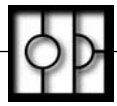

Research Article

International Videoconferencing for Public Health Education: Linking the U.S. and Germany

Sloane C. Burke, Beth H. Chaney, and Wolf Kirsten

ABSTRACT

Background: *Video-linking with other countries provides a low-cost vehicle for students to learn more about health issues of other cultures and reflectively discuss the public health promotion and education activities of those countries in real time.* ***Purpose:*** *This article presents a case study of international videoconferencing in the higher education setting.* ***Methods:*** *Undergraduate students enrolled in three different public health courses at East Carolina University (ECU) in Greenville, North Carolina, USA were linked with graduate students enrolled in the public health master's degree program at the Freie Universität (FU) in Berlin, Germany for two videoconference sessions during the fall semester of 2008. A pre-post knowledge scale was administered to assess the impact of the learning modality with the student participants.* ***Results:*** *Utilizing this technology for fostering intercultural communication proved to be an effective method of instruction for student participants.* ***Discussion:*** *Intercultural communication has become a marketable skill for future public health professionals, and incorporating these communications skills into professional preparation programs provides unique learning experiences for students.* ***Translation to Health Education Practice:*** *Videoconferencing technology provides learners with synchronous experience for interacting with other cultures furthers understanding about global perspectives. Today, globalization introduces challenges and opportunities for health educators. Moreover, increasing communication and fostering dialogue between the future public health leaders improves knowledge levels and ideas for resource utilization.*

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BACKGROUND

Global initiatives in public health education continue to surge to the forefront, as our world becomes more interconnected due to modern transportation, greater reliance of exports, increased immigration, a global business market and the health inequalities or social injustices of others.[1] In today's interconnected world, global health has become more relevant to health education. Higher education institutions have a responsibility to prepare future public health educators and educated citizens by integrating basic principles of global health to their public health education curriculum. Ensuring future health educators have global experience, may ensure they work towards social responsibility, health disparities and improving the health of others worldwide.[1] The millennium provides some of the greatest accomplishments and improvements in technology and global health. With death rates falling steadily, more progress has been made in population health, particularly in developing countries, during the last 50 years.[2] In the past three decades, nearly every sector, including health, has undergone a transformation in the way information is collected, managed and transmitted.[3] We are a technology-based society, and technology-based learning has produced

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a number of theories, including situated cognition, anchored instruction, and the community model, which illustrate the importance of technology and its impact on social interaction and effective learning.[4-7] Schools have now been transformed into sites of a multimedia culture which integrate audiovisual and telecommunication systems that students feel comfortable using and are expected to use in their school and professional life.[8] In addition, "technology-rich learning environments contribute definitely and positively to children's success in school." [9 (p. 27)]

Videoconferencing is a live synchronous video, audio and integrated computer-based process that joins two parties at different locations for the purposes of communication. Participants can see and hear each other during the live call. In addition, computer applications such as PowerPoint®, Adobe, or text messaging and media, such as DVDs, can be incorporated as additional instructional materials. Videoconferencing can be a rather low-cost technology to implement with the now relatively inexpensive computer video cameras and microphones. In addition, text capabilities can be added as a supplement for hearing-impaired students.[10]

Traditionally, video linking or videoconferencing has primarily been used in telemedicine, nursing education, and education. Videoconferencing has been greatly utilized in medicine via telemedicine, both nationally and internationally, to link remote patients to health care services via video and audio communication with physicians. Overall, remote patients have expressed a high satisfaction with telemedicine.[11, 12]

Videoconferencing has been noted to be an effective teaching strategy in nursing education. International video linking has been used to hold topic discussions, provide clinical case presentations, and deliver nursing education.[13,14] Some have reported this medium to be effective, while others have not. Kim and Vetter[15] explored course satisfaction through an elective distance education nursing course, *Nursing in the U.S. and Japan*, offered via video conferencing at the University of North Carolina at Wilmington to nursing students at Mie Prefecture College of Nursing in Japan. The course was designed to teach Japanese students nursing practices and health care issues in the United States. The class format used a combination of synchronous (two-way interactive video conference sessions) and asynchronous technologies (email, and an Internet course platform). Through course evaluations, the authors found that Japanese nursing students, even with the use of interpreters, felt unaccustomed to public speaking and felt a discomfort in answering instructors' questions, but enjoyed the chance to interact with students from another country. Through assessing learner satisfaction and achievement with in-person students versus video conference students, Fetzer[16] reported that nursing students (N = 114) found in-person teaching more effective than videoconferencing. However, Zalon and Meehan,[14] Iwasiw[17] and Daley et al[18] found videoconferencing to be effective among their U.S. and Western European nursing students. Though only case studies, the authors shared that their students in the U.S. and Ireland, Canada, and the United Kingdom respectively reported higher course satisfaction, greater understanding of content, an improvement in communications skills, a higher level of cultural competence and an increased understanding in global perspectives in nursing. The authors shared the importance of planning, shared goals, comfort level with technology and assessment. It should be noted that these researchers did not experience language barriers with their respective populations. In linking her U.S. students majoring in German with German students in Munich, Sanders[19] found a high student satisfaction with videoconferencing when it was integrated into her German culture undergraduate class. Visual and audio contact with speakers from the respective cultures, information exchange, debates and student learning motivation were all noted as perceived benefits from student interviews and an incentive lunch with the U.S. students. Further, the use of live interaction versus taped asynchronous communication was touted by the instructors as creating a more engaging and transformative environment from a pedagogical perspective.[19]

Videoconferencing has also shown to be effective when supplemented with online chats in distance education courses using platforms such as Breeze and Centra, e-mailing with partner students, journaling, usage of drama and skits and photo language methods.[20-22] These studies also found that eye contact, clarity and brief student presentations lead to a more effective and enriching learning experience. Videoconferencing has proven to be successful in higher education courses that do not have a "hard science" or technical data content and focus.[23]

It can be a challenge for undergraduate public health education students to obtain experience with intercultural communications or international health, due to limited time during the academic semester and the high cost of travel.[23] International education has traditionally been achieved by learners traveling to other countries to learn the content and be immersed in the culture.[24] Academic exchange programs, international internships and travel abroad programs have gained in popularity in recent years in the U.S., but are still not cost-effective for all socioeconomic backgrounds. In addition, safety issues for the student traveling to certain countries may be a realistic concern.[14,25]

Videoconferencing technology can provide a mechanism for students to be engaged with populations from other cultures and learn more about various health issues of that country. Connecting learners and educators via videoconferencing is effective "as it reaches across distance, connects diverse student groups and provides a rich visual environment and electronic 'field trips.'" [26(p.1)]

Despite limited research in nursing, education and telemedicine, there is a lack of published studies of this medium's usage as a learning method in public health education. An extensive search of 14 electronic databases was conducted to find studies utilizing videoconferencing as a method of instruction for health education and public health students. The databases included

Academic Search Premier, Biomedical Reference Collection, Health Source, Nursing and Allied Health Collection, Ebsco, Psychology and Behavioral Sciences Collection, ERIC, PsychINFO, Ovid, Gale, Medline, PubMed, Wilson, Cambridge and CINAHL. Key terms that were used to identify relevant studies were: (1) "videoconferencing," (2) "health education," (3) "public health," and (4) "students." Every paper that was identified through this process was taken into consideration, regardless of the year of publication. The references of these initial papers were searched for more studies that could be included in the review.

Only 16 articles were found, using this methodology, and eight of the 16 were focused on telemedicine, as described previously, and one investigated videoconferencing as a teaching strategy for medical students in two institutions. Seven articles included videoconferencing for health education purposes.[27-33] Two studies utilized videoconferencing technology to delivery asthma education to Latino immigrants.[27-28] A study conducted by Faulkner,[29] assessed utilization of videoconferencing in delivering community education programs for rural women in Brisbane, Australia; additionally, Faulkner and McClelland,[30] used videoconferencing as a mechanism for presenting menopausal health seminars to women in southwest Queensland. Hoolahan, Grosvenor, Kurtz and Kelly,[31] conducted a small empirical study in Australia, in which mental health information was delivered to small rural towns via videoconferencing, telephone conferencing and the Internet. Similarly, Paul, Johnson and Cranston[32] used videoconferencing to provide information on nutrition and dementia to rural caregivers. Videoconferencing used to provide educational information to these identified segments of the population proved to be successful in these six studies.

The final article that surfaced in the literature search involved utilization of web conferencing and videoconferencing technology in two graduate level safety program courses in 2007.[33] Students on the main university campus were linked with students at a satellite campus. Using videoconferencing technology allowed students to engage in live communication with one another and the professor during the safety program lectures. To date, this study is one of few that documents videoconferencing as a mechanism to teach health education/public health courses to students. Additionally, it is important to note that none of these studies involves linking to other countries.

PURPOSE

The purpose of this study was to assess through a pre- and post-test and informal interview process if videoconferencing may serve as an effective platform for cross-cultural communication, integrated learning between students from two different countries and for fostering increased awareness in global health. The following describes a case study in which videoconferencing was utilized to link health education and public health students from the U.S. and Germany.

METHODS

Participants

Undergraduate students enrolled in three different public health courses at East Carolina University (ECU) in Greenville, North Carolina, USA were linked with graduate students enrolled in the public health master's degree program at the Freie Universität (FU) in Berlin, Germany for two videoconference sessions during the fall semester of 2008. In the first session, 24 ECU and 12 FU students participated; 29 ECU and 12 FU students participated in the second session. The ECU students' attendance was optional but they were offered a small point value of extra credit for attending the sessions. The Freie Universität graduate students participation was required as part of their class attendance.

Procedures

The intent of linking these two universities was to broaden the learners' knowledge of health issues who were enrolled in health education and public health courses in the respective countries. Extra credit for the U.S. students was offered. The sessions were not attached to an international health travel abroad/partnership course, but integrated to their current curriculum in Germany and supplemental curriculum in the U.S. Two class sessions were dedicated to the students preparing their contributions (as group work) and additional time was required out of class for research and fabrication of the presentation.

The goals of the two videoconference sessions were to: (1) provide undergraduate students (in the U.S.), graduate students (in Germany) and faculty at both locations with an opportunity to engage in an international learning experience; (2) increase participants' knowledge and understanding of the U.S. and German health care systems and public health promotion strategies; (3) elicit critical and reflective discussion among the two groups about common international public health issues, health care systems and health promotion initiatives; (4) provide instructors in respective countries with a greater comfort level for using videoconferencing technology; and (5) create international partnerships with faculty in other countries.

In planning the content and format of the two videoconference sessions, e-mail served as the primary form of communication between the instructors at each university. Preparation to assess Instructional Technology (IT) requirements at both sites (Table 1), implementation of a test run with the two systems and coordination of content outlines were discussed and confirmed between the instructors. The planning phase occurred for approximately 12 weeks prior to the launch of the videoconferencing. Various semester schedules, time changes and incorporation of relevant syllabus content all had to be considered, in addition to the logistical issues. Since the ECU students had nearly no fluency in German and all of the FU students spoke English as a second language, it was decided that English would be the language used for the videoconference. Both sessions were recorded, and in accordance with ECU policy, consent forms for all U.S. participants had to be signed and witnessed prior to the taping of the videoconference.

First Videoconference Session. The first videoconference session, titled *What is Health Care in the United States?*, was facilitated by the U.S. instructor. After brief introductions of the students and instructors in the U.S. and Germany, the ECU instructor presented a 60-minute lecture that included an overview of the U.S. health care delivery system, the leading causes of mortality and morbidity and U.S. public health promotion and disease prevention systems, such as the Centers for Disease Control and Prevention and the National Institutes of Health. Following the lecture, the ECU professor posed discussion questions (Table 2)[34] to generate conversation between the U.S. and German students. Close to 30 minutes was spent discussing various issues related to the U.S. private and public health care systems and public health initiatives, with both the U.S. instructor and the U.S. students responding to the follow-up questions asked by the German participants which covered the following areas: HIV/AIDS, alcohol habits among young people, breast and lung cancer statistics, and health disparities.

Instrumentation. Prior to the session, a pre-test survey was distributed to the U.S. students to assess their prior knowledge of the health care system and public health in the U.S. At the close of the session, a post-test survey, using the same questions, was administered. The pre- and post-test knowledge instrument was comprised of 10 multiple-choice questions that measured specific content related to the U.S. health care system. Researchers have investigated appropriate item format(s) to measure knowledge on specific content, and according to Mondak, the utilization of multiple choice questions maximizes the capacity to "form valid inferences regarding respondents' levels of knowledge." [35 (p.228)] The questions were developed from the content presented in the first session. Students were asked to answer the 10 questions, prior to the presentation, and place a non-identifiable code at the top of the test. After the presentation, students were given the same 10 items, in which they were asked to respond and put the same code at the top for test-matching. This simple exercise allowed instructors to gauge short-term knowledge increase regarding specific content presented during the presentation. Reliability and validity were assessed with the scores from the instrument.

Table 1. Minimum IT Requirements to Link with East Carolina University's Global Classroom

A participating university must meet the following requirements:

- 256K bidirectional bandwidth Internet connection available to the videoconferencing unit. Video conferencing is network traffic intensive. A participant must have 256K dedicated to the video-conference for each class period plus an additional 15 minutes both before and after class time.
- No firewall or has ability to unblock specified ports during class time.
- 1 computer to operate the videoconference unit. Minimum specifications: PIV – 1.7GHz, 1GB RAM, Ethernet connectivity.
- 1 computer for the tech support person to constantly monitor the class.
- 1 computer for possible use of SKYP when audio is not ideal through the class period.
- 8 computers connected to the Internet for use during and outside of class periods.
- 1 data projector and a pair of powered PC speakers.
- 1 faculty member assigned to the course.
- 1 tech support person who can provide assistance with technology.
- If using DSL technology, possible dedicated DSL line for videoconference computer.
- Commitment of one year active participation in the partnership.
- Start from very beginning to incorporate this course into regular curriculum so students get credit for taking the course, and teacher and tech help get paid for teaching this course.

Second Videoconference Session. The second session, which the instructor in Germany facilitated, was titled *Health Challenges and Health Promotion in Germany*. The instructor presented some of the current health-related news headlines in Germany, which served to engage the U.S. students with German health issues. The instructor then covered the demographics of Germany and the health care system. The students then presented key public health challenges as well as identifying the major health promotion initiatives and organizations in Germany. After the lecture, the German instructor posed a discussion question, "Should people with risky lifestyles (overweight/smokers) contribute more to the health care premiums?" Interactive discussion ensued among the students and instructors from both countries regarding the health issues and health promotion programs in Germany. The German students provided responses to the additional questions posed from the U.S. participants. The German students also spoke about their perspectives on public health issues, their involvement in promotion campaigns and their respective career backgrounds and interests.

RESULTS

Pre-Test/Post Test Knowledge Survey Results

A 10-item pre- and post-test multiple choice survey was administered to par-

Table 2. Discussion questions from Videoconference 1—What is Health care in the United States?

- In the United States, insurance companies can deny coverage to people who are sick or who have "pre-existing conditions," and they can make a profit. How do you think these two factors impact American health care?
- In Germany, the rich pay for the poor, the ill are covered by the healthy, health insurance continues with or without employment, and doctors, who are private entrepreneurs, make less money than they did before reform.
- Why will doctors in Germany accept less money?
- Should the rich pay for the poor when it comes to health insurance?
- With over 40 million people uninsured in the U.S., do you believe that a universal health care system in the U.S. would be good policy for the country?
- Other questions or comments from the floor?

ticipants (N = 22) attending the U.S. hosted videoconference session both before and after the link with Germany. The sample for the pre- and post-test survey was comprised of 22 of the U.S. students attending the first videoconference session. A paired sample t-test revealed a statistically significant increase ($P<0.001$) in knowledge related to health care and public health in the U.S. from attending the session, with an increase in mean score from 6.36 (out of 10) to 8.64 (22% increase). Reliability analysis for this knowledge scale resulted in a desirable Cronbach's α of 0.610.[36] Additionally, content validity of the multiple-choice questions was established through consensus of three area experts. The experts agreed that the questions adequately and appropriately assessed the learning objectives from the first session. Finally, a key check was conducted to ensure the correct response to the multiple-choice questions was actually correct, and that no item could result in more than one correct answer. These measures helped to ensure the scores from the items were valid.[37]

Qualitative Feedback from Students

The graduate students at the Free University in Berlin provided qualitative feedback after both videoconference sessions as part of a moderated discussion in class. All students found the sessions useful and qualified these as a learning experience. None of the students had participated in an international videoconference before, and therefore, became familiarized with the technology and protocol. A learning curve among students and the instructor could be observed from the first to the second session with regard to handling the technology. In addition, the presented materials on public health in the United States were mostly new to them. When asked about desired improvements, two main issues emerged:

Format: student presentations were the preferred method, rather than a presentation by the professor. Also, an open, roundtable formation was suggested instead of classroom style to foster an enhanced exchange and sharing.

Topical focus: a more specific health promotion focus was requested for future sessions, e.g. health promotion for socially disadvantaged populations. The feedback session ended with a unanimous vote for scheduling another videoconference for the following semester.

DISCUSSION

This example provides an overview of the process of developing and implementing an international videoconference link. The results of this study indicate that videoconferencing is an effective strategy for delivering international public health education and health care content. Overall, the sessions were well received by the students and the faculty involved, and continuing the sessions in upcoming academic semesters is being explored. The FU students enjoyed the experience of videoconferencing and learning about health promotion in the US first-hand.

Limitations

Participation for the U.S. students was optional and was required for the German students, which may have impacted the goals of the videoconferencing sessions. In addition, the U.S. students were undergraduates and the German learners were graduate students, which may have impacted the processing and comprehension of the content for the U.S. undergraduate learners. English was a second and sometimes third language for the German students, which may have impacted their comprehension of the material or comfort level with presenting. Another limitation is that the German students were assessed using an interview format for more qualitative feedback on their experience, and as a pilot study, only U.S. students were assessed with the pre- and post-survey instrument. If this study were implemented again, it is recommended that the same assessment techniques be administered to both populations. Although based on a prior evaluation instrument, there are limitations in the knowledge pre-posttest survey. The assessment was created as a preliminary pilot to assess U.S. learner's knowledge level with this medium. And using the same pre-posttest measures and items interjects testing threat to internal validity into the results, as students may have learned from the test rather than the presentation. Further development and validation of the instrument is being considered by the authors. In terms of planning, from inception to execution, this is a process that is somewhat time-intensive and may require up to three months to plan an initial video conference linking session. However, once the first session is established, subsequent sessions take less planning and are less time-

intensive due to established processes. Lastly, an established IT department is critical for this medium. Many universities have this set up as part of their distance education program. Videoconferencing can be done with less technology-based infrastructure and with low cost, but it will probably prove more challenging.

The informal qualitative feedback from both the students and faculty was that the content was interesting and beneficial in increasing their understanding of not only another country's health issues and health care systems, but their own country's as well.

It is recommended that faculty encourage other classes in the same department or discipline to attend the videoconference sessions in order to expose as many students as possible to the topic of international health and to further broaden their knowledge base in this area. The results of the quantitative pre-test/post-test survey to assess gains in students' knowledge support the claims that videoconferencing is effective in increasing learners' knowledge of the content covered. It is recommended to construct a class assignment out of the videolink, i.e., have the students' research specific health issues and prepare the presentations ahead of the time. This will enhance their experience and improve the presented material.

TRANSLATION INTO HEATLH EDUCATION PRACTICE

To improve the experience in future sessions, informal feedback from German and U.S. students indicated they would favor a semi-circle formation in class to enhance openness and discussion and also feature student presentations on both sides. Based on feedback from the German students' interests and experience with specific health issues, proposed topics for future videoconference links include: health disparities and programs for socially disadvantaged populations, and childhood obesity and the role of the family as well as the government in health promotion.

Additionally, several key aspects in conducting such videoconferences should be considered. When implementing videoconference technology, allowing adequate time for collaborative planning is essential. Considerable time was needed to establish contacts in another country and plan the videoconferencing content and logistics. The needs, priorities and objectives of all involved must be recognized and respected with open communication and negotiation. Compromises may also need to be considered.[17] For example, in this study each organizer had a vision of what objectives needed to be accomplished in the classroom. Negotiation and compromising took place among the key players (i.e. the Germany professor and ECU professors) on what content and learning objectives would be covered during the videoconferencing sessions. The outcome was two separate sessions that allowed each participating university to meet their goals and objectives for the global link.

Another consideration is the need for IT support. Table 1 shows the minimum technology requirements that an institution should have. Use of an existing university IT infrastructure with videoconference capabilities and experienced technicians is recommended. Although this is not a requirement, due to the low cost video and audio technology available, higher cost equipment does provide better results for videoconferencing. As discussed above, having an established IT infrastructure is important, but not required, to ensuring that the video conferencing process operated smoothly. In this study both sessions were recorded and uploaded to a shared server space. It is recommended that this recording of the session be offered to accommodate those that cannot attend and to use as a resource in future in-class or online courses.

In addition, differences in time zones are an important consideration in the planning phase of the videoconference. Time differences can be challenging in linking two countries in different time zones.[38] For example, Germany is six hours ahead of the U.S. Eastern Time Zone, but the FU course was a graduate class which was offered only at night, which meant the course in the U.S. had to link with the German course during the afternoon in the U.S. Facilitators should note any time changes (such as daylight savings time) that may occur during the scheduled videoconferences.

Finally, it is important to protect all videoconferencing participates by requiring each to sign an informed consent form. Although not required by German students, this was a requirement of the U.S. students. The form should provide the purpose of the session, the fact that participants will be on camera and recorded (if the session is being videotaped) and appropriate contact information for follow-up purposes. Students should feel comfortable with the recording process, and collecting consent forms protects the rights of all parties involved in the videoconferencing session.

Videoconferencing technology provides learners with synchronous experience with interacting with cultures other than their own and furthers their understanding in global perspectives. In addition, opportunities for faculty members to partner with their counterparts in other countries are also an important aspect of international education initiatives.

Today, globalization introduces challenges and opportunities for public health educators. Increasing communications and fostering dialogue between future public health leaders from across the globe enhances knowledge levels and ideas for resource utilization that can help to improve global health. We recommend that public health educators embrace the technological advances, such as videoconferencing, that can help create a "global environment" for today's public health and health education students. Providing these opportunities for students in the classroom can bring awareness to international health issues and help bridge the gap or create the link between their country's health issues and health care infrastructure and other countries outlook on health.

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