Student Engagement and Examination Performance in a Team-Based Learning Course
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ABSTRACT
With calls for innovation in nursing education from national bodies of nursing, nurse educators must determine the best teaching strategies to meet educational standards. Team-based learning (TBL), an innovative teaching strategy, offers educators a structured, student-centered learning environment. The purpose of this study was to compare TBL and traditional lecture (a commonly used teaching method) in regard to student engagement and performance on examinations. In addition, the relationship between student engagement and examination scores was examined. Findings showed significant differences in student engagement (p < 0.001). Analysis of examination scores indicated a significant effect within participants (p < 0.001). Mixed findings were found regarding the relationship between student engagement and examination scores. This research contributes to the body of knowledge related to TBL and suggests this teaching strategy is, at minimum, equally as effective as traditional lecture. [J Nurs Educ. 2013;52(8):475-479.]

Nurse educators face numerous challenges to equip students with the knowledge and skills to apply theoretical content in the clinical setting (Fink & Parmelee, 2008). Further complicating nursing education, these tasks must often be accomplished within short class periods and with large class sizes. In addition, the book Educating Nurses: A Call for Radical Transformation (Benner, Sutphen, Leonard, & Day, 2010), as well as similar appeals by the American Association of Colleges of Nursing, the National Council of State Boards of Nursing, and the National League for Nursing, has left nurse educators searching for teaching strategies that enhance student learning in the classroom and improve preparation for clinical practice.

Historically, traditional lecture has been one of the most commonly used teaching strategies (Di Leonardi, 2007). A major disadvantage of the traditional lecture is the lack of student engagement. Student engagement with content and with peers has been shown to enhance student performance and student satisfaction (Haidet, Schneider, & Onady, 2008; Parmelee, 2008). In an effort to enhance student learning and increase student engagement, several strategies, including the use of case studies, problem solving, and small-group discussions, have found their way into the nursing classroom. Another active learning strategy, team-based learning (TBL), which uses a structured cycle of preclass preparation, individual and team tests, and application exercises, has been used in a variety of disciplines but has had limited use in nursing education. Student engagement is a critical component of TBL and is summarized by Parmelee (2008), who stated that “for professional students to be engaged fully, challenged intellectually, … the TBL strategy holds the greatest promise in curriculum development” (p. 6).

TBL is an innovative, student-centered teaching strategy that uses small-group learning in a structured environment. Unlike other active learning strategies, such as problem-based learning, TBL requires only one educator to facilitate (Clark, Nguyen, Bray, & Levine, 2008). TBL was developed for use in the business course classroom in the late 1970s and has since been used in a variety of disciplines, including law, marketing, accounting, engineering, pharmacy, and medicine (Chad, 2012; Dana, 2007; Fink & Parmelee, 2008; Grady, 2011; Opdecam & Everaert, 2012; Vasan, DeFouw, & Compton, 2009; Yost & Lane, 2007). However, TBL has had limited use in nursing education, perhaps because much of the available literature is expository only. Consequently, nurse educators may be hesitant to adopt TBL in their classrooms until further research is available.
Purpose

Based on the small amount of available research regarding the use of TBL in nursing education and the widespread use of the traditional lecture method, the purpose of this study was to compare these two teaching strategies in regard to student engagement and performance on examinations. This study aimed to answer three main research questions:

- Is there a difference in student engagement between baccalaureate nursing students who are taught using TBL and those taught using traditional lecture?
- Is there a difference in examination scores between baccalaureate nursing students who are taught using TBL and those taught using traditional lecture?
- Does student engagement impact examination scores?

Overview of Team-Based Learning

TBL requires modifications to the course, the classroom environment, and the roles of both the educator and student. Ideally, the course is first divided into five to seven units of instruction. The structured TBL sequence, including the preparation, the readiness assurance process, and the application of course content (Table), occurs with each unit of instruction and may occur over several class periods (Michaelsen & Sweet, 2008). Teams are formed, typically during the first class period, and remain intact throughout the course.

The TBL cycle begins with preclass preparation, which may include readings or other assignments that students must complete before class. After the class begins, the readiness assurance process occurs. This process includes the completion of the Individual Readiness Assurance Test (IRAT) and the Group Readiness Assurance Test (GRAT). These tests consist of identical, multiple-choice questions based on the preclass readings. The students initially take the IRAT individually. Following the IRAT, students gather in their teams and take the GRAT using Immediate Feedback Assessment Technique (IF-AT) forms (available at http://www.epsteineducation.com/home/about/default.aspx). The forms, which are similar to a lottery ticket, allow the teams to scratch off their answer choice. If they do not answer correctly, they continue to scratch off options until a star is uncovered, signifying the correct answer. Although the IF-AT forms do not have to be used to incorporate TBL in the classroom, the immediate feedback provided to teams can be beneficial to their discussion and learning process (Michaelsen & Sweet, 2008). Following the completion of the GRAT, teams can appeal wrong answers by providing written, valid arguments to the nurse educator. If needed, the nurse educator can use class time following the readiness assurance process to answer any student questions. If students appear confused regarding course content or pose a question, the nurse educator can use the class time to have a discussion or mini-lecture to provide clarification. The next step in TBL is application of course content. Students remain in their teams and complete application exercises designed by the nurse educator. Discussion regarding application exercises can be conducted among the teams or with the entire class, based on the nurse educator’s discretion.

Method

Study Design and Sample

This study included two groups of baccalaureate nursing students at one midwestern university in the fall 2009 and spring 2010 semesters. The control group was taught using traditional lecture as the primary method of instruction and was composed of 74 nursing students enrolled in a community health nursing course during fall 2009. The experimental group (TBL group) was taught using TBL as the sole teaching strategy and was composed of 69 students enrolled in the course during spring 2010.

Following institutional review board approval, the purpose of the study was explained to the students, and they were invited to participate. Students were assured of confidentiality and also were informed that their decision to participate would have no impact on their course grades and that the data would not be viewed or analyzed until after final course grades were submitted.

Course Description

The course used for this study was a three-credit hour community health nursing course that met once per week. The course included nine objectives and consisted of six modules. Students took four course examinations throughout the semester. Students in the fall semester (control group) were taught primarily using traditional lecture, with the intermittent use of case studies, discussions, and small-group activities. The course was Web-enhanced using Desire2Learn®. Students could access the syllabus, calendar, module outlines, module study guides, course content, and their grades using Desire2Learn. The course was cotaught by three instructors, including the researcher (H.A.M.). The practice of coteaching is routine at the university where the study occurred.

Students in the spring semester (experimental group) were taught exclusively using TBL. For each module, students completed IRATs and GRATs based on the preassigned readings. The remainder of class time was used for application activities to provide deeper learning of the course content. As with the control group, Desire2Learn provided student access to the syllabus, calendar, module outlines, module study guides, course content, and their grades. The study researcher had actively participated as an instructor in a previous course using TBL and therefore provided sole instruction.

Because students did not have previous exposure to TBL, the first day of class was devoted to student orientation to the TBL process. This included a brief presentation about the ex-

### Table: Team-Based Learning Sequence

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<tr>
<th>Preparation</th>
<th>Readiness Assurance Process</th>
<th>Application of Course Content</th>
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<tbody>
<tr>
<td>Preclass</td>
<td>During class time</td>
<td>During class time</td>
</tr>
<tr>
<td>Individual test (IRAT)</td>
<td>Application of</td>
<td>Oriented activities</td>
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<tr>
<td>Team test (GRAT)</td>
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Note. IRAT = Individual Readiness Assurance Test; GRAT = Group Readiness Assurance Test.
pectations of the student and the instructor in TBL, the rationale for why the TBL strategy was chosen by the instructor, and a practice TBL session, including an IRAT, a GRAT, and an application exercise. The formation of heterogeneous groups was conducted by asking students a question such as, “Do you have an interest in community health nursing?” When students answered yes to a question, they assumed their place in a line. When all students were in line, they were assigned a number to form teams of five or six. Michaelsen and Sweet (2008) recommend orienting students to TBL, forming teams in class, and limiting groups to five to seven participants.

Instruments

The eight-item Classroom Engagement Survey was arranged in a 5-point Likert-type scale and measured student engagement during class. The survey, developed by members of the Fund for the Improvement of Postsecondary Education, has demonstrated adequate validity and reliability (U.S. Department of Education, 2003). In the current study, Cronbach’s alpha was 0.881. The two subscales—participation (five items) and enjoyment (three items)—each yielded Cronbach’s alphas of 0.807 and 0.873, respectively.

The 34-item Team-Based Learning Student Assessment Instrument was arranged in a 5-point Likert-type scale and consisted of three subscales (accountability, preference for lecture or TBL, and student satisfaction). This instrument was developed by the researcher due to lack of available instruments and has demonstrated adequate validity and reliability (Mennenga, 2012). Preliminary psychometric analysis had been completed prior to the use of the instrument in this study, with an initial Cronbach’s alpha of 0.952 for the 34-item instrument. Cronbach’s alphas for the subscales were 0.845 for the accountability subscale, 0.909 for the preference for lecture or TBL subscale, and 0.949 for the student satisfaction subscale (Mennenga, 2012). In this study, the Cronbach’s alphas were 0.935 for the total instrument, 0.745 for the accountability subscale, 0.893 for the preference for lecture or TBL subscale, and 0.914 for the student satisfaction subscale.

Procedure

During one of the final weeks of the fall semester, the control group (n = 74) was asked to voluntarily complete a short demographic form and the Classroom Engagement Survey. They were also asked to provide written consent authorizing the release of their four examination scores for the course. During one of the final weeks of the spring semester, the experimental group (n = 69) was asked to also voluntarily complete a short demographic form and the Classroom Engagement Survey. In addition, this group was asked to complete the Team-Based Learning Student Assessment Instrument and to provide written consent authorizing the release of their four examination scores for the course, their six IRAT scores, and their six GRAT scores.

In an attempt to increase the response rate, students who participated in the study were asked to fill in their name on a perforated section at the bottom of the consent form and enter their names into a drawing. The control group was entered into a drawing for a chance to win one of five $20 gift certificates to a local coffee shop or bookstore. Because students in the experimental group had to complete an additional survey, their names were entered into a drawing for a chance to win one of five $20 gift certificates.

Because the course instructor was also the researcher, many ethical considerations had to be considered. Students in both groups were assured that their decision to participate would not impact their course grade and that the consent forms and data would not be viewed or analyzed until final course grades were submitted.

Data Analysis

Data were analyzed using Predictive Analytics Software, version 17.0. Descriptive statistics were conducted, including the summing of the Classroom Engagement Survey and the subscale and total scores for the Team-Based Learning Student Assessment Instrument. Differences in engagement scores between the TBL group and the traditional lecture group were assessed using an independent t test. Repeated measures analysis of variance was used to analyze examination scores for the two groups. A Pearson correlation was calculated to examine the potential relationship between student engagement and examination scores.

Results

Sample

A total of 143 participants were included in the study sample; the control group was composed of 74 students (51.7%), and the experimental group was composed of 69 students (48.3%). The majority of participants were women (87.4%) between the ages of 20 to 22 years (91.7%).

Team-Based Learning Student Assessment Instrument

Only students in the experimental group completed the Team-Based Learning Student Assessment Instrument. Each subscale score and a total score were determined. On the accountability subscale, possible scores ranged from 9 to 45, with a higher score indicating a higher level of accountability. The subscale scores ranged from 23 to 44, with a mean of 35.5 (SD = 3.87). As a score of 27 was considered neutral, participants had a high level of accountability with TBL.

On the preference for lecture or TBL subscale, possible scores ranged from 16 to 80, with a higher score indicating a preference for TBL. The subscale scores ranged from 27 to 67, with a mean of 47.84 (SD = 9.63). As a score of 48 was considered neutral, participants were almost neutral in their preference for lecture or TBL.

On the student satisfaction subscale, possible scores ranged from 9 to 45, with a higher score indicating a higher level of satisfaction with TBL. Scores ranged from 14 to 41, with a mean of 30.29 (SD = 6.52). As a score of 27 was considered neutral, participants were generally satisfied with TBL.

A total instrument score was also calculated, with possible scores ranging from 34 to 170. A higher score indicated a more favorable experience with TBL. The scores ranged from 72 to 144, with a mean score of 113.2 (SD = 17.35). As a score of 102 was considered neutral, participants had a generally favorable experience with TBL.
Classroom Engagement Survey

All participants completed the Classroom Engagement Survey. A total score was calculated, with possible scores ranging from 8 to 40. A higher score indicated a higher level of engagement. In the control group, the participants’ scores ranged from 11 to 32, with a mean of 21.3 (SD = 1.97). In the experimental group, the participants’ scores ranged from 16 to 39, with a mean score of 30.03 (SD = 4.43). As a score of 24 was considered neutral, the control group did not feel engaged in the classroom, whereas the experimental group did feel engaged (Figure).

Research Question 1

Students using TBL reported higher levels of engagement (M = 30.03, SD = 4.43) compared with students who were taught using traditional lecture (M = 21.31, SD = 3.97). This difference was significant (t = –12.36, df = 140, p < 0.001).

Research Question 2

Examination scores for both groups were collected and compared at each of the four points throughout the semester. A significant effect was found among participants (F = 943.15; p < 0.001); however, results were not significant between participants (F = 0.009; p = 0.923).

Research Question 3

In examining the relationship between student engagement and examination scores, weak correlations that were not significant were found with two of the four examinations. A moderate positive correlation that was significant was found with examination one, and a moderate negative correlation was found with examination three. These findings indicate mixed results regarding the potential relationship between student engagement and performance on examinations.

Discussion

This study found that students using TBL are more engaged in the classroom setting—a finding that is consistent with the literature (Clark et al., 2008; Dana, 2007; Thackeray & Wheeler, 2006). However, although the students using TBL reported higher levels of engagement, the majority of students did not want to see TBL used in future classes. When students in the TBL group were asked if they would like more classes to include the teaching strategy, only 20 (29%) of the 69 students agreed with the statement. Although TBL engaged the students, they devalued its use in the classroom. In a study by Haidet, Morgan, O’Malley, Moran, and Richards (2004), students had a similar reaction. They also were more engaged when using TBL, but they also had lower perceptions of the value of the course.

The students also voiced strong concerns over the lack of lecture and having to “teach themselves.” As one student stated, “We have grown up learning with lecture and it was very difficult for me to switch to no lecture.” Another student stated, “I really like getting lectured to more than trying to teach myself.” Although some of this reluctance towards TBL may be attributed to the fact that it was the student’s first exposure to the teaching strategy, the literature also recognizes that students have been taught to learn passively and therefore may have difficulty adapting to active involvement in the learning process (Young, 2009).

These findings demonstrate students’ hesitance to adopt TBL as a learning strategy and also reinforce how unengaged students are in the traditional lecture classroom. Furthermore, these findings may also indicate how traditional pedagogies are entrenched in education, consequently creating students who expect to learn passively and struggle when faced with active learning.

Although findings from this study regarding examination scores do not suggest TBL to be better than traditional lecture, they do suggest that TBL is, at minimum, equally as effective as traditional lecture. In addition, the results may indicate that inaccurate measurements were used to evaluate the students. Because TBL focuses on the application of material, a clinical or simulation scenario may have been a more appropriate evaluation method. This is an alternative viewpoint from the current emphasis on examination scores and grade point averages; however, TBL requires a change in teaching strategy and may require a change to the student evaluation process as well.

Limitations

Limitations of this study include the small sample size at one college of nursing, which limits generalizability, and the limited instructor and student experience with TBL. To prepare for TBL instruction, the researcher shadowed another teacher using TBL to learn how to facilitate its use in the classroom. Although this experience provided a foundation for the new way of teaching, the researcher was still new at creating IRATs, GRATs, and application activities. In addition, students had not been taught using TBL prior to this experience. Therefore, both the novice level of the instructor in teaching TBL and the newness of the teaching strategy to students may have impacted student responses.

Conclusion

This study contributes to the body of research needed regarding the use of TBL in nursing education. The results of this
study indicate that students using TBL are significantly more engaged than students using traditional lecture. This is a critical finding at a time when national bodies of nursing are calling for dramatic transformation in nursing education in an effort to create student-centered learning environments. Although students using TBL reported higher levels of engagement than students using traditional lecture, other results were inconclusive. However, it is important to consider whether nursing students should be evaluated using traditional methods, such as examination scores and grade point averages. To truly transform nursing education, nurse researchers must look at alternative, perhaps more appropriate, methods of measuring student outcomes, such as student performance in a simulation scenario, clinical performance, or clinical ability as a registered nurse. Although this study provides further evidence that TBL can be an effective teaching strategy, additional research is needed to explore the impact of TBL on student outcomes, including student performance, comprehension, and recall of material.

References