A Webinar Case Study by a Clinical Microbiologist to Microbiology and Physiology Students: An Integrative Learning Experience

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INTRODUCTION

Integrative learning is an approach that extends beyond traditional academic boundaries and is an essential learning outcome for college students (1). Using a webinar format to connect to an off-site clinical microbiologist, we presented an interdisciplinary and interactive case study to undergraduate microbiology and anatomy and physiology students. After an introduction to pathophysiology and microbiology, the clinical microbiologist’s case study provided students with a unique look at real life problems. Our goal was to have students appreciate the interrelationship between microbiology and physiology, and to apply their knowledge of microbiology and physiology to solve the case study. The webinar format facilitated the delivery of the integrative learning experience to multiple classes and the off-site clinical microbiologist simultaneously. Students and faculty in both anatomy and physiology and microbiology undergraduate lectures and laboratory sessions can benefit from this approach.

Case studies provide the opportunity for the application of student learning. In a previous study, a clinical microbiologist presented cases to microbiology students using Skype and “clickers” for student questions and responses (2). We hypothesized that a webinar would streamline the process and replicate the advantages of the previous study. By integrating microbiology and physiology presentations we hoped to enhance the students’ understanding of the interrelationships of pathophysiology, infections, and the vital role of the clinical microbiology lab in diagnosis and treatment.

A final project goal was to elucidate the essential role of the clinical microbiologist in the diagnosis and treatment of infections. The case presentation by the clinical microbiologist provides students with an overview of the diagnosis of infectious diseases and antibiotic susceptibility testing. Furthermore, student contact with the microbiology professional provides an opportunity for the microbiology community to reach out to students in an easy and efficient manner, when compared to a visit to the college classroom. Community outreach to college biology students is an important aspect of recruitment for future clinical microbiologists.

PROCEDURE

A microbiology class and an anatomy and physiology class at Bergen Community College, Paramus, NJ, participated in the Diabetes Infection Webinar from two separate computer laboratories using individual student computers for the majority of students. The off-site clinical microbiologist joined the webinar by connecting from her personal computer. The webinar was set up in three parts: an introductory discussion on the pathophysiology of diabetes by the physiology professor; an introduction to diabetic infections by the microbiology professor; and a clinical diabetic case study by the clinical microbiologist. The student population represented a mix of pre-Health Professional majors, Biology majors, and non-Science majors.

A diabetic infection was selected because the topic spanned the course content for the microbiology and anatomy and physiology courses. The instructors created PowerPoint presentations interspersed with questions for students, which were uploaded to the webinar. The webinar was developed using Adobe Connect Pro. Technical support was provided by the Center for Innovation in Teaching and Learning and the Media Technologies Departments at Bergen Community College.

Students logged into the webinar from their individual student computers through a password protected URL. Upon entry to the webinar, each student’s name appeared on the attendee list and the ability to ask questions was provided through a chat feature. Students answered questions throughout the webinar with feedback through question response statistics. The entire, live Diabetes Infection Webinar was recorded by Adobe Connect Pro and subsequently made available for online viewing.

Surveys were given to students to assess the effectiveness of each individual portion of the webinar. Surveys were designed to evaluate if the webinar was informative and enhanced their biology course, as well as their understanding of diabetes and infections in patients with diabetes. The survey also determined whether the webinar educated students about diagnostic procedures and the role of clinical microbiology in the diagnosis of infection in patients with diabetes.

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To facilitate the webinar program, faculty and off-site collaborators must learn how to use Adobe Connect Pro and have access to technical support staff during the webinar to facilitate its successful production. In our experience, the technology required significant technical support and malfunctioned during the presentation. An alternative delivery method must be available as a backup when problems occur. PowerPoint presentations should be available to all participants prior to the webinar in the event of a technical malfunction.

**DISCUSSION**

Students (n = 57) completed a survey following the Diabetic Infection Webinar. Student understanding of diabetes was evaluated for each section of the webinar, the pathophysiology, the diabetic infections, and the case study. There were additional questions regarding diagnostic procedures to identify infections and the role of a clinical microbiology lab in patient diagnosis, as well as a general question to determine if the webinar was informative and if it enhanced the biology class. Between 86%–97% of students strongly agreed or agreed that the individual sections of the webinar enhanced their understanding of diabetes. More than 93% of students strongly agreed or agreed that the webinar made them aware of diagnostic procedures and the role of clinical microbiology lab in diabetic patient diagnosis. Ninety-seven percent of students strongly agreed or agreed that the webinar was informative and enhanced their Biology course (Fig. 1).

Student evaluations of the webinar indicated that the project goal of understanding the interrelationship of pathophysiology and infections and applying the knowledge to solve the case was met. Students also became aware of the vital role of the clinical microbiology lab in patient diagnosis and treatment. We believe that the webinar strengthened students’ analytical skills.

The Adobe ConnectPro webinar offered advantages over a previous project (“Meet the Expert”) in which we utilized Skype and an audience response system (“clickers”). We were able to link separate computer labs and our off-site professional, which saved logistical issues involving travel for the professional and provided an adequate venue for the number of students who participated. Additionally, the webinar facilitated archival reinforcement, which is not available with Skype videoconferencing, and thus can be used as a teaching tool.

The limitations of the study consisted of the need for webinar technology, adequate technical capabilities, and technical support staff availability during the webinar. The technology required significant technical support and malfunctioned during the presentation, with fairly rapid resolution.

**CONCLUSION**

Overall, the pathophysiology and microbiology presentations followed by a related case study directed by a clinical microbiologist provided a positive, integrative learning experience for the students. Future projects to accomplish...
the goals of this project will utilize a variety of technologies, multiple experts, and diverse formats to investigate current events.

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