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Blended Learning Instructional Approach to Teach Pharmaceutical Calculations

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Abstract : Active learning pedagogies are valued for their success in increasing 21st-century learners' engagement, developing transferable skills like critical thinking or quantitative reasoning, and creating deeper and more lasting educational gains. 'Blended learning' is an active learning pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter. This project aimed to develop a blended learning instructional approach to teaching concepts around pharmaceutical calculations to year 1 pharmacy students. The wrong dose, strength or frequency of a medication accounts for almost a third of medication errors in the NHS therefore, progression to year 2 requires a 70% pass in this calculation test, in addition to the standard progression requirements. Many students were struggling to achieve this requirement in the past. It was also challenging to teach these concepts to students of a large class (> 130) with mixed mathematical abilities, especially within a traditional didactic lecture format. Therefore, short screencasts with voice-over of the lecturer were provided in advance of a total of four teaching sessions (two hours/session), incorporating core content of each session and talking through how they approached the calculations to model metacognition. Links to the screencasts were posted on the learning management. Viewership counts were used to determine that the students were indeed accessing and watching the screencasts on schedule. In the classroom, students had to apply the knowledge learned beforehand to a series of increasingly difficult set of questions. Students were then asked to create a question in group settings (two students/group) and to discuss the questions created by their peers in their groups to promote deep conceptual learning. Students were also given time for question-and-answer period to seek clarifications on the concepts covered. Student response to this instructional approach and their test grades were collected. After collecting and organizing the data, statistical analysis was carried out to calculate binomial statistics for the two data sets: the test grade for students who received blended learning instruction and the test grades for students who received instruction in a standard lecture format in class, to compare the effectiveness of each type of instruction. Student response and their performance data on the assessment indicate that the learning of content in the blended learning instructional approach led to higher levels of student engagement, satisfaction, and more substantial learning gains. The blended learning approach enabled each student to learn how to do calculations at their own pace freeing class time for interactive application of this knowledge. Although time-consuming for an instructor to implement, the findings of this research demonstrate that the blended learning instructional approach improves student academic outcomes and represents a valuable method to incorporate active learning methodologies while still maintaining broad content coverage. Satisfaction with this approach was high, and we are currently developing more pharmacy content for delivery in this format.

Keywords : active learning, blended learning, deep conceptual learning, instructional approach, metacognition, pharmaceutical calculations
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