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Christine M. Thomas

West Chester University of Pennsylvania, cthomas@wcupa.edu

Cheryl Monturo

West Chester University of Pennsylvania, cmonturo@wcupa.edu

Katherine Conroy

West Chester University of Pennsylvania

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Experiences of Faculty and Students

Using an Audience Response System in the Classroom

Abstract

The advent of innovative technologies, such as the Audience Response System, provides an opportunity to engage students and enhance learning. Based on their experiences, three nursing faculty evaluated the use of an Audience Response System in four distinct nursing courses through the use of informal survey results. When using the Audience Response System the faculty experienced an increased perception of student attentiveness and engagement, high level of class attendance, and enhanced learning. Faculty feelings were mixed concerning the burden in adapting to increased classroom time and increased preparation time. Students perception of the value of ARS use was mostly positive, except when responses were included as part of the grade. The majority of the students indicated that use of the Audience Response System enhanced learning and was a helpful learning method when used with NCLEX style questions. Overall, faculty believed that the benefits of student engagement and enhanced learning outweighed the burdens of incorporating this new technology in the classroom.

Keywords: Educational Technology; Computer Assisted Instruction; Teaching Methods

Introduction

Learning, as a process, is a dialogue between teacher and learner.¹ During a lecture, as the teacher explains a topic or asks a question, the learner processes the information utilizing current understanding and responds. The teacher compares the response to current theory and if there is a discrepancy provides feedback and/or remediation. Dialogue between individual students and faculty is minimal in the lecture format. As such, the use of Audience Response

Systems (ARS) can provide an opportunity for dialogue and improved learning,^{2,3} particularly in large classrooms.

ARS is an innovative technology offering faculty the opportunity to engage students in an otherwise traditional lecture format. The technology also provides a means to evaluate student comprehension, survey student perceptions, record attendance, document program outcomes, implement interactive question/answer games, and review tests.^{4,5,6,7} Many innovative teaching methods have come and gone over the years, peaking faculty and student interest based on uniqueness or newness. However, each new teaching method requires analysis for its feasibility, cost, and effectiveness. This paper presents the experiences of Nursing faculty and students with the ARS, perceived advantages and disadvantages, as well as pedagogical merit.

Teaching Learning Perspectives

Early scholars utilized traditional lectures to present information since most documentation was hand-written and not generally available. Most perceived this method as a one-way transmission of information, necessary with large groups of students. The advent of mass produced books and instant access to internet information did little to revolutionize the traditional lecture format, leaving it virtually unchanged. Whereas the lecture method limits student to faculty interaction, it remains the easiest to organize, prepare, and reproduce, providing significant classroom control.^{2,8}

Interaction in the classroom is highly regarded in nursing education as a necessary element in the active learning process. This process requires attention, concentrated effort, thinking and engagement.⁹ Attention during classroom learning is defined as a primary focus on all materials presented, whereas concentrated effort is required for moderate to hard concepts. This necessitates that students limit their multitasking skills and concentrate on one activity.

Thinking during class occurs as students build connections between new and existing knowledge, subsequently determining how they will use the information. Engagement occurs when students are emotionally committed to the topic, with a desire to learn more. Use of an ARS may encourage active learning in large groups, through enhanced attention, engagement and thinking.

An ARS utilizes wireless technology in the form of a student handheld device resembling a small remote control. The computer based receiver connects with a USB port and software that quickly tabulates and displays student response data in a graphic form. The displayed data may include aggregate responses, individual responses, or small group responses. Data may be displayed on an overhead screen for immediate faculty and student viewing, as well as analysis. Responses may be recorded to track student progress toward outcomes and grading, or may be anonymous. Analysis of aggregate student responses during a lecture increases student to faculty interactivity and student learning in the classroom.^{6,7}

Faculty and Students Experiences

Currently, the faculty augment lectures with various teaching methods (case study, gaming, etc.) in an attempt to increase student interaction and learning. The ARS is the newest tool, creating a higher level of interaction between teacher and the current 'techno-savvy' generation of nursing students who value immediate feedback. The ARS was used by at least five different faculty in four distinct nursing courses: a 3 credit mixed level nursing elective, two 6 credit nursing major courses (one each in 3rd and 4th year), and a 1 credit nursing test taking and study skills course during the spring and fall semester of one academic year. The ARS equipment (handheld clickers and receiver) and software was purchased by the nursing department using university technology funds. Several advantages and disadvantages were

evident as a result of faculty perceptions and informal student surveys during classes using the ARS to record anonymous responses. This article outlines faculty experiences and student surveys taken as part of end of class evaluations using ARS.

Attentiveness and Engagement

Although the interactive learning process involves both attentiveness and engagement, they are intertwined and flow naturally from one to another. Faculty perceived an increase in student attentiveness with use of the ARS. Although faculty did not allow the class to view individual student responses, the number of correct and incorrect responses was viewed immediately in a graphic histogram format. This format allowed students to anonymously compare their responses to peers in a less threatening environment. Despite anonymity, a certain amount of psychosocial pressure exists for students to pay attention, respond, and perform equally or better than their peers. The faculty attributed this higher level of attention to the emotional aspect of competition based on student anecdotal comments during the semester.

A survey of the class showed a majority of students (~ 95%) responded using the ARS device, which is consistent with the literature.^{1,5,10} Congruent with this high percentage, the majority of students in the 3rd year nursing major class (81%, number of responses 48) agreed that use of an ARS lead to increased individual involvement or engagement in class discussion. All faculty who taught the upper level nursing courses (3rd & 4th year), in which student responses were not graded, also believed that use of the ARS increased student engagement and discussion of class content.

Attendance and Grading

Use of the ARS for attendance and grading purposes revealed high class attendance (approximately 95%) in the 3 credit mixed nursing elective. Each student's name was entered

into the ARS software using an assigned ARS responder. To assess comprehension of assigned readings an 8 to 10 item test was administered during class using the ARS. This class exercise served both as validation of attendance and a grade in the elective, consistent with the literature.⁵ Since the ARS system was not used on a regular basis for attendance in the two 6 credit major courses, it could not be used to validate attendance. In those classes where ARS was not used for grading or attendance purposes, attendance waxed and waned.

Student and Faculty Perceptions

Student perception of the value of ARS use was mostly positive, except when student responses were included as part of the grade. Three out of four classes used the ARS to survey student perceptions of the technology. The majority of the nursing students indicated that use of the ARS enhanced learning (64%, number of responses 89). See Table 1 Student Perceptions of ARS and Enhanced Learning. The nursing study skills class course did not survey the students. However, course evaluations consistently listed “the most helpful teaching/learning strategy used” in class was the use of the ARS in completing NCLEX style questions. When asked to give suggestions for improvement for the study skills course, many students requested more class time using the ARS. Students also commented that analysis of questions and class responses improved their ability to identify the meaning of the question and the subsequent selection of a correct answer. When the mixed level course was surveyed, which used ARS as part of the grade, students were less positive that the technology enhanced learning to a high degree (48% Yes, 38% No, 14% Unsure; total number of responses 29). Of the 15 respondents who were unsure or perceived a lack of enhanced learning , the majority (80%) indicated that this was “because the questions were for grading purposes in this class.”

The negative responses of those students using ARS as part of the course grade (mixed level nursing elective) may be attributed to higher levels of anxiety due to the consequences of incorrect responses. In an overly stressful or disengaging atmosphere only simple conditioned responses are reinforced. If students are too anxious or unwilling to engage in discussion, minimal learning occurs.^{4,10} In addition, when answers were discussed in the mixed level elective class, the faculty member noted an adversarial atmosphere in which students were less receptive to discussing the responses after the correct answer was provided. This was not noted by faculty in the 6 credit major course and testing skills class using ARS in a non-graded fashion. In these classes discussion of questions and responses was more exploratory with a higher level of analysis and discussion. Although this difference appeared important, it may be attributed to the lower cognitive level of questions used in the mixed level class, rather than the association with a grade. The lower level questions accommodated the class's wide range of nursing clinical experience (freshman to senior level) and met the lower level (200 level) elective class objectives.

While the university supported the nursing faculty with funds to purchase the ARS equipment and software, the faculty were responsible for maintaining the handheld devices (batteries, coding, etc.) and distributing/collecting the handheld devices before and after class. This was not perceived by the faculty as a hardship or complicated. No formal training was provided to faculty who desired to implement ARS. Students were given simple instructions on when and how to use their handheld devices to indicate their responses to questions shown on the slides. The level of student experience using ARS varied in each class as some students indicated they had used the ARS in other non-nursing classes. See Table 2 Student Experience in Using ARS. Most of the faculty found the ARS software easy to incorporate into previous

presentation software (MS PowerPoint). Despite faculty familiarity and competence in using slide presentation software, one found that the ARS software was frustrating and not intuitive. Acquiring the knowledge to prepare new slides was initially difficult and discouraging. Through perseverance and a collegial atmosphere, all were eventually successful.

Although student faculty interactions were positive, additional time was needed in the classroom to allow students time to read, think, and respond to the question presented in ARS format. In addition, some content areas stimulated more discussion and analysis than others. Given these time constraints, faculty adapted lectures accordingly. The challenges of a more dynamic classroom atmosphere required flexibility and a willingness to relinquish control of didactic time. Therefore, additional faculty preparation was needed when using the ARS.

Test Review

Two faculty members teaching in the 4th year nursing major used the ARS for test review and found less student frustration and negative emotions compared to more traditional methods of providing test question answers and discussing rationale. The faculty believed this positive response was a result of the students' ability to compare their performance with that of their peers prior to challenging the validity of a test question. As noted previously, this may also be a result of peer pressure.

Burdens vs. Benefits

Although research into whether ARS increases critical thinking (CT) (one type of clinical problem solving), was not evident in the literature, the faculty and previous studies noted increased discussion, communication, and interaction between students and faculty.^{3,6,11} Using the ARS, faculty can support and model clinical problem solving through explanation or student exploration of the correct vs. incorrect response. This process involves clarifying judgments,

discussing rationale for conclusions and analysis of data that lead to assumptions, all of which enhance CT.^{12,13} Conversely, if discussions involve basic knowledge or comprehension questions as compared to application, analysis and synthesis questions, ARS will not enhance student clinical problem solving abilities¹³. The ARS can diminish student anxiety in answering questions at the analysis and synthesis level, which may enhance clinical problem solving.^{4,10}

Research has shown that increased student interaction in the classroom enhances learning,^{15,16} with statistically significant increases in the number of students obtaining a grade of C or better in courses using ARS,⁶ while other studies were inconclusive.^{1,10,11} Although the faculty did not compare grades among or between classes, many agreed that the use of an ARS enhanced student learning and attention. The novelty of the ARS may account for the increased interaction and once it is a more common classroom tool it may no longer incite students' enthusiasm or interaction.

In classes where ARS was used, faculty attributed the increased interaction to the anonymity of student responses. Faculty also recognized that an increased commitment on the part of the students allowed for more in-depth discussion of content during class, consistent with the literature.^{1,3} These students were also more likely to discuss rationale for their choice and compare their decisions to that of their classmates. In essence, the teacher and students shared the thinking process that lead to the choice. Critical thinking was modeled and faulty content or thinking identified.

The percentage of students responding to questions was not always 100% (except in the class where responses were used for grading) and appeared to diminish toward the end of the class and semester. This may be attributed to a variety of reasons including student class schedules, question fatigue, frustration over difficulty of the question, disengagement due to the

simplicity of questions, or nonworking responders. Our experiences were similar to those of faculty across a variety of disciplines.^{3,5,7,10,17,18,19}

Overall Value of ARS

Overall, the nursing faculty who utilized the ARS found more benefits in student engagement and perceived learning than burdens. Therefore, all plan to continue and expand the use of the ARS. Although added time to learn and implement ARS was a major disadvantage, this diminished as faculty incorporated the ARS into previously developed slides and lectures. Despite the need for additional class time when using the ARS, faculty believed the system provided pedagogical merit as evidenced by enhanced quality of the discussion and analysis of content. Use of the ARS graphs, also allowed faculty to evaluate content that required more in-depth discussion.

The use of new learning technologies should not only address the cognitive domain but also the affective domain. While minimal tangible evidence exists to support the use of ARS for improved cognitive measures, the affective reactions should not be dismissed as they possess the potential to increase interest and improve learning.⁶ Student motivation to learn is related to emotional perceptions in the classroom. From a humanistic perspective all teaching should recognize the importance of human feelings, values, and perceptions in an attempt to develop a “learning climate that is challenging, understanding, supportive, exciting, and free from threat”.^{21(pp82)} Undertaking new innovative teaching methods may also be affectively beneficial for faculty. As Fuszard points out, “adoption of new appropriate teaching strategies are circular. The teacher risks, and the student has a chance to grow, in the growing the student and teacher are freed from the archaic self-image of what a teacher and what a student should be.”^{22(pp12)} In this case the faculty risk paid off for both students and faculty.

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