FY09 Innovations in Teaching with Technology Awards: Measuring Effectiveness of Two Technologies Adopted in Nursing Pharmacology

FY09 Innovations in Teaching with Technology Awards

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<th>Proposal Title:</th>
<th>Measuring Effectiveness of Two Technologies Adopted in Nursing Pharmacology</th>
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<td>Org Unit:</td>
<td>College of Nursing</td>
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<td>Department(s):</td>
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<td>$6,500</td>
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I teach pharmacology to undergraduate nursing students. Historically, nursing students find pharmacology difficult; many say it is like reading Greek and they try to memorize a bunch of unfamiliar terms with a very limited frame of reference. Historically, the course was taught using lectures and assigned reading. The book is thorough but very dense reading with little in the way of organizers or other tools to students get the material into short term memory (long enough to pass the test). During the semester the students take this course, they are also enrolled in pathophysiology, complex concepts (two of the heaviest courses in our curriculum) and their first clinical experience. During this semester many students state they don’t get the pharmacology reading done because they run out of time due to the other course demands. Undergraduate nursing students in this course have little experience in practice so are often unaware of the meaning or relevance of what they are trying to learn. I wanted to add facets to the course that would help students engage in active learning and support the transfer of this material into long term memory so that the knowledge is available for them in practice.

There are approximately 80 undergraduate students/semester in the Pharmacotherapeutics for Nursing Care course (96:124). This is a required course for all nursing students in the Bachelor of Science in Nursing (BSN) and entry into practice Master’s in Nursing Science/Clinical Nurse Leader (MSN/ CNL) programs. The course is offered 3 semesters/yr.

In 2007, I began working with ITS to develop an online tool for students to review key drug information (name, how it works, route of administration, major side effects, patient assessment for effect and how to educate patients). We built a program
Medimax) that affords both static review and dynamic drill functions. Both are self-paced, optional and ungraded. In 2008, the College of Nursing bought personal response devices "clickers" for all undergraduates and we are incorporating their use in the 3 core courses in which this cohort of students enroll in the fall semester (one of which is pharmacology). We have deployed these tools believing and hoping the tools will be used extensively and will be of value to student learning. I would like to collect data to see what the student use and benefit actually is.

The learning principles of offering students multiple ways to learn are sound. In addition to the formal classroom lecture (audio and visual) the online review tool offers an independent modality where students have complete privacy, opportunity to do the activity at their own pace and the chance to repeat the drill as many times as they want or need to. I believe the in-class clicker questions enhance student engagement, offer a real time chance to correct misconceptions, support knowledge application to clinical care, and guide students test taking logic. I believe the student responses give me as the instructor a chance to ask better questions in class and assess better whether or not the material is being understood by the majority of the students. Students give feedback regarding instruction each semester. In addition to the standard questions asked of all undergraduates in didactic courses, the testing service affords the opportunity to customize questions. On the ACE forms, students will be asked to respond using a Likert scale. The statements that will be added this semester for this course are:

1. I used the Medimax online review? (Scale: Always, frequently sometimes rarely never)
2. I used the drill function in Medimax (Scale: Always, frequently sometimes rarely never)
3. The Medimax review helped me remember important facts about specific drugs? (Scale: Strongly agree, agree, neutral, disagree, strongly disagree)
4. I believe the drill helped me retain information about specific drugs (Scale: Strongly agree, agree, neutral, disagree, strongly disagree)
5. I liked using personal response devices "clickers" in class (Scale: Strongly agree, agree, neutral, disagree, strongly disagree)
6. The personal response devices "clickers" helped me better understand the material presented in class. (Scale: Strongly agree, agree, neutral, disagree, strongly disagree)

Each semester, students in this course are required to take the Assessment Technologies Institute, Inc. Pharmacology Proficiency Exam (ATI exam). This is a test that is designed to mirror the pharmacology content on the national licensure exam for registered nurses. A number of schools of nursing nation-wide subscribe to this testing service. We have the ability to compare UI students across semesters and to compare UI students from the national average. Data is also presented by subject area (i.e.
cardiac). This affords the ability to see if there is a particular segment of the content where student performance is stronger or in need of improvement. Questions I'll be using the ATI scores to address are whether the student performance after the introduction of these technologies is different from prior semesters and whether the aggregate performance score for the class differs in comparison to students in other schools.

I want to test four beliefs 1) students use the online tool 2) students like the online review and drill 3) students prefer the use of clickers in the classroom to having questions posed and having to raise their hands to answer 4) student performance on standardized tests improves that these two technological additions. If student preferences favor these tools and if performance is improved, these data will be useful in decision-making for future financial investment in personal response devices. If the data indicates that student preference is not as expected or mastery is not improved, those findings could guide valuable redesign.

The project aim is to:
• create an expandable database to archive data from ACE form student feedback and ATI performance scores on the nursing pharmacology exam.
• create capability within this program to query the data and create reports
• use the findings to trend student performance over time and based on these data reassess and refine teaching tools including these two specific technological applications.

I intend to work with instructional design staff to build a data base that will merge class data. The data elements will be course evaluations (ACE form) questions about the use of the tools (Likert scale data) and data from a standardized performance test (ATI) that nursing students from a number of programs take.

I believe the student engagement is the key to improving learning. Both technological tools are designed to increase active student learning. The online review and drill gives students a chance to practice privately, test themselves, use their mistakes in the drill to design a personalized practice test focusing on the areas they don't know well. By intermittently responding to clicker questions in class, students whose attention has drifted are refocused on the content. Anecdotal comments from students this semester indicate that the anonymity of the response devices frees students from the fear of being wrong in front of peers and encourages response behavior they would not have demonstrated by raising their hand. The entrance standards are high to this program and the student pressure “not to look dumb” is high. Therefore, class participation is hampered if student confidence in their understanding is low. That lack of participation may lead the instructor to assume that students understand a concept when in fact the majority of the class does not. The opportunity to see via clicker responses that a

How will it improve student learning?

https://its.uiowa.edu/support/article/101144
segment of the class is confused affords the instructor a chance to re-explain in different terms or use peer exploration to uncover the source of misunderstanding.

If the data support the notion that students want and use these tools and that the tools help them achieve their learning goals, further time and resources can be invested in developing additional content modules. This data could serve as pilot work to develop a larger study of the use of these tools in this content and related undergraduate nursing core courses. Expansion of the purchase of personal response devices for students in other courses could be supported by this data.

**What resources will you need?**

- A graduate assistant with experience in database work is needed to design the database, maintain data integrity, execute queries and design reports. The estimated time commitment would be 10 hrs per week. Average salary for a graduate assistant with this background is $3500/semester. It would be expected that the database would be designed such that after the initial semester, it could be managed by the faculty.
- Statistical consulting would be required to assure that the data analysis was done using the most appropriate tests and that the sample size was sufficient to draw conclusions.
- $3,000
- Data entry support would be needed and could be accomplished by the teaching assistant assigned to support for this course.

**Rough estimate of costs**

Estimated cost: $6,500.

**IT Support Information**