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ARAŞTIRMA MAKALESİ/ORIGINAL ARTICLE

Learner Reactions and In-Class Engagement in Team-Based Learning Implemented in Nursing Education

Hemşirelik Eğitiminde Uygulanan Takım Çalışmasına Dayalı Öğrenmede Öğrenci Tepkileri ve Sınıf İçi Katılım

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Abstract

Background: There is a need for training strategies and programs to enable students to actively participate in their learning process by using critical thinking and decision-making skills.

Objective: The aim of this study was to compare the traditional lecture-based teaching with the team-based learning method in terms of student satisfaction and in-class learner engagement.

Method: This study was conducted using a quasi-experimental design. The population of the research consisted of first-year nursing students (n = 101). During half of the 16-hour course conducted by the researcher, team-based learning was used as the teaching method (intervention group, n=30), and lecture-based (control group, n=59) approach was employed for the remaining 8 hours. The in-class engagement measure was used to assess the in-class engagement of the students. A feedback form composed of five parts was made available to learners in order to reveal their reactions.

Results: In-class learner engagement scores and the number of questions asked both by the instructors and students were found to be higher in team-based learning sessions. In four basic feedback areas (preliminary preparation and readiness, discussion, teacher, and general), there was a statistically significant difference between the satisfaction scores of the students in favour of team-based learning. Satisfaction scores regarding the organization, infrastructure, and resources did not differ between team-based learning and lecture-based method.

Conclusion: The results have indicated that Team-Based Learning is an effective method for student satisfaction and in-class engagement. The high level of student participation in the lessons conducted with Team-Based Learning is compatible with the nature of method. The findings of the study have also shown that students are open to new methods and prefer learner-centered approaches that support in-class engagement.

Keywords: Team-Based Learning, Nursing Education, In-class Engagement, Learner Satisfaction

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Öz

Giriş: Öğrencilerin eleştirel düşünme ve karar verme becerilerini kullanarak öğrenme süreçlerine aktif olarak katılmalarını sağlayan eğitim stratejilerine ve programlarına ihtiyaç vardır.

Amaç: Bu çalışmanın amacı, geleneksel ders ve takım çalışmasına dayalı öğrenme yöntemini öğrenci memnuniyeti ve derse katılımı açısından karşılaştırmaktır.

Yöntem: Araştirma yarı deneysel desen kullanılarak gerçekleştirilmiştir. Araştırmanın evrenini hemşirelik birinci sınıf öğrencileri oluşturmuştur. Araştırmacı tarafından yürütülen 16 saatlik dersin 8 saatinde takım çalışmasına dayalı öğrenme yöntemi (girişim grubu, n=30), 8 saatinde ise geleneksel ders yöntemi (kontrol grubu, n=59) kullanılmıştır. Öğrencilerin derse katılımlarını değerlendirmek için "sınıf içi katılım formu", öğrencilerin geri bildirimlerini ve memnuniyetlerini belirlemek için beş bölümden oluşan "geri bildirim formu" kullanılmıştır.

Bulgular: Takım çalışmasına dayalı öğrenme oturumlarında öğrencinin derse katılım puanları ve hem öğretim üyelerine hem de öğrencilere sorulan soru sayısı daha yüksek bulunmuştur. Dört temel dönüt alanında (ön hazırlık ve hazırbulunuşluk, tartışma, eğitici ve genel) öğrencilerin memnuniyet puanları arasında takım çalışmasına dayalı öğrenme lehine istatistiksel olarak anlamlı bir fark bulunmuştur. Organizasyon, altyapı ve kaynaklarla ilgili memnuniyet puanları takım çalışmasına dayalı öğrenme ve geleneksel ders yöntemi arasında farklılık göstermemiştir.

Sonuç: Bulgular takım çalışmasına dayalı öğrenmenin, öğrenci memnuniyeti ve derse katılım için etkili bir yöntem olduğunu ortaya koymuştur. Takım çalışmasına dayalı öğrenme ile yürütülen derslerde öğrenci katılımının yüksek olması yöntemin doğası ile uyumludur. Çalışma bulguları öğrencilerin yeni yöntemlere açık olduklarını ve derse katılımı destekleyen öğrenen merkezli yaklaşımları tercih ettiklerini göstermiştir.

Anahtar Kelimeler: Takım Çalışmasına Dayalı Öğrenme, Hemşirelik Eğitimi, Sınıf İçi Katılım, Öğrenci Memnuniyeti

INTRODUCTION

Advancements in science and technology, as well as the production and transfer of massive amounts of information, have led to rapid changes in the field of healthcare (Branson, Boss and Fawler, 2015). Healthcare providers are supposed to adopt these changes to provide quality care (Currey et al., 2015). Nurses use critical thinking skills when determining best care practices and solving problems they encounter (Hung, 2013). Higher-order skills such as critical thinking and problem solving seem to be the basic skills to get adapted to developmental changes and to ensure safer and high-quality patient care (Currey et al., 2015). Teaching nursing students critical thinking skills have a great importance in training nurses who can provide quality care. Critical thinking skills enable students to use their knowledge and experience in the nursing field more efficiently and provide them with more effective decision making processes (Çalışkan et al., 2020). Therefore, there is a need for training strategies and programs to permit students to actively participate in their learning process by making use of critical thinking and decision-making skills (Hung, 2013; Kim et al., 2016).

Ensuring the learning engagement of students, which is one of the important components of the education process, is one of the main responsibilities of educators in nursing education. Traditional lecturing is a teaching method based on the instructor giving information to students through passive learning. Participation of students in educational activities is directly related to learning. Replacing traditional teaching approaches with student-centred methods can

positively affect student participation (Wolff et al., 2015). It is extremely important to ensure permanent learning by using modern education models, methods, and techniques. Various student-centred, problem- or practice-based strategies are used in nursing education, such as collaborative learning, problem-based learning, mastery learning models, web-based education, mobile applications, and simulation (Roca, Reguant and Canet; 2016; Jeppesen, Christiansen and Frederiksen; 2017). Team-Based Learning (TBL), one of the collaborative teaching methods, is a way of teaching that encourages students to think critically and solve clinical problems not only individually but also as a team, in addition to developing problem solving, effective teamwork and communication skills (Currey et al., 2015; Çalışkan et al., 2020; Oldland et al., 2017; Lee, 2018). There are also several studies showing that the TBL effects students' in-class engagement positively (Mennenga, 2013; Alimoglu, Yardim and Uysal, 2017).

The TBL is a learner-centred strategy led by the facilitator and has functions similar to Problem-Based Learning (PBL) (Cheng et al., 2014; Altintas and Alimoglu, 2012). The TBL approach encourages students to think critically and solve clinical problems both individually and as a team (Currey et al., 2015, Lee, 2018). Dr. Larry Michaelsen developed the TBL in a business curriculum in the 1970s. The first reported implementation of the TBL in health professions education was at the Baylor College of Medicine in 2002 (Haidet, O'Malley and Richards, 2002). Currently, the TBL is being used at schools of medicine, nursing, dentistry, pharmacy, residency programs, and continuing medical education (Reimschisel et al., 2017; Chen et al., 2018; Saadaldin et al., 2022; Burgess and McGregor; 2022).

Implementation of the TBL Approach

The TBL structure is characterized by four main phases: 1) advanced preparation by the students; 2) individual and group readiness assurance; 3) application, including team assignments, discussion, and feedback; and 4) peer evaluation process (Haidet, O'Malley and Richards, 2002; Michaelsen and Sweet, 2008; Parmelee and Michaelsen, 2010).

For the preparation phase, students are given sufficient time for self-study and are provided with required learning resources or recommended to use them (Altintas and Alimoglu, 2012). On the implementation day, the class starts with the readiness assurance phase. On the test called "the individual readiness assurance test" (IRAT), students first answer the questions individually. Then, the large group is divided into teams, with five to seven students on each team to take the group readiness assurance tests (GRAT). Each team answers the same questions used in IRAT by discussing and sharing opinions. The next step is the presentation of the responses by the teams and explanations given by the instructor about the test content. In the implementation phase, the exercises that build on the readiness materials are used to encourage students to engage with the content at a deeper and more meaningful level (Parmelee and Michaelsen, 2010). These exercises help students achieve the learning objectives through the careful evaluation of problems or cases that require critical thinking and investigation to come up with the best solutions (Haidet, O'Malley and Richards, 2002). Effective implementation exercises for team-based learning are generally conducted in conformity with the "4S" rules. First, implementation exercises should be designed around problems that are "significant" to the students. When students are able to attach

relevance and value to a problem, it becomes significant and meaningful to them, which leads to deeper learning. Second, teams should be working on the "same" problem since it will ensure that there can be discussions among teams, following the completion of the exercise. Third, teams should be required to make and defend a "specific" choice. This helps teams develop consensus-building and critical-thinking skills. Finally, teams should "simultaneously" report their choices to the class. This promotes team accountability and motivates teams to defend their answers; it also eliminates the phenomenon associated with sequential teams' answers, where the first team's answer has a potent effect on subsequent answers (Michaelsen and Sweet, 2008; Parmelee and Michaelsen, 2010). Team presentations, discussion by a large group, and feedback from the instructor are beneficial to learners for deeper learning. The implementation phase may be repeated with different assignments for the teams using various problems to achieve their learning objectives. Each team member evaluates the other students in the team at the end of the session(s), focusing on group dynamics such as the contribution of others to team performance, communication and collaboration skills (Haidet, O'Malley and Richards, 2002; Michaelsen and Sweet, 2008; Parmelee and Michaelsen, 2010; Parmelee et al., 2012).

TBL Approach in Nursing Education

Although the TBL is widely used in medical education, its implementation in nursing education has increased in recent years (Roh, Lee and Choi, 2015; Kang et al., 2016; Wong et al., 2017; El-Banna, Whitlow and McNelis, 2020). In a study conducted with nursing students, Kim et al. (2016) reported that the TBL is an effective teaching strategy to improve problem-solving ability, knowledge, and clinical performance. In another study conducted with second-year nursing students, it was determined that the TBL contributed significantly to teamwork and the academic performance of the students (Park et al., 2015). In a study performed among graduate nursing students, the TBL was found to encourage learning and improve academic achievement (Currey et al., 2015). Moreover, in a systematic review of studies on the effectiveness of the TBL in achieving learning outcomes in undergraduate nursing students, it was reported that the TBL was effective in achieving the learning outcomes of undergraduate nursing students (Alberti et al., 2021).

The effects of the TBL on knowledge or academic performance, student satisfaction, and team performances have been frequently reported (Currey et al., 2015; Kim et al., 2016; Parmelee and Michaelsen, 2010; Park et al., 2015). Its use in nursing education is very limited in our country (Tanrıkulu et al., 2018; Göktepe et al., 2018). It is thought that the use of the TBL method in nursing education will contribute to the development of important clinical skills by using the clinical experience, knowledge and problem-solving skills (Hung, 2013). In addition to developing problem-solving skills, class time can be used to improve core professional competencies such as interpersonal and teamwork skills. The TBL ensures that students are placed at the centre of the learning process (Mennenga, 2013; Altintas and Alimoglu, 2012). Due to its positive influence on group members besides increasing their self-confidence, learning motivation and learning responsibilities (Wolff et al., 2015; Altintas and Alimoglu, 2012), the use of the TBL as an effective teaching method is expected to increase with further studies. In addition, the results may add evidence for incorporating team-based learning into the nursing education curriculum.

It is known that active learning strategies encourage and improve in-class student engagement and student assimilation of content and concepts (Wolff et al., 2015; Mennenga, 2013). In learning environments where traditional lecture or student-centered teaching strategies are used, both students and educators assume different roles and responsibilities (Altintas and Alimoglu, 2012; Burgess and McGregor; 2022). Therefore, such environments require different student engagement. While students are passive recipients in traditional lessons, students are expected to be more active in TBL. Knowing whether different teaching methods support student engagement will guide educators in determining teaching strategies. Since there are limited studies investigating students' in-class participation in courses taught through TBL in nursing education in Turkey, the results of the study will contribute to filling the gap in this field. Student engagement was evaluated by two independent observers; the evaluation of both the students and the teachers has made the study original. In this study, the effect of the TBL on student satisfaction and learner engagement was evaluated.

Aim

The aim of this study was to compare the lecture-based approach and the TBL method in terms of learner satisfaction and in-class learner engagement.

Hypotheses of Research

$H_{0:}$ Team-based learning has no effect on students' engagement and satisfaction levels.

$H_{1:}$ Team-based learning is effective on students' class engagement and satisfaction levels.

METHOD

Type of the Research

This study has been carried out-with a quasi-experimental design.

Place of the Research

The study was conducted during the academic year of 2017/18 (between February and March 2018) with registered Fundamental of Nursing course 89 first-year students who were studying in the Nursing Faculty of a university.

Research Universe/Sample of the Study

The study sample was first-year students (n = 101). Of the entire sample, 71 students took part in the lecture group, and 30 students made up the TBL group. In the first lesson of the academic term, the students were informed about the application and volunteer students who wanted to participate in the study were included in the sample. Thirty volunteers who wanted to experience TBL sessions formed the intervention group, while the rest formed the control group. The students who missed any one of the lectures or TBL sessions, or who filled out the feedback form incompletely, were excluded from the study. Finally, a total of 89 students formed the study group (59 vs. 30 in the lecture and TBL groups, respectively).

Procedure

The "Fundamentals of Nursing" course is offered in both the fall and spring terms of the first year at a university's nursing faculty. In the fall semester (Fundamentals of Nursing I), some basic nursing skills, such as identifying vital signs or infection-related practices, are taught, whereas in the spring semester (Fundamentals of Nursing II), parental drug applications and organ system applications (digestion, excretion, urinary) are practiced. The "Fundamentals of Nursing II" course consists

of 60 hours of lectures, 60 hours of practice in the skills laboratory, and 120 hours of clinical practice in the hospital.

The first author of this paper has 16 instruction hours in the "Fundamentals of Nursing II". In the 2017/18 academic year, we decided to use the TBL as the instruction method for half of the period (8 hours), and lecture for the remaining 8 hours. The TBL and lecture-based methods were compared by means of the TBL (intervention) and lecture (control) groups. Each TBL session was carried out in 2 sessions for 4 hours and once a week. The topics of the TBL sessions were digestive system applications (4 hours) and excretory system applications (4 hours), while drug management (4 hours), death and mourning processes (2 hours), and blood transfusion (2 hours) were the topics of the lectures.

In the study, a modified TBL design was applied, omitting the peer evaluation phase (Figure 1).

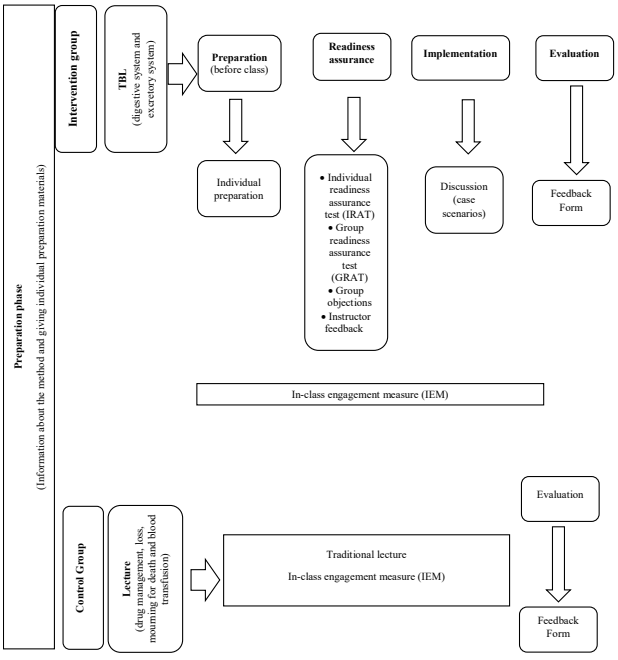

Figure 1. Study Design

Preparation phase: At the beginning of the semester, the students were informed about the TBL process. They were then provided with the self-study material and a list of learning resources prepared by the instructor, one week before the TBL session so that they could self-study the content.

Readiness assurance phase: The session started with an individual readiness assurance test (IRAT) in which the students answered the test questions individually. Following IRAT, the students were divided into teams to perform a group readiness assurance test (GRAT). The instructor formed the teams after IRAT according to the seating arrangement in the classroom formed by the students randomly. Generally, three students from the front rows and three students from the back rows were selected to build a team. We created five teams, including six students in each. In GRAT, the teams tried to solve the same test questions used in IRAT by discussing among team members to find the correct answer. On the readiness assurance tests, we used 10 multiple-choice questions (MCQ). After assurance tests, the instructor provided the correct answers and discussed each answer with the classroom to explain the reasons behind it. Additionally, the instructor gave brief theoretical information (5 minutes at most) about the subjects on which the students' knowledge was thought to be inadequate.

Implementation phase: Two written case scenarios prepared by the authors were used for team assignments in the implementation phase of each TBL session (two for the digestive system and two for the excretory system). The teams were supposed to identify the problems within the scenarios and then to propose solutions to those problems. All teams were engaged in the same assignment at the same time.

We delivered the scenarios one by one and reserved 30 minutes for the teams to discuss each case. At the end of the time reserved for a

scenario, each team prepared a written report, including their solutions and explanations, and delivered it to the instructor simultaneously. Then, a representative from each team presented the team's views and solutions to the whole class. All students asked questions and discussed the points they agreed or disagreed with the presenting team. At the end of each team's presentation, the instructor briefly clarified the case and provided some theoretical information if needed.

Peer evaluation: Since two half-day sessions were not regarded as a sufficiently long period to observe group dynamics, the peer evaluation phase was omitted in this study. Feedback from the students was obtained at the end of the session in a written form.

Data Collection Instrument-Validity and reliability information

We performed two half-day TBL sessions, each of which took four hours. The participants were instructed through the TBL method about the subject matters of digestive system and excretory system applications, while they were taught about drug management, loss, mourning for death, and blood transfusion with the traditional method. Since this was the first time students had been exposed to this learning strategy, it was taken into account that they might have anxiety about whether they could be successful in midterm/final exams. Accordingly, the TBL sessions were held before the day the subject was covered in the curriculum. Intervention group students who participated the TBL sessions on digestive and excretory system subjects did not participate in the traditional lectures about the same subjects. Drug management, loss, mourning for death, and blood transfusion, in which the traditional lesson method was used, were taught simultaneously to both groups. Feedback forms were anonymous to prevent any possible negative effect on the teacher-student relationship since one of the authors was also the teacher and assessor of the participants. All the students participating in the classes were randomly observed by independent observer pairs using an observation tool to determine their engagement levels in the classes.

In-class engagement and student satisfaction with the instruction method were accepted as parameters to compare the outcome of instructing lectures and TBL. In-class learner engagement was determined by using a written observation form. A feedback form was used to identify learner reactions to instruction methods. Additionally, in order to test whether or not in-class learning was ensured in a learner-centred approach, IRAT and GRAT scores of the TBL were compared to see if any improvement occurred in favour of group performances.

Data Collection Tools

In-class engagement measure

This is a written form for observing and recording the behaviours of the instructor and four randomly selected students as snapshots for a 5-minute cycles in classes. The in-class engagement measure (IEM) was created based on a previously developed observation tool called The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) (O'Malley et al., 2003) and validated in a study conducted among Turkish medical students (Alimoglu et al., 2014). Instructor and student behaviours were scored between 1 and 5 on this tool. The IEM scores were parallel to the degree to which the behaviour contributed to active student engagement, so that higher scores for student and instructor behaviours were associated with more in-class learner engagement. Additionally, the number of questions asked by the instructor and students was recorded. A sample of the IEM

is provided in Appendix 1.

Observation process: The observers were trained in observation procedures, descriptions of observable behaviours, and how to select individuals to observe. The observation unit was a 5-minute cycle in both groups. The cycle proceeds as follows: First, the observer writes the starting time of the cycle and information about the class (title, instructor's name, and the number of students). Next, the observer selects a student from the class and observes the learner for 20 seconds, marking the type of engagement the learner exhibits. These observations are performed four times with different students in succession. The observer also observes the instructor and records the instructor's behaviour. Then, for the remainder of the STROBE cycle, the observer tallies the number of questions asked by all students-not only the observed ones-and the instructor to get an idea of the learner to learner and learner to teacher interaction level that can be an indicator to show in-class learner engagement degree (Alimoglu, Yardim and Uysal, 2017; Ozgonul and Alimoglu, 2019). According to Alimoglu et al. (2014), in the validity study of the observation form, which was developed to determine the students' level of participation in the course and the behaviour of the instructor and students, inter-rater reliability analysis was performed using Cohen's statistics to determine inter-observer consistency. The rate of agreement between observers in the instructor behaviour scores was 93.7% with the coefficient .87 (p = .000, 95% *CI* .801- .914); in the observed student behaviour scores, the agreement between the observers was 80.6% with the coefficient .71 (p = .000, 95% *CI* .507- .783). A Pearson correlation analysis was performed to show the relationship between the behaviour scores of the instructor and students. A moderate and significant relationship was found between the instructor and student behaviour scores (r = .623, p = .000).

Observers independently selected the students, observed, and marked their behaviours separately. On the whole, the classroom was divided into two, and observers selected the students from their section. They were asked not to observe the same student repeatedly, if possible.

Feedback Form

This form was used in the research to evaluate the satisfaction levels of the students. The form is composed of five parts: (1) organization, infrastructure, and resources (three statements); (2) preliminary preparation and readiness (two statements); (3) discussion (two statements); (4) teacher (three statements), and (5) general (six statements). The students scored each statement on a five-item Likert-type scale between 1 (absolutely not agree) and 5 (absolutely agree). There is also a part which collects age and gender data at the top and an open-ended part for comments at the bottom of the form (Appendix 2). For the first time, Alimoglu, Yardim, and Uysal (2017) switched to the team-based learning (TBL) method to teach "polyneuropathies" in their neurology internship (2014–2015 academic year). Since the TBL was a new methodology for students, a comprehensive feedback form was created by the authors to get more detailed feedback from students. The created form was then used to receive student feedback in the courses conducted with the TBL method at the Faculty of Medicine (Ozgonul and Alimoglu, 2019). In our study, it was preferred to use this form, which had been used before with different student groups.

Data Analysis

We used descriptive statistics to determine the mean and median values. The student's t-test

was used to investigate the difference between engagement and satisfaction scores in two groups. A repeated measure analysis of variance (ANOVA) test was used to explore differences between IRAT and GRAT scores. For statistical significance, p .05 values were used.

Ethical Aspect of the Research

Ethical approval for the study was granted by the a university's board of ethics on non-invasive clinical human studies (Ethics committee, reference number: 21.02.2018/143). Students were informed about the study. A written voluntary informed consent form was received from the students. Permission for use was obtained from the authors of the in-class engagement measure and the TBL feedback forms used in the study. Research and publication ethics were followed in the article.

RESULTS

The mean age of the participants was 18.9 ± 1.02 and 71% of the students were female.

IRAT/GRAT Score

Mean IRAT scores were 5.12 ± 1.3 and 4.40 ± 2.7 in TBL sessions for the digestive system and excretory system, respectively. In GRAT, these scores increased to 6.25 ± 0.8 for the digestive system (repeated measures ANOVA, Bonferroni correction test, p = .002) and 6.33 ± 1.3 (repeated measures ANOVA, Bonferroni correction test p = .027) for the excretory system.

In-Class Engagement

In-class learner engagement scores and the number of questions for both of the instructors and students were found higher in TBL sessions compared to lectures (Table 1).

Table 1. Comparison of TBL and Lectures Regarding In-Class Engagement Scores

	TBL	Lecture	*p**
Observation scores			
Digestive System			
Instructor	3.65 ± 1.4	1.05 ± 0.3	< .001
Student	3.29 ± 1.3	2.33 ± 0.9	< .001
Excretory system			
Instructor	3.75 ± 1.4	1,10 ± 0.4	< .001
Student	3.33 ± 1.3	2.27 ± 0.6	< .001
Number of questions			
Digestive System			
Instructor	2.39 ± 1.3	1.20 ± 0.9	< .001
Student	3.24 ± 1.1	2.54 ± 0.86	< .001
Excretory system			
Instructor	2.66 ± 1.8	1.90 ± 0.9	< .001
Student	3.64 ± 1.4	2.04 ± 0.65	< .001

*student-t test

Student Satisfaction

In four of the five basic feedback areas (preliminary preparation and readiness, discussion, teacher, and general), there was a statistically significant difference between satisfaction scores of the students in favour of the TBL. Satisfaction scores about the organization, infrastructure, and resources did not differ between the TBL and lecture (Table 2).

The answers given to the open-ended questions of the feedback form based on the teamwork were generally positive in terms of students' satisfaction levels. They stated that it would be more fun and active to do it with larger groups. Particularly, they stated that the cases discussed in the discussion section contributed to the permanence of their learning. On the other hand, there were minor complaints about the self-study material. The participants were of the opinion that the materials given for pre-lesson preparation should be more explanatory.

Table 2. Comparison of TBL and Lectures Regarding Student Satisfaction Scores

	TBL	Lecture	*p**
Digestive System			
Organization, infrastructure, and resources	4.25 ± 0.6	4.08 ± 0.5	.223
Preliminary preparation and readiness	4.33 ± 0.7	3.97 ± 0.7	.019
Discussion	4.92 ± 0.1	4.15 ± 0.8	.001
Teacher	4.89 ± 0.2	4.48 ± 0.5	.004
General	4.85 ± 0.3	2.72 ± 0.7	.001
Excretory system			
Organization, infrastructure, and resources	4.22 ± 0.4	3.95 ± 0.5	.084
Preliminary preparation and readiness	4.46 ± 0.4	4.00 ± 0.7	.001
Discussion	4.92 ± 0.2	4.12 ± 0.7	.001
Teacher	4.94 ± 0.1	4.44 ± 0.6	.003
General	4.85 ± 0.3	2.66 ± 0.8	.001
Overall	4.66 ± 0.3	3.86 ± 0.6	.001

*student-t test

DISCUSSION

This study was carried out to compare the TBL method and lecture-based teaching in terms of in-class learner engagement and learner satisfaction of the nursing students who took the Nursing Principles course. We would like to discuss our findings regarding learner engagement and learner satisfaction of the TBL compared to lectures.

Learner engagement

Any learner-centred approach requires students to take responsibility for their learning and participating in the learning process actively, preferably in small groups (Burgess and McGregor; 2022; Bate et al., 2014). In the TBL process, self-study material was provided to the students so that they could get prepared for the class. In order to assure that the students were prepared, the class started with IRAT. In this study, even though some students stated that the material was insufficient, the mean IRAT scores attained by our students indicate that they prepared for the class by studying the learning material on their own to some degree. Otherwise, their scores would have been much lower than they attained in IRAT. Considering the nature of the assessment material (MCQ with five options), a mean score around "two" would be expected for 10 MCQs if none of the students had prepared for the class. However, the mean IRAT scores in this study were around five and this indicated that the students had taken responsibility for their learning and studied the material on their own before they came to the classroom. Tanrıkulu et al. (2018), in their study with 165 first-year nursing staff, reported that the students' readiness point averages in a team-based learning application group were found to be significantly higher than their individual readiness point averages. Similarly, it was seen in the international literature that students' group readiness scores were significantly higher (Wong et al., 2017; El-Banna, Whitlow and McNelis, 2020; Sakamoto et al., 2020). After coming together in teams, students increased their scores in GRAT by discussing with their teammates and still taking responsibility for their learning. Parallel to our study findings, Göktepe et al. (2018) study results showed that group discussions of TBL design not only helped students develop better teamwork skills, but also skills such as respecting others' opinions, active listening and collective decision-making,

influencing, persuading and negotiating. This process helped them to teach and learn together. Working as a team, sharing opinions between the team members seems to be helpful in enhancing and consolidating their knowledge. High GRAT scores are an important contribution of the TBL design, as it makes students more responsible and active while preparing for the lesson. An action research study (2018) conducted to determine the contribution of TBL to the learning experience of students participating in the nursing leadership course revealed that Readiness Assessment Tests (RAT) increased participation in the course, increased interest in the course, ensured better retention of the learned content, and made it easier to prepare for exams (Göktepe et al., 2018). On the other hand, in the lecture-based approach, there is no self-study material for students to support their readiness for learning. Additionally, there is no measurement to determine the readiness level of the students at the start of the class. In the TBL, taking responsibility for learning continues throughout the class with team activities, while the students are generally passive receivers in lectures. TBL provides a positive learning environment as teamwork creates strong group dynamics, offers shy students the chance to voice their opinions in group discussions, and strengthens mutual trust among team members (Göktepe et al., 2018).

Active student participation in the learning process (in-class learner engagement) is another characteristic of learner-centeredness. In our study, we measured the in-class learner engagement of our students in TBL and lecture using IEM. The students were found to be much more engaged in the class in the TBL method compared to lecture-based approach. The results of the studies about in-class learner engagement in the literature are similar to this study. In a quasi-experimental study conducted with third-year medical students (n=84) who attended the rheumatology course for the first time, it was determined that the students' in-class engagement was significantly higher in the TBL group (Faezi et al., 2018). Regardless of the type of the measurement tool, all studies indicate higher levels of engagement in TBL than in lectures (Alimoglu, Yardim and Uysal, 2017; Cheng et al., 2014; Faezi et al., 2018; Tai and Koh, 2008; Cheng at al., 2014 (b); Mennenga, 2013). The IEM has some advantages against self-administered tools used in the majority of other studies. First, IEM is based on observation by two independent observers, not self-responses of the participants. The second advantage is IEM evaluates not only the learner but also the teachers. Since the learner-centred approach requires appropriate learner and teacher behaviour together, a tool considering both sides like IEM seems to be more valid.

Learner Satisfaction

In Kirkpatrick's four-level program evaluation model, learner reactions are stated in the first level (Frye and Hemmer, 2012). Having the opinion of learners about the program is one of the simplest ways to determine whether the program is effective or not. In this study, overall satisfaction levels of the students in the TBL sessions were found to be significantly higher than in lectures. Our results are compatible with those reported in the literature (Kang et al., 2016; Tanrıkulu et al., 2018; Sakamoto et al., 2020; Dearnley et al., 2018). Satisfaction scores of our study group about the organization, infrastructure, and resources did not differ between the TBL and lecture-based approach as expected since we used the same learning environment and resources for both methods. We would especially like to underline the difference between student satisfaction scores about two methods regarding the "teacher" section of the feedback form. The students found the teacher significantly more effective in the TBL, although the teacher invested less effort compared

to the lecture. This is a promising finding for the TBL to be used wider in the future.

The nature of the TBL fits well into the principles of andragogy. Some studies suggest that andragogy is related to learner satisfaction (Ekoto and Gaikwad, 2015). According to one principle of andragogy, adult learners will be motivated better when they see the relevance between theory and practice (Taylor and Hamdy, 2013). In the TBL method, the students are supposed to deal with some scripts and problems of real life in the "implementation" phase. Consequently, the students can easily comprehend the connection between the knowledge they gain and the implementation of this knowledge in the practice of nursing. Some answers given to the open-ended questions support this suggestion. A systematic review of the effectiveness of the TBL in achieving learning outcomes in undergraduate nursing students found that the opinions of the students about the TBL method are generally positive (Wong et al., 2017). Similarly, although there are studies indicating that students are generally satisfied with the TBL, they did not particularly report enough satisfaction to prefer the TBL over traditional courses (Tai and Koh, 2008). Researchers have attributed student dissatisfaction to the fact that they attended a TBL session for the first time and to the intense and challenging process of the TBL. Besides that, an approach requiring more in-class engagement and practice may threaten the comfort zone of the learners who are used to the comfort of traditional lessons that necessitate minimal contribution to the learning activity. This might be another reason for the student dissatisfaction reported in other studies. In order to prevent worries against the TBL, providing students with detailed information, including expectations about individual and group performances, will be helpful.

An increasing number of studies have been found to have focused on the effectiveness of the TBL in undergraduate courses in health. It has been observed that our results regarding the readiness test results, student satisfaction with the TBL method and their participation in the course are similar to the results of the current literature. The TBL is still applied in the faculty where this study was conducted. In line with the feedback received from the students after the lessons with the TBL, it can be said that the students were quite satisfied with the discussion section. In the implementation phase of the TBL (discussion), students stated that they felt the need to come to class prepared out of a sense of responsibility towards their teammates, which was important. We believe that the TBL increases learner to learner interaction, encourages active teamwork and student participation in the lesson. Further research is recommended to confirm the findings of the current study and to evaluate other possible positive effects of the TBL and its effectiveness in achieving learning goals.

Limitations

The first limitation of the study is about generalizability. It is not possible to generalize the results of a study performed with the limited number of students taking a single course during an academic year in a single nursing school. The second limitation of the study is its design. In its current design, we cannot have any ideas about the long-term effects of the TBL method, such as knowledge retention or transfer of gained knowledge and skills to practice. Peer evaluation encourages students to contribute positively to group problem solving and learning, and helps to ensure student accountability. However, the lack of peer evaluation in our study is a limitation of the study. Another limitation of the study is that the student interaction between the TBL group and the lecture group was not prevented. This might have affected the student satisfaction levels

in the lecture group. The final limitation is that this study does not give any information about the contribution of the TBL method or the lecture-based approach to the academic achievement (for example, exam scores) of the students.

IMPLICATIONS FOR PRACTICE

The study compared the traditional education and team-based learning method in terms of student satisfaction and in-class engagement and its findings suggest that TBL may be an effective method in nursing education in terms of student satisfaction and classroom participation. The study found that students' overall satisfaction levels in TBL sessions were higher than in traditional courses. Students found the lessons conducted with TBL sessions to be more fun and active. In the teacher's dimension of the measurement tool that evaluates student satisfaction, it was determined that students satisfaction levels were higher with the courses conducted with TBL. In addition, students stated that the cases discussed in the discussion section of TBL contributed positively to the permanence of learning and that more explanatory materials should be provided prior to class . When examining student engagement in the course it was determined that the number of questions asked to both faculty members and students was higher in TBL sessions.

It is recommended that active-learning methods that will increase student satisfaction and in-class engagement be integrated into nursing curriculum programs. Strategies such as providing comprehensive study materials and incorporating multimedia elements can further improve TBL effectiveness. For successful implementation, trainers should be competent in the method and have the qualifications to manage group dynamics. The creation of suitable physical conditions is important for the effectiveness of the method. Multicenter and longitudinal studies are needed to better understand the short and long-term impacts of TBL on learning outcomes in nursing education. This study may also serve as a guide for those planning to implement the TBL method in nursing education programs.

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Additional files

Appendix 1: In-class Engagement Measure (IEM) 5 minute observation form

Date and hour:

Observer's name:

Class title:

Instructor's name:

Number of students:

Special notes:

BEHAVIORS

Instructor

1- Talking to entire class while all the students are passive receivers t

2- Telling/asking to one or a group of students, or teaching/showing an application on a student

3- Starting or conducting a discussion open to whole class, or assigning some students for some learning tasks

4- Listening/monitoring actively discussing one or a group of students

5- Listening/monitoring actively discussing entire class

Other:

Number of questions Student: Instructor:

Comments:

	Student 1	**Student 2**	**Student3**	**Student4**
1. Engaged with non-educational material / browsing a book/notes/ whispering to a friend etc.				
2. Reading or writing something (maybe following the lecture from a published material or taking notes)				
3. Listening to the instructor or a talking student/looking at slides or board				
4. Talking to the instructor/ reading something to entire class or writing something on the board, flipchart etc.				
5. Talking/discussing with one or a group of students on the subject matter				
Other:				

Appendix 2: Student Satisfaction Feedback form statements.

Age:……..

Gender: ( ) Male ( ) Female

Organization, infrastructure, and resources

1. Information given at the start of the semester about how classes run was sufficient to understand my responsibilities as a student.

2. The classes/ sessions (duration, break time, exams, discussion process, etc.) were all well-organized.

3. Physical conditions in the learning environment were suitable.

Preparation and readiness

4. Self-study materials provided or recommended at the start of the semester were comprehensive enough to gain required knowledge.

5. I came to the classroom prepared for the class by reading the self-study material.

Discussion

6. Discussing all possible solutions facilitated the learning.

7. This class helped us to show more systematic and logical approach to the patient.

Teacher

8. The teacher helped us to better comprehend the subject by providing feedback, discussion, and explanations.

9. The teacher supported our learning as much as she did in her other classes.

10. The teacher managed the whole class process successfully.

General

11. This class increased my interest in fundamentals of nursing.

12. I understood this class better than other fundamentals of nursing classes.

13. I focused on this class longer than other fundamentals of nursing classes.

14. I participated more actively in this class than other fundamentals of nursing classes.

15. I think that the knowledge I gained in this class will be more permanent than that I gained in other classes.

16. Overall, I am satisfied with this class.

Comments: