Research

Replacing traditional live lectures with online learning modules: Effects on learning and student perceptions [☆]

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Abstract

Purpose: The objective of this study was to compare the effectiveness of an interactive online learning module (OLM) to a traditional live lecture (TLL) format with regard to effects on short- and long-term student learning. Student perceptions toward this type of learning format were also assessed.

Methods: A traditional live lecture (TLL) taught in previous years was developed into an online learning module (OLM). Researchers assessed student perceptions as well as the effectiveness of this intervention compared to a traditional live lecture in an evidence-based medicine course.

Results: Students randomized to the OLM group performed better on the quiz compared with those in the TLL group (mean score 55% vs. 48%, respectively, $p = 0.039$); scores on final-exam questions pertaining to the same material were similar (mean score 84% vs. 87%, $p = 0.40$). Most respondents in the OLM group (86%) felt that online modules should continue to be used in the course to supplement live lectures, although most (56%) felt that they should not replace live lectures.

Conclusions: Given the effectiveness and positive student perceptions, faculty and course directors may consider using this type of technology in their courses, but a blended approach may be better received by students.

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Introduction/background

E-learning, also known as web-based learning, internet-based learning, online learning, or computer-assisted instruction, has been defined as any type of educational format that involves the use of information technology to deliver instruction to learners.[1] Many students enrolled in pharmacy programs today are members of the "Millennial" generation,[2] one generally considered to be technologically savvy. Educators who use instructional technology may facilitate the learning process for these students.[2]

A 2011 survey assessing trends in the use of educational technology in pharmacy found that the use of technology in the classroom is becoming commonplace.[3] The American Association of Colleges of Pharmacy (AACP) Academic Affairs Committee recommends that "institutions and faculty members should commit to improving teaching and learning through the use of technology."[4]

The effectiveness and perceived value of e-learning in medical and nursing education have been evaluated.[5–10] One recently published meta-analysis concluded that internet-based education was more likely to be accepted by students if they perceived that it offered an advantage over traditional alternatives, was technically easy to use, and was compatible with their values/norms.[10] With regard to outcomes, the authors concluded that interactive e-learning was effective only if the learners were able to communicate with others to gain formative feedback.[10]

Another review that assessed the effectiveness of internet-based learning in health professions education determined that the use of interactivity, practice exercises, feedback, and repetition were associated with improved student learning outcomes, whereas the use of online discussion, interactivity, and the presence of audio in the tutorial or discussion were associated with improved student satisfaction.[9]

Specifically related to the use of e-learning in pharmacy education, one systematic review reported improvement in knowledge after e-learning (specifically short-term learning), although the magnitude of this effect varied greatly (7−46%).[11] Three studies in this review had an active comparator, and the majority of studies included showed e-learning to be relevant and practical.[11] Another study conducted by Erickson et al.[12] compared a web-based tutorial to a traditional live lecture to teach students about inhaler technique and found no difference in knowledge test scores between the groups. Congdon et al.[13] compared live lectures given to students on their college's main campus to a recorded version of the same lecture used for a satellite campus and found no difference in graded assessments, course averages, or evaluations. Lancaster et al.[14] used Articulate® Presenter to create online modules combined with audio files and compared this delivery method to traditional live lectures on different topics in the same course as well as to a historical control group taught the same topic in previous years via live lectures. For both comparisons, students using the online software performed better than the controls.[14]

A more recently published study randomized students in an immunization course to attend live lectures or recorded versions of the same lecture and found no difference in overall grade for the course.[15] In this study, most students randomized to the classroom preferred the classroom or blended delivery (classroom plus online) and most students randomized to the online group preferred blended or online delivery.[15]

Rationale/objectives

The objective of this study was to compare the effectiveness of an interactive online learning module (OLM) to a traditional live lecture (TLL) format with regard to effects on short- and long-term student learning. Student perceptions toward this type of learning format were also assessed.

Methods

This project took place in a large college of pharmacy in the Midwest with approximately 200 students per class year. Online learning is not a standard method of course delivery at this institution. The vast majority of lectures are given in the traditional live lecture format with active learning incorporated in the form of audience response software, small group discussions, and workshops. Lectures are not recorded at this institution.

As part of a two-phase project, three, one-hour, traditional live lectures (TLLs) taught in previous years were developed into online learning modules (OLMs). In phase I of the project, the OLM was piloted in a small elective course ($n = 27$). During this phase, the researchers assessed student perceptions of two one-hour OLMs and the logistical feasibility of using this method of content delivery in a larger class. Results obtained from phase I were used to modify and improve the implementation of an OLM in a required course (phase II). During the second phase of the project, the researchers assessed student perceptions as well as the effectiveness of a one-hour online module compared to a traditional live lecture. Both phases of this study were reviewed and designated exempt by the university's Institutional Review Board (IRB).

Instructional technology

After a review of several commercially available e-learning software programs, Articulate Storyline® was chosen as the platform to use for this study. This program has built in graphics and avatars as well as the ability to create highly interactive presentations with audio and video. A variety of interactive tools allow for the creation of in-module assessments and/or case-based scenarios with the ability to customize feedback to the learner based on the choices that are selected. It is also compatible with Blackboard®, the university's learning management system. The course coordinator attended a live training session on how to use the software prior to developing the module.

Instructional design

Phase I of the project occurred during December 2012−February 2013 in a 2-credit elective course focused on advanced ambulatory care topics offered to third-professional-year pharmacy students ($n = 27$). Two of the nine topics taught in this course were converted into OLMs —asthma and hypertension. Phase II of the project occurred during March 2013−May 2013 in a required, evidence-based medicine course for first-professional-year students ($n = 208$). One OLM was developed in this course that discussed two concepts (meta-analysis and the intention to treat principle) and used lecture content that was delivered as a TLL in previous years.

For both phases of the project, each OLM was developed to be identical in time and content to a TLL. The OLMs were narrated, and included interactive features, images, and videos as well as scenario-based learning. Formative assessments, including clinical cases and/or interactive quiz questions, were embedded within each OLM. The OLMs were completed by the students asynchronously and at their own pace.