ABSTRACT

To increase student participation in the learning process, active learning methods, including small group learning, have become increasingly popular in modern curricula. One kind of small group learning, team-based learning, is a relatively new instructional strategy in health care education. Team-based learning uses theoretically based and empirically grounded strategies for ensuring the effectiveness of small groups working independently in classes with high student-to-faculty ratios (e.g., up to 200:1), without losing the benefits of faculty-led small groups with lower ratios (e.g., 7:1). To explore the effectiveness of this learning pedagogy, we evaluated students' level of engagement and attitudes toward the value of teams. Findings demonstrated that team-based learning is an effective teaching strategy for large groups of students.

Active learning methods have become increasingly popular in modern curricula. One such method, small group learning, is advantageous in its ability to promote problem solving, critical thinking, and interpersonal communication skills. In contrast to lectures, small group learning can increase student engagement and behavioral interaction. For learners, not only is this method more energizing, but it also has been associated with greater assimilation of subject matter (Kelly et al., 2005; O’Malley et al., 2003; Watson, Michaelsen, & Sharp, 1991), especially when compared with the passive lecture format (Clark, 2007; Michaelsen, 2002; Moffett & Hill, 1997).

Problem-based learning is one kind of small group learning that has been incorporated into clinical nursing courses. In problem-based learning, students use case examples to research and apply newly learned concepts (Beers, 2005). In each small group, students work with a faculty facilitator who assists in disclosing the details of a prepared case and helps the group members identify their learning needs. Problem-based learning is relatively resource intensive, requiring several expert faculty members (Beers, 2005). Involving enough faculty can be challenging in light of the recent faculty shortages and legislative demands to contain education costs throughout the United States (American Association of Colleges of Nursing, 2005).

Another kind of small group learning, team-based learning, is a small group-based instructional strategy that has been used for many years in business and science education but is relatively new to health care education. Team-based learning uses theoretically based and empirically grounded strategies for ensuring the effectiveness of small groups working independently in classes with high student-to-faculty ratios (e.g., up to 200:1), without losing the benefits of faculty-led small groups with lower ratios (e.g., 7:1). In contrast to problem-based learning, team-based learning requires only one facilitator for classes of up to 200 students. Team-based learning has also demonstrated effective stimulation of out-of-class study, high levels of in-class engagement, and increased teamwork among students (Searle et al., 2003). Overall, team-based learning seems to enhance students' attitudes about learning and working in teams, and it raises students' knowledge-based performance, at least as favorably as traditional didactics do (Michaelsen, Knight, & Fink, 2004).

This article describes our experience of introducing the team-based learning method into an undergraduate nurs-
ing course at a major medical health science center. We converted a traditionally lecture-based course into a course that combined lectures and team-based learning modules. To evaluate the effects of the team-based learning method, we compared classroom engagement in the classes using the team-based learning method with that of another class using only conventional lectures. At the beginning and end of the semester, we also assessed the students’ evaluation of the team-based learning strategies used in class and their attitudes about the value of teams.

BACKGROUND

Team-Based Learning

Team-based learning became an instructional strategy in business schools in the late 1970s. The method was designed to replace lectures but to retain a teacher-centered approach for classes of up to 200 students so that small teams could be created within large classrooms with one teacher (Fink, 2002). Students were placed into learning teams where they remained for the duration of the course. Units of instruction, known as “modules,” are taught in three-step cycles: preparation, readiness assurance, and application-focused activity (Table 1).

The literature demonstrates that these three-step cycles can enable students to master desired content by increasing engagement and involvement while promoting team communication (Moffett & Hill, 1997; O’Malley et al., 2003). Specifically, the applications of content in problem-solving or decision making, as well as individual and group accountability for learning, are important components of this teaching strategy (Dunaway, 2005; Watson et al., 1991).

Lectures are a common teaching strategy in nursing education. Despite efforts to make lectures livelier or to use more audiovisual material, students often remain passive and uninvolved. More significant, students often come unprepared to class, opting to skip reading the assigned material and instead focusing on the Power Point® presentation to learn the material (Maki & Maki, 2002; Williams, Aubin, Harkin, & Cottrell, 2001).

However, recent trends in nursing education demand that exit goals for graduating seniors include critical thinking skills and problem-solving skills for complex health care situations (Garrett, Schoener, & Hood, 1996). Lectures along with Power Point handouts, as the primary learning material, cannot produce practitioners who are critical thinkers. On the other hand, focusing on problem-based learning, which requires using several faculty to help with group learning, is not within the resources of many academic settings (Sefton, 1997).

Although not yet adopted in nursing education, team-based learning presents an opportunity to create active and instructor-driven learning (Kelly et al., 2005). The guiding structure, which follows specific guidelines for implementation, is tailored around four underlying essential principles (Michaelsen & Richards, 2005):

- Groups should be properly formed (i.e., intellectual talent should be equally distributed among the groups).
- Students are accountable for the work.
- Team assignments must promote both learning and team development.
- Students must receive frequent and immediate feedback.

These four main principles of team-based learning (Michaelsen et al., 2004) are summarized below.

Principle 1. Proper Group Formation. Teams or groups need to be created by distributing students’ abilities equally across groups. This can be done in a variety of ways, but it is important that the students think that distribution is done in a fair and equal way.

Principle 2. Student Accountability. Students are required to spend time studying the assigned material in-
dividually before class and then during class through interaction with their group members. When students come to class, they are tested on the material they have read. Then they take the same test as a group. This assures that students are accountable for their work. When students review and master the content through this process, they are prepared to use class time working on assignments aimed at strengthening their ability to apply the knowledge they have learned to clinical situations (which are presented in case scenarios or classroom activities).

**Principle 3. Team Assignments.** Team assignments must require group interaction. This principle can be fulfilled most effectively when assignments require teams to use course concepts to make decisions about complex clinical situations. However, the exercise must be structured so that teams report their decisions in a simple and parsimonious fashion. The principle here requires that team members work together on projects and not divide the work. Group interaction requires that most assignments be the same for all groups and that students are working together to come up with one solution.

**Principle 4. Feedback.** Feedback is important not only for learning but also for team development. After they take the Readiness Assurance Test, students receive immediate feedback. This allows students and faculty to be aware of how well students understand the content. With this immediate feedback during class time, faculty is able to instantly clarify any content that is unclear to students. Students are quickly able to apply this new or corrected information to more complex situations that build throughout the course.

**Application of Team-Based Learning to Health Science Education**

The diffusion of team-based learning into health science education (and in particular, into medicine) has grown in the past 4 years (Michaelson & Richards, 2005). Searle et al. (2003) received a 1-year grant from the Fund for the Improvement of Postsecondary Education (FIPSE) to pilot and evaluate team-based learning. Elements of this teaching strategy were applied to medical education taught in 11 different settings. Over an 18-month period, the FIPSE project supported 40 courses that ranged from preclinical to clinical medical education, one residency program, and three clinical courses in a physician assistant’s program. The percentage of time that team-based learning pedagogy was used in the courses varied from 0.5% to 100%. Although faculty generally expressed satisfaction with the strategy, the students’ responses were mixed (Searle et al., 2003). However, academic performance was equal to or better than performance when other teaching methods were used.

Team-based learning has been used successfully in different areas of required clinical medical courses. Haidet, O’Malley, and Richards (2002) implemented team-based learning for an internal medicine residency noontime lecture focusing on the evaluation and use of diagnostic tests. This required course had previously been lecture based. The faculty found that with the lecture format, medical residents rarely used evidence practice principles when ordering and interpreting diagnostic tests. However, with team-based learning, residents demonstrated using more evidence practice principles. Haidet et al. (2002) also found that students’ engagement was high, which was validated by the students and also by an outside observer. However, more meaningful to educators is that presurvey and postsurvey results demonstrated that the residents had increased their feeling of competence toward all content areas.

Hunt, Haidet, Coverdale, and Richards (2003) found similar results. They were also involved with teaching evidence-based medicine, but they were teaching 168 second-year medical students rather than residents. This team discovered that the majority of students demonstrated mastery of all objectives of the course, as evidenced by the final examination results. The class also had a high level of engagement, improving interactions among students and between students and the instructor. Faculty expressed satisfaction about this teaching method because it shifted the burden of content learning to out-of-class preparation and in-class group problem solving. However, students’ evaluations were mixed, largely because of the increased emphasis on out-of-class studying. Some students said they preferred the lecture format.

Levine et al. (2004) also collected data to support students’ perceptions that team-based learning activities were significantly more effective that traditional didactics. As a specific example, for a 6-week psychiatry clerkship, approximately 20 students per term participated in team-based learning for 8 one-hour sessions (Levine et al., 2004). Scores on the Classroom Engagement Survey, as well as on the Value of Teams Survey, demonstrated significant increases in engagement and improved attitudes toward the values of teams at the end of the clerkship when compared with pretest scores and with the scores of students who did not participate in the team-based learning experience (Levine et al., 2004). Most encouraging were the statistically significant increases in the National Board of Medical Examiners subject test scores that the team-based learning group demonstrated, compared with students who participated in the regular didactic format.
Because team-based learning has been shown to effectively increase student engagement with content assimilation similar to and sometimes greater than conventional teaching methods, the authors hope that use of this method might translate into better informed, more self-directed health care providers.

**PURPOSE**

As team-based learning is a new pedagogy, little is known about its effect on nursing student learning and, in particular, about how engagement in and active group participation influences students’ learning and grades. Therefore, the purposes of this study were to evaluate whether team-based learning improved our students’ experience of in-class engagement and their attitudes about the value of using groups for learning, compared with the experiences students would have had in the traditional lecture format. The study has two main research questions:

- Is there a difference in students’ engagement when team-based learning pedagogy is used versus when the lecture format is used?
- Is there a change in students’ attitudes about the value of teams after exposure to team-based learning?

**METHOD**

**Study Design and Sample**

The study uses two research designs to address the research questions. The first design was a group comparison used to evaluate team-based learning pedagogy versus the traditional lecture format on students’ perception of their individual engagement in class. Students in the Nursing Pharmacology course received the traditional lecture format, and all of the students in the Case Management course participated in the team-based learning pedagogy, as there were no other sections of the course that used different teaching methods. Although the content of the courses differed, they were chosen specifically to compare the effectiveness of the different teaching methods. During the semester under study, the Nursing Pharmacology course was the only course that was entirely lecture based, whereas the Case Management course was the only one to incorporate team-based learning. In addition, students took both courses simultaneously. Faculty delivering the team-based learning methods received formal training in the use and evaluation of the technique and taught only in the Case Management course.

The second research design, a pretest and posttest, was used to assess the change in the students’ attitudes about the value of teams after exposure to team-based learning. All students enrolled in a core nursing clinical course (Case Management) were eligible to participate in the study. Students who consented completed the Value of Teams Survey at the beginning and end of the semester. In addition, at the end of the semester, students were asked to evaluate their team’s process and performance.

The university’s institutional review board approved this study. Students were assured of anonymity because codes used to identify surveys were developed by the students (day of birth and the first three letters of the participant’s mother’s maiden name). Students were also informed that they could refuse to participate or withdraw from participation in the evaluation of the teaching methods in either course at any time without penalty to them or their course grade.

**Educational Intervention**

Team-based learning was used to teach four modules in an eight-module course called Case Management for Older Adults. This required course lasted 7 weeks, with approximately 70 junior nursing students enrolled. All four principles of team-based learning were integrated into the classes. To assure that students’ resources had been equally distributed among the groups, groups were divided using predetermined criteria related to work, parenting, and course load. These criteria were chosen by the researchers based on experiences with students and as one mechanism to create diverse groups and demonstrate that self-selected groups do not equally distribute the intellectual talents of the class (Michaelsen et al., 2004). Groups remained the same throughout the semester. A summary of the team-based learning components of the course is outlined in Table 2.

The pharmacology course that was offered during the same time frame as the team-based learning-based Case Management course ran for 15 weeks and had a traditional lecture-based format. The instructor for the pharmacology course was not involved in the Case Management course and was comfortable and skilled in delivering lectures.

**Instruments**

The 8-item, Likert-type Classroom Engagement Survey measures a student’s engagement during class (FIPSE, 2003). This tool was developed and tested only on the participants of the FIPSE team-based learning project before it was used in this study. Initial factor analysis demonstrated adequate validity (FIPSE, 2003). Total scores can range from 7 to 40.

In this study, Cronbach alphas were 0.80 to 0.89 at time 1 and time 2, respectively. For the two subscales learner’s participation (5 items) and learner enjoyment of class (3 items), Cronbach alphas were 0.80 and 0.81 at time 1, and 0.81 and 0.88 at time 2, respectively. The scale demonstrated high reliability in this sample of nursing students.

The 9-item, Likert-type Value of Teams survey measures a student’s appreciation of learning within a group (FIPSE, 2003). The tool was developed and tested with participants of the FIPSE team-based learning project. Total scores can range from 9 to 45. Initial factor analysis demonstrated adequate validity (FIPSE, 2003).

In this study, Cronbach alphas were 0.92 and 0.87 at time 1 and time 2, respectively. For the subscales working with peers (4 items) and value of group work (5 items), alphas were 0.84 and 0.88 at time 1, and 0.76 and 0.81 at time 2, respectively. The instrument showed high reliabili...
ity in this sample of nursing students.

Data Analysis
Descriptive statistics were generated to understand the distribution of responses to the items. Cross-sectional relationships between variables were explored using Pearson $r$ correlations. Group differences in engagement scores between the lecture and team-based learning format was assessed using a $t$ test. For the team-based learning pedagogy group, change in the value of team's scores between the first day and the last day of class was evaluated with a paired $t$ test.

Characteristics of Study Participants
All of the participants were undergraduate nursing students. The majority of students were women ages 20 to 24 years (62%), who were full-time students. The participants in the team-based learning pedagogy were enrolled in a required theory and clinical course and participants who were in the comparison lecture course were in a required nonclinical course.

RESULTS
Table 3 lists the comparisons between team-based learning pedagogy (Case Management course) and lecture format (Nursing Pharmacology course). Higher scores indicate more participation and enjoyment. There was a statistically significant increase in participation in the team-based learning subgroup compared with the lecture subgroup. There was also a statistically significant difference in enjoyment, with higher enjoyment in the lecture subgroup than in the team-based learning subgroup.

Table 4 demonstrates that students rated their attitudes about the value of teams relatively high, and this did not change significantly between the pretest and the posttest. Likewise, the peer and group subscales showed minimal change between the pretest and the posttest.

DISCUSSION
To the best of our knowledge, this study describes the experience of incorporating the team-based learning method into an undergraduate nursing course. Without increasing the numbers of faculty, we were able to incorporate small group experiences to increase classroom engagement, reinforce out-of-class learning, and facilitate students’ use of their newly acquired knowledge to solve complex clinical health problems.

Students who used team-based learning reported more in-class participation than did students in the lecture course. Student course evaluations suggested a mixed response to the team-based learning method: 33% liked it very much, 47% were neutral, and 20% did not like it. Students’ overall success in passing the course, as well as the distribution of grades, was similar to the outcomes of students in previous semesters, when the lecture method was primarily used. Although all of the students in the course using team-based learning achieved the learning objectives as evidenced by their course examination results, some students expressed fear that out-of-class learning without complementary lectures put them at risk for missing important content. Not having Power Point presentations to guide their studying was voiced as a disadvantage, and some students articulated more uncertainty about what they should focus on and learn. These concerns were expressed during class sessions in which the students had opportunities to discuss any concerns they were having at that time. The anxiety so many students experienced...
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about the preclass reading may account for the lower level of enjoyment that was evident compared with the comparable lecture course and the failure to generate changes in the attitudes about the value of teams.

After years of exposure to the lecture format, students may not have felt prepared to organize and summarize required readings in a meaningful and useful way for class preparation (Michaelsen, 2004). This possibility is certainly troublesome given that one important goal of all education programs is to develop lifelong learners. However, students did report that they actively prepared for their team-based learning classes more than they did for their lecture classes because of their desire to do well on the Readiness Assurance Tests.

LIMITATIONS

This study has several limitations. First, we were not able to compare how grades were affected with the team-based learning pedagogy because there was no suitable comparison group. The Case Management course was a new course combining two previously required clinical courses. Second, faculty were new at developing Readiness Assurance Tests and application exercises, which are the core of the team-based learning pedagogy, which may have influenced students’ satisfaction with this method. Finally, the long-term effects of the new teaching approach cannot be evaluated until the students graduate and complete their nursing board examination.

However, the results from this study did highlight important information on the benefits of team-based learning pedagogy over the traditional lecture format. Students in the team-based learning pedagogy were more engaged in the learning process and used more communication skills to express their arguments for an answer. This increase in communication abilities was evident to the researchers in the amount and distribution of dialogue with the instructors and other students throughout the course.

CONCLUSION

This study represents our first attempt to incorporate team-based learning into an undergraduate nursing course. Our study results support team-based learning as useful instructional pedagogy for teaching clinical content, as well as team building and communication skills to solve complex clinical problems. In addition, students using team-based learning met course objectives with fewer lectures and, unlike problem-based learning, the group activity learning did not require additional faculty. It has been our experience with team-based learning that it is a promising pedagogy that warrants additional study to ascertain the degree to which it can help nursing students improve and enhance their learning. As the health care system changes, requiring greater multidisciplinary team involvement, further research is needed to explore the effects of the team-based learning pedagogy on preparing students to work in a complex multi-team environment.

REFERENCES


