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Improving Online Teaching Efficacy using Bloom's Taxonomy

E-learning is grounded in many interconnected theories of learning and pedagogy, such as Piaget's theory of active learning and Bloom's influential (revised) taxonomy of thinking and learning (Galway *et al.*, 2014). For the purposes of this study, Bloom's taxonomy will be the theory used to assess e-learning in the context of teaching public health in higher education. Bloom's taxonomy differentiates between cognitive skill levels, with higher levels that can subsequently lead to deeper learning and application of knowledge and skills gained to other situations (Adams, 2015). Bloom's taxonomy is comprised of six categories: knowledge, comprehension, application, analysis, synthesis, and evaluation. Each of these "stages of learning" are based in assessing cognitive skills that range from low to high cognitive processing (Adams, 2015). The most basic cognitive skill in Bloom's Taxonomy is knowledge and has been defined by Adams (2015) as, "the retention of specific, discrete pieces of information like facts and definitions or methodology, such as the sequence of events in a step-by-step process." Comprehension, which is the second level of cognitive skill, and can be described as the ability to paraphrase a concept/idea into your own words, giving meaning to the information that is being learned. Application, the third cognitive skill, allows learners to use the knowledge, skills, or techniques acquired in new situations or applications (Adams, 2015).

Moving on to the higher levels of the taxonomy, analysis, is the fourth level of Bloom's Taxonomy and initiates the importance of critical thinking. This level of critical thinking and skill would include distinguishing between evidence-

based information and opinion as well as understanding how an argument is constructed (Adams, 2015). The fifth cognitive skill is synthesis, which involves creating an original invention in a specific situation (Adams, 2015). Evaluation is the highest level of the taxonomy. Evaluation utilizes learner feedback and assessment results to judge the value of a learning opportunity (Adams, 2015). Bloom's Taxonomy has been used for many years to assess and predict learning outcomes, but it has been used most in a face-to-face context within the walls of a classroom. This study attempts to take the traditionally used Bloom's Taxonomy and transfers it to the e-Learning format in order to demonstrate that traditionally used teaching methodologies can be effectively implemented through distance education.

Distance education in public health instruction is growing due to student demand and has been shown to be an effective method of teaching and learning (Allen & Seaman, 2015). Allen and Seaman (2015) also found that more than one in four students (28%) now take at least one distance education course (a total of 5,828,826 students, a year-to-year increase of 217,275).

Galway *et al.* (2014) reported on the design, implementation, and evaluation of a "flipped" classroom instructional model for an Environmental and Occupational Health course. Course content was delivered online while in-class sessions focused on active learning activities. Using a mixed-methods approach, investigators examined learning experiences and perceptions of the flipped classroom model and evaluated changes in students' self-perceived knowledge after taking the course. The students

reported an increase in knowledge while survey and focus group results demonstrated positive learning experiences and perceptions of the flipped classroom instructional model. Galway and colleagues (2014) concluded that the integration of this model can be effective in public health higher education as the flipped classroom students achieved similar test scores to traditional students, though flipped classroom students rated their course experience more highly and conveyed positive learning experiences and an increase in self-perceived knowledge.

Halawi *et al.* (2009) evaluated e-learning through WebCT, a web course tool, on the basis of Bloom's taxonomy among a sample of management information systems (MIS) students from a medium-sized university in the southeastern region of the United States (Halawi *et al.*, 2009). WebCT is a program that provides instructors with the tools to create and organize assignments, discussions, course materials, and exams in an online environment. The goal of this study was to explore the relationship between individual factors, instructional factors, and e-learning through WebCT. The results of the study concluded that there were no significant differences among the constructs of individual and instructional factors and learning through WebCT. In addition, the results of the study demonstrated that individual and instructional factors did not have a significant effect on e-learning; however, the study found that e-learning is an effective learning tool when based on Bloom's taxonomy.

Implementing Bloom's Taxonomy with Online Learning

Bloom's taxonomy has long been used as an effective framework in education (Anderson & Krathwohl, 2001) and ought to be considered when creating the structure for online learning. We apply a health education example, using the health belief model (HBM) in e-learning. The HBM is one of these most commonly used theories in health and is widely taught in undergraduate and master's level theory courses in health education, public health and health promotion (Carpenter, 2010). We divide Bloom's taxonomy into three sections for logical ease of implementation through distance education.

The first section includes remember, understand

and apply. Students listen to a live or recorded lecture on HBM and read textbook chapters and/or peer reviewed journal articles pertaining to HBM and how it is used in various settings. In using HBM, lecture material includes defining the theory and explaining each stage: perceived susceptibility, perceived severity, cues to action, perceived benefits, perceived barriers and self-efficacy (Rosenstock & Irwin, 1974). While the readings serve as a tool to increase HBM comprehension, the duplicate material increases memory retention. These two processes create the introduction to HBM material. To increase concept recollection, students complete a discussion board posting. The instructor poses a question related to the readings and lecture, and students are required to post a thoughtful response. It is recommended that students not only post a response but reply to a peer. A due date for the initial posting and a separate due date for the reply post could be assigned. A rubric for posting guidelines is also recommended. Distance education studies indicate that interaction improves perceived learning (Rovai & Barnum, 2003). Student engagement improves when replies to peers are encouraged requiring students to read other students' posts. The continual interaction of students on the lecture topic improves topic retention. Yet, this low threshold activity forum allows students to apply knowledge while the instructor can assess comprehension. If students are challenged on components of HBM, the instructor can intervene and improve comprehension prior to any high stakes assignments being due.

The second section includes analyses and evaluation of the HBM. In the analyze stage, students will draw the connection between concepts and ideas of the HBM. Following this, students' progress into activities oriented with the evaluate level of Bloom's taxonomy. We combine these two stages with one activity. We recommend assigning two journal articles where investigators report on program implementation and evaluation of the same specific health topic using HBM. Firstly have the students analyze implementation of the HBM and program processes, then, have the students submit a Dropbox homework assignment describing how the HBM was used in one or both of the programs and why. From here, students

examine, differentiate and compare the two programs for strengths and weaknesses. Students may debate which program was better via the discussion board. Another suggestion is a live discussion with the class split into groups and the groups evaluate the programs and the HBM. Communication tools to use may be Google hangouts, WebCT or another live interface program.

Last is the create stage of Bloom's taxonomy. Here students construct new work generating new ideas. The final assessment can be through an essay asking students to implement the HBM with a specific health problem or wellness scenario. Students will need to address each stage of the HBM with specific program planning ideas while also offering an evaluation plan to determine if the implementation was a success. Students may use some peer reviewed research for best practices but also need to generate new ideas. As such, we recommend a health topic that is less researched that uses a unique population.

Conclusion

Bloom's taxonomy is widely used in a variety of academic subjects and is therefore applicable to many education courses and specifically health education, public health, and health promotion courses.

The application for online learning encourages student learning outcomes while using up-to-date technology and applications.

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