Engaging Undergraduate Nursing Students With Barcode Scanning in an Oncology Course

The implications of technology use in the classroom setting are becoming increasingly evident. Although smartphones can be a distraction for students during class, they can also be used for learning inside and outside the classroom (Thorne, 2016). When technology is embraced in the classroom, it can support experiential learning and therefore meet the needs of students with differing learning styles (“7 things you should know about...QR Codes,” 2009). Although most students present a multimodal learning preference, it can be challenging for faculty to satisfy the visual, auditory, reading and writing, and kinesthetic learning styles (Prithishjumar & Michael, 2014). To address the different learning styles and keep students actively engaged in their learning, barcode scanning evolved as a classroom learning activity.

Barcode scanning has become integrated into many areas of health care to ensure patient safety. Quick response (QR) codes are a type of matrix, two-dimensional, barcodes that are read from left to right and top to bottom (Robertson & Green, 2012). Nursing students encounter barcode scanning in their clinical rotations and must be able to use this technology safely and efficiently. In addition to being used in the clinical setting, QR codes can be easily incorporated into the classroom as (a) links to information on the Internet, (b) review information, or (c) a requirement for assignments.

Learning Activity

The purpose of this learning activity was to determine nursing students’ perceptions of incorporating barcode scanning into the classroom as an interactive teaching and learning methodology. In this study, the use of barcode scanning was explored in an undergraduate nursing classroom as a review in an oncology course. The nursing students received 10 hours of classroom lecture on the clinical concepts and mechanisms of oncology. To review the oncology content prior to the examination, the authors created the classroom activity “Scan It to Learn It!” The authors made QR barcodes using a web-based, QR code generator tool. Each barcode consisted of one review question for the oncology content. The authors created the barcodes, printed the barcodes, and then taped each barcode to a separate index card. The index cards were strategically taped throughout the perimeter of the classroom and down the hallways outside of the classroom.

For this learning activity, the students were instructed to download a free version of a QR barcode reader on their smartphone. The class of 67 participants was divided into small groups of three to four students in each group. The students were given 30 minutes to circulate around the room and into the hallways to scan the codes with their smartphones. Four types of oncology review questions appeared when the barcodes were scanned: (a) multiple choice, (b) select all that apply, (c) completion, and (d) true or false. Within their small groups, the students discussed the answer to the scanned questions and each group was designated to present their response to one or two of the questions. The authors created a PowerPoint® presentation to align with the review questions so all the students could follow along as the questions were individually reviewed. After class, the students could further review the questions, as the QR barcode questions were saved in the history of their smartphones. The barcode activity took approximately 1 hour of classroom time for the barcode scanning and review of oncology content.

Student Evaluation

On the day of the oncology examination, a survey was administered after the examination to each student who participated in the barcode scanning activity. A four-item survey was given to assess the nursing students’ perception of the interactive barcode scanning in the classroom in the following areas: (a) gaining more content knowledge, (b) being better prepared for the examination, (c) feeling that learning needs were met, and (d) feeling that the barcode scanning was a worthwhile activity. Based on their participation in the barcode scanning activity, the students were asked to rate their experience on a 1 to 7 Likert scale, with 1 = not at all and 7 = to a great extent. The mean scores were 5.78 for gaining more content knowledge, 5.77 for feeling better prepared for the examination, 5.82 for feeling their learning needs were met, and 6.13 for feeling that the barcode activity was a worthwhile activity.

Besides finding the barcode scanning activity interesting, it also affected the students’ performance on the oncology examination. The oncology examination average was 85%, with most of the students passing the examination and 12 students scoring lower than 80%. The students had higher scores on the oncology examination compared with the other medical–surgical examinations in the course. The averages for the endocrine, neurological and vascular, gastrointestinal, and cardiac examinations were all 83%. More students (ranging from 22 to 33 students) scored less than 80% on the endocrine, neurological and vascular, gastrointestinal, and cardiac examinations. Therefore, the students who experienced the barcode scanning activity for the oncology content scored 2% higher on their examination, with more students achieving a score higher than 80%. Based on this evaluative data, the students performed better on the oncology examination, but the oncology content may have been perceived as less difficult compared with the other medical–surgical content areas.

The students were also asked to identify their dominant learning preference on the survey. Most of the students identified their learning preference as kinesthetic (32%), followed by visual (25%), reading and writing (25%), and auditory (3%) as the lowest. The barcode activity incorporated all the learning styles. The activity was kinesthetic as students had to move around the room and in the hallway to scan each review question. The barcode questions were visual as they appeared on the students’ smartphones and then reappeared as the questions were reviewed in PowerPoint by the instructor. The students had to read the questions, then write down their responses. The
students also had to listen as each group read aloud their questions and responses.

By engaging students in active learning, different learning styles can be satisfied. Students felt the barcode activity met their learning needs, helped them to better prepare for the examination, was a worthwhile activity, and helped their performance on the examination. This barcode activity was found to be an engaging interactive classroom activity for the students. This type of learning activity and assessment can be used easily in a variety of classroom settings with students of any academic level.

**References**


Karen Aul, PhD, RN, CNE
University of Florida
kaul@ufl.edu

Lauren Johnston, MSN, RN
Arkansas State University
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