of the presenter to the audience. The presenter's slides could be projected using a second laptop and advanced by the on-campus seminar instructor when prompted by the remote presenter. This no-cost arrangement transfers control of the presentation advancement from the presenter to the course instructor. This might work fine for presentations that do not require critical timing; however, presentations that use animations or depend critically on timing may fare poorly using nonintegrated software. We are unaware of a no-cost, interactive whiteboard-like capability for dynamic scientific sketching for use during the question-and-answer section.

As with all seminars, in a webinar it is important that students retain their focus on the content, rather than the presentation medium. Enhancing functionality and complexity of the presentation technology requires an increased vigilance and preparation to ensure minimization of distracting technical glitches. Though, as a reviewer pointed out, repeated use of this presentation format should increase student familiarity, which would enable students to focus on the content rather than the format and any associated minor issues. In fact, in our most recent webinar, student's blog posts contained much less content on the webinar format and more content on the substance of the webinar.

In the inaugural year of student blogging as part of their undergraduate seminar experience, most students met this course requirement in terms of completion, quality, and punctuality. One aspect of blogging that requires attention is increasing postseminar interaction between the students and speakers via the blog site. With our thank you letter to the speaker, we now request that each speaker log into the blog site to read the blogs on their seminar, respond to student comments, and even post their own entries.

SUMMARY

Although both of the communication technologies described here—webinars and blogging—are now fairly commonplace for social and business interactions, we believe that coupling them together in an undergraduate chemistry seminar course is innovative, pedagogically valuable, and applicable to a wide variety of chemistry seminar formats.[7,10,27,28] We are not aware of any quantitative measures, studies or reports in the literature regarding the independent use and impact of either technology in undergraduate chemistry seminars. However, our experience in coupling these technologies strongly suggests important pedagogical and practical benefits will accrue to the student and the department from such an effort. For example, the webinar format facilitates (i) increasing the diversity of the potential speaker; (ii) varying presentation format so that, for example, "virtual tours" of research facilities could be done; and (ii) reducing or eliminating some budgetary costs associated with sustaining a robust and regular seminar program. Further, interactive postseminar blogging enhances the potential learning value of the seminar experience.

Finally, we believe that coupling communication and collaboration technologies serves as an effective teaching and learning practice in an increasingly globally networked science community. This approach implemented and illustrated here in undergraduate chemistry seminar is applicable across multiple disciplines and educational levels and has the potential to simultaneously transmit content, develop student communication skills, and foster meaningful collaborations in cost-effective ways.

ASSOCIATED CONTENT

Supporting Information

Figures S1 and S2 illustrate the presentation screen and a cartoon of the system configuration and the full content of the student blog posts. This material is available via the Internet at http://pubs.acs.org.

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