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THE EFFECTIVENESS OF IMPLEMENTING TEAM-BASED LEARNING IN IMPROVING LEARNING OUTCOMES OF NURSING STUDENTS: LITERATURE REVIEW

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ABSTRACT

Learning methods are considered to be a factor in improving nursing student learning outcomes. The pedagogy currently used greatly limits the role of students in taking an active role in class, has high costs, and limits the number of student ratios. Learning methods are needed that can increase student interest in class, and work together in teams, and are able to influence academic performance, such as the Team-Based Learning (TBL) method. Objective: To evaluate the effectiveness of implementing TBL in improving nursing students learning outcomes. Method: The design of this research is a literature review. Article searches used Pubmed, Proquest, ScienceDirect, Cochrane Library, and Scopus databases. The research questions are structured using the PICO method, and keywords are based on Boolean combinations. There were 4083 articles found, and only 6 articles included were in accordance with the research questions. published from 2016-2021. Results: The results of critical analysis of articles that include the application of TBL to nursing students can significantly improve academic achievement, knowledge, clinical performance, learning attitudes, problem solving, critical thinking, learning attitudes, and learning experiences. Conclusion: Implementing TBL can improve nursing students' learning outcomes. Therefore, the TBL method can be recommended in nursing education.

Keywords: nursing students; learning outcomes; team-based learning

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INTRODUCTION

Nursing student learning outcomes are an indicator in determining student competency achievement. Where learning methods are considered to be a factor in improving nursing student learning outcomes (Kang et al., 2016). Therefore, nursing education authorities strive to improve student learning outcomes by incorporating various pedagogical modalities, including action learning into nursing curricula and courses (S.-M. Kim & Park, 2016). The pedagogy currently used greatly limits the role of students in taking an active role in class, has high costs, and limits the number of student ratios such as Teacher Center Learning and

Problem-Based Learning (Cheng et al., 2014). Therefore, learning methods are needed that can increase student interest in class, and work together in teams, and are able to influence academic performance. One method that can be used is Team-Based Learning (TBL) (Ofstad & Brunner, 2013).

TBL is a learning method developed by Larry K. Michaelsen at the University of Oklahoma in 1970, based on teamwork, deep reasoning and critical thinking (Sobral & Campos, 2012). This method allows students to be stimulated to develop, process and discuss. as a result, increasing their intellectual abilities in a particular subject (Sakamoto, Dell'Acqua, et al., 2020). Furthermore, TBL can be implemented in large classes (>100 students) with one instructor, reducing educational costs and increasing students' independent learning abilities and class engagement (H. R. Kim et al., 2016). In addition, TBL has been widely applied in nursing education because it effectively improves the quality of academic education, such as developing interprofessional communication and collaboration competencies, as well as independent learning (M. E. Kim & Kim, 2021).

Several studies have explained the effectiveness of implementing TBL in nursing students. According to Kang et al. (2016), TBL learning in nursing students can improve learning attitudes, academic achievement, and student readiness in carrying out nursing simulations. Furthermore, the application of TBL to a graduate nursing program found that students were satisfied with the team experience, quality of learning, clinical reasoning abilities and professional development (Currey, Eustace, et al., 2015). However, according to Dearnley et al. (2018), suggests that faculty and students need to understand the processes involved in TBL and why those processes must be adhered to in an effort to improve student experiences and outcomes in higher education. TBL is an appropriate active learning method to be applied to nursing students because it can increase student activity in learning, competency and learning outcomes of nursing students. However, research related to the application of TBL to nursing students in evaluating learning outcomes is still rarely conducted. Therefore, we conducted a literature review to summarize, evaluate, and describe the effectiveness of implementing TBL in improving nursing students learning outcomes.

METHOD

This research uses a Literature Review design

Search Strategy

The literature search for this article used 5 electronic databases, namely Pubmed, Proquest, ScienceDirect, Scopus, and the Cochrane Library. Meanwhile, keywords are based on Boolean combinations (Table, 1).

Table, 1.
Keywords PICO

P	"Nursing Students" OR "Nurse Students" OR "Baccalaureate Nursing Students" OR "Undergraduate Nursing Students"
I	"Team-Based Learning" OR "Team Based Learning" OR "TBL"
C	-
O	"Learning Outcomes" OR "Competence"

Article Criteria

This article's questions were prepared using the PICO method (Population, Intervention, Comparison, Outcomes) (Eriksen & Frandsen, 2018). The PICO in this research is P: Nursing Students, I: Team-based learning, C: -, O: Learning outcomes. Meanwhile, the inclusion criteria for this review article are (1) focus on the application of team-based learning, (2) to

evaluate nursing student learning outcomes (3) type of intervention research, (4) published in English, and (5) published in the last 10 years. The research question in this article is how effective is the implementation of team-based learning on nursing student learning outcomes?.

Article Selection

In this article, 4083 articles from 5 databases were identified. Next, the articles are screened by all researchers. In the articles that have been identified, 1088 articles were excluded due to double publication, 2113 articles were excluded because they did not match the title and abstract. Then, 817 articles were excluded because they did not match the research questions, 46 articles were excluded because they were not research results, and 3 articles were excluded because they did not use English. There were 6 articles included in this study, namely articles with intervention research (Figure, 1).

Data Extraction

All authors contributed to data extraction and categorization. In this study, the data extracted in each article is the name of the researcher and country, research design, objectives, sample size, intervention, instruments, and research results (Table, 2). Methods in each article were identified, categorized into themes, summarized and synthesized systematically.

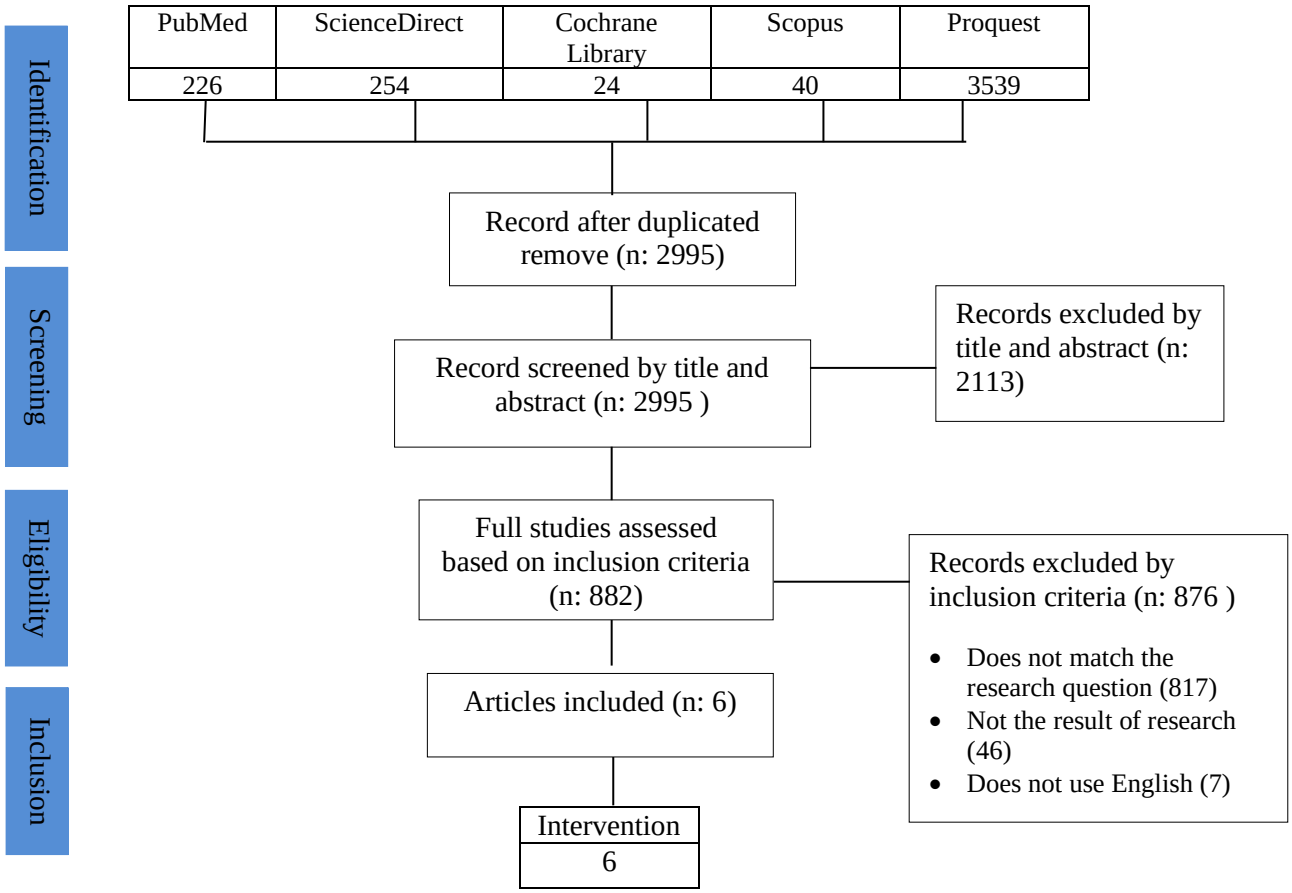

Figure 1. Flow diagram for selection of included studies

RESULTS

Characteristics Study

This literature review is to analyze the application of team-based learning in nursing education, and there are 6 related studies included. The six studies were conducted in South Korea, England, Brazil and China. published from 2016-2021. Five studies used quantitative

research and one study used mixed research. Each intervention is implemented for 3 weeks to 3 months of learning. All respondents in this study were nursing students with a sample size of 28-197 respondents.

Intervention

The 6 articles included, there were 5 articles that divided respondents into intervention and control groups (Kang et al., 2016; H. R. Kim et al., 2016; Lee, 2018; Sakamoto, Dell'acqua, et al., 2020; Xue et al., 2021). Meanwhile, 1 article divided respondents into teams consisting of 5 to 10 respondents receiving TBL (Branney & Priego-Hernández, 2018). Several studies explain the stages of implementing TBL. Research conducted by Kang et al., (2016) applies TBL through 3 stages, namely the preparation, implementation and assessment phases. Apart from that, the implementation of TBL is adjusted through 6 stages, namely pre-class preparation, readiness assurance, concept application, peer evaluation, and methodology evaluation (Sakamoto, Dell'acqua, et al., 2020). Furthermore, Xue et al. (2021), also explains the application of TBL using 3 stages, namely active learning, classroom activities, and application training.

Academic Achievement

There are 2 articles that discuss the academic achievements of nursing students. The application of TBL in newborn care simulations can improve the academic achievement abilities of lower achieving students. although it is not significantly different for students who have higher achievements, the academic achievement of students who apply simulation and TBL is higher than those who only receive simulation (Kang et al., 2016). However, in assessing exam results, students who received TBL learning were no better or worse than those who took traditional lectures (Branney & Priego-Hernández, 2018).

Learning Attitude

There are 3 articles that discuss nursing students' learning attitudes. The application of TBL can improve the learning attitudes of higher and lower achieving students compared to those who only receive simulations. Students are also better prepared for learning who receive TBL (Branney & Priego-Hernández, 2018; Kang et al., 2016). Additionally, nursing graduate students who received TBL experienced improvements in independent learning compared to students who received lecture lectures and small group discussions (Xue et al., 2021).

Knowledge

There are 2 articles that discuss nursing students' knowledge. The application of TBL to nursing students can increase students' knowledge compared to those who receive traditional lectures and case studies (H. R. Kim et al., 2016). In addition, although there was no significant difference in the application of TBL and lectures, nursing students who received TBL answered more correctly than those who took lecture lectures (Sakamoto, Dell'acqua, et al., 2020).

Learning Experience

There are 4 articles discussing the learning experiences of nursing students. Implementing TBL improves students' learning experiences and engagement in class (Xue et al., 2021). Furthermore, although TBL did not show a significant difference in classroom leadership, TBL increased accountability, communication, and satisfaction of nursing students. Students also prefer TBL to traditional lectures. In addition, students feel TBL is a fun and positive learning method (Branney & Priego-Hernández, 2018; Lee, 2018; Sakamoto, Dell'acqua, et al., 2020).

Sloving Problem

There are 2 articles that discuss solving nursing student problems. Students who received TBL had significantly higher problem solving abilities than those who received traditional lectures and case studies (H. R. Kim et al., 2016; Lee, 2018).

Critical Thinking

There is 1 article that discusses critical thinking of nursing students. The application of TBL to nursing students is considered to have no significant value in improving critical thinking skills compared to those who receive lecture lectures. However, students who received TBL had a higher average critical thinking ability score than those who received lecture lectures after the learning process (Lee, 2018).

Clinical Performance

There are 3 articles that discuss the clinical performance of nursing students. The application of TBL to nursing students who take part in pulmonary nursing care simulations can significantly improve nursing students' clinical performance abilities (H. R. Kim et al., 2016). However, the application of TBL in infant nursing care simulations was not found to significantly increase the clinical performance of students compared to those who only received simulations (Kang et al., 2016). In addition, although the application of TBL compared to lecture classes was considered not significant on the clinical competence of nursing students. However, the average clinical competency score of students increased more than those who received lecture classes (Lee, 2018).

Instrument

The instruments used to evaluate TBL are the Team-Based Learning Student Assessment Instrument (TBL-SAI), Team-Based Learning Questionnaire (Branney & Priego-Hernández, 2018; H. R. Kim et al., 2016). Meanwhile, students' clinical performance assessments are measured using the Clinical Competence Skills Instrument, and instruments developed by researchers (Kang et al., 2016; H. R. Kim et al., 2016; Lee, 2018). In addition, problem solving was measured using the Problem-Solving Ability Instrument and the Problem-Solving Scale (H. R. Kim et al., 2016; Lee, 2018). Furthermore, the instrument used to assess learning attitudes is the Self-Directed Learning Instrument, and an instrument developed by researchers (Kang et al., 2016; Xue et al., 2021). Meanwhile, learning experiences use Student Evaluation of Teaching and Units, Self-Report of Engagement Measure, Global Interpersonal Communication Competence Scale, Revised Self-Leadership Questionnaire, and instruments developed by researchers (Branney & Priego-Hernández, 2018; Lee, 2018; Xue et al., 2021). Furthermore, critical thinking ability is measured using the Critical Thinking Ability Instrument (Lee, 2018). In addition, students' academic achievement and knowledge were measured using instruments developed by researchers (Kang et al., 2016; Sakamoto, Dell'acqua, et al., 2020). This research is also supported by qualitative research by collecting data through Discussion Group Forums (Sakamoto, Dell'acqua, et al., 2020)

Table, 2.
Grid Synthesis of the Effectiveness of implementing TBL in Improving Nursing Student

No.	Researcher, State	Study Design	Objective	Sample Size	Intervention	Instrument	Results
1	Kang et al. (2016), South Korea	Randomized Controlled Trial	To determine the effectiveness of simulation with TBL, compared with simulation alone, in nursing care for newborns	• The total sample is 74 respondents • The intervention group had 37 respondents and the control group had 37 respondents • Respondents are nursing students at a Seoul university, South Korea	• The intervention group was included in group E1 consisting of 10 teams who received simulation and TBL • The control group was included in group E2 which received the simulation • The intervention group follows 3 stages of TBL • The intervention was implemented for 3 months	The instrument was developed by the researcher	• Learning attitudes did not differ significantly between students who achieved lower (t= 1.002, P= 0.324) or higher (t= −0.392, P= 0.698) between groups. • Academic achievement was significantly different between the low achieving group (t= 3.445, P= 0.002), but not significantly different in the high achieving group (t= 0.502, P= 0.619) • Simulation performance did not differ significantly between groups (t = −1.744, P = 0.098) • Individual and group readiness differed significantly in the intervention group (t = 5.543, P < 0.001)
2	Branney & Priego-Hernández (2018), England	Mixed Methods Observational Study	To evaluate the use of team-based learning in teaching applied pathophysiology to undergraduate nursing students	• The total sample is 197 respondents • The sample consists of a team consisting of 5-10 respondents • Responden	• Respondents received a TBL-based applied pathophysiology of circulatory shock module • The intervention was implemented during the	Team-Based Learning Student Assessment Instrument (TBL-SAI)	Quantitative: • 93% higher level of accountability with TBL • 92% higher satisfaction rate with TBL compared to traditional lectures • 76% like TBL, 21% like traditional lectures

No.	Researcher, State	Study Design	Objective	Sample Size	Intervention	Instrument	Results
				ts are nursing students at one of the universities in England	2nd year of study in September 2014 and February 2015		Qualitative: • More enjoyable experience with TBL compared to traditional lectures • Prior preparation is very necessary • Students enjoyed the TBL intervention • TBL exam scores are comparable to traditional lecture exam scores
3	Sakamoto et al. (2020), Brazil	Randomized Controlled Trial	To compare knowledge about surgical safety through team-based learning methodology with lecture lectures for undergraduate nursing students	• The total sample is 28 respondents • The intervention group had 14 respondents, the control group had 14 respondents • Respondents are undergraduate nursing students at one of the state universities of Sao Paulo, Brazil	• The intervention group was divided into 3 groups A, B, C by receiving TBL • The control group received lecture lectures • The intervention group followed 6 stages of TBL • The intervention was implemented during the first half of 2017 for 30 days	Team-Based Learning Questionnaire	• The TBL group's pre-test correct answers were significantly higher than the control group ($p<0.002$) • Post-test there were no significant differences between groups in correct answers • Experience with TBL methods is considered positive
4	Kim et al. (2016), South Korea	RandomizedControlled Trial	To examine the effect of TBL on problem solving abilities and learning outcomes (knowledge and clinical performance) of nursing students	• The total sample is 63 respondents • The intervention group had 32 respondents, the control group had 31 respondent	• The intervention group was divided into 7 teams that received TBL • The control group received lecture lectures and traditional case studies • The	• Problem-Solving Scale • Instrument developed by researchers	○ Problem solving abilities differed significantly between groups ($t = 10.89$, $P < 0.001$) ○ Knowledge differed significantly between groups($t = 10.21$, $P < 0.001$) ○ Clinical performance differed

No.	Researcher, State	Study Design	Objective	Sample Size	Intervention	Instrument	Results
				s • Respondents were nursing students at the University College of Nursing in South Korea	intervention was implemented for 3 weeks, including 3 sessions in a 2 hour class		significantly between groups (t = 12.22, P < 0,001)
5	Lee (2018), South Korea	Quasi Experimental Study	To assess the comparative effectiveness of TBL classes with lecture classes in teaching core competencies in nursing education	• The total sample is 183 respondents • The intervention group had 95 respondents, the control group had 88 respondents • Respondents were senior nursing students at Yeungnam University in Daegu City, South Korea	• The intervention group received TBL classes • The control group received lecture classes • The intervention was carried out for 3 weeks with a duration of 2 hours	• Clinical competence skills Instrument • Problem-solving ability instrument • Global Interpersonal Communi-nication Competence Scale • Critical thinking ability instrument • Revised Self-Leadership Questionnaire	• Clinical competency skills did not differ significantly between groups (t= 0.150, P= 0.881) • Problem solving ability did not differ significantly between groups (t=-0.012, P=0.990) • Communication competence did not differ significantly between groups (t= -0.127, P=0.899) • Critical thinking abilities did not differ significantly between groups (t=0.185, P=0.853) • Self-leadership did not differ significantly between groups (t=0.247, P=0.805)
6	Xue et al. (2021), China	Quasi Experimental Study	To compare the effects of TBL on nursing graduate students with lecture-based teaching and small group discussions	• The total sample is 75 respondents • The intervention group had 48 respondents, the control group had	• The intervention group received TBL • The control group received lectures and small group discussions • The intervention	• Self-Directed Learning Instrument • Self-Report of Engagement Measure • Student	• Independent learning ability differed significantly between groups (t = 2.92, P < 0.01) • Class engagement differed significantly between groups (t = 2.19, P < 0.05) • Evaluation of learning

No.	Researcher, State	Study Design	Objective	Sample Size	Intervention	Instrument	Results
				27 respondents • Respondents are nursing graduates who have graduated for 5 years and have passed the national postgraduate entrance examination in China	group is divided into teams of 5-7 students • The intervention group followed 3 learning stages • The intervention was implemented for 10 weeks	Evaluation of Teaching and Units	experiences is significantly different (t = 3.31, P < 0.01)

DISCUSSION

This literature review aims to identify the effectiveness of implementing TBL in improving learning outcomes for nursing students. There were 6 articles reviewed, 5 intervention research articles (RCT and Quasi Experimental) and 1 Mix-method research article. The results of this research found that TBL can improve student academic achievement. This is in line with other research which explains that the application of TBL to nursing students provides a perception of increased academic achievement (Vasan et al., 2009). In addition, team-based learning is proven to have a very strong effect on students who are weak academically and allows students to strengthen and maintain academic achievement (Tan et al., 2011). This research also explains that the application of TBL to nursing students can improve attitudes and learning experiences. According to Cheng et al. (2014), the application of TBL to nursing students significantly increases students' interest in learning. Furthermore, the implementation of TBL caused significant changes in the learning attitudes of nursing students in teams. Additionally, the quality of learning, clinical reasoning abilities, professional development, and satisfaction with the team experience improved (Currey, Oldland, et al., 2015).

Through this research, the application of TBL also increases nursing students' skill components such as knowledge, problem solving, critical thinking, and clinical performance. In previous similar studies of medical students, those who received TBL had significantly higher problem solving and knowledge scores than those who received traditional lecture-based learning (Jafari, 2014; Mody et al., 2013). On the other hand, TBL applied in hematology and adult care courses is also able to improve students' critical thinking abilities (Zeb et al., 2022). Additionally, students who received TBL scored higher on practical laboratory exams than those who received traditional lectures (Huitt et al., 2015; Sapeni et al., 2020). The results of this study also explain the instrument used to evaluate TBL using the Team-Based Learning Student Assessment Instrument (TBL-SAI). Furthermore, to evaluate TBL it is best to use valid and reliable instruments. According to Ibrahim (2020), based on the results of the TBL-SAI research that has been developed it is valid and reliable for health students. Apart from that, it is also easier for students to use TBL-SAI to understand aspects of TBL (Parthasarathy et al., 2019).There are several limitations in this research, including that although the search was carried out extensively and inclusively, there may have been

several relevant studies that were missed. Apart from that, research studies are limited in meeting inclusion criteria, RCT research is still lacking, and instruments are still being developed by researchers.

CONCLUSION

This Literature Review is limited to 6 research articles involving 592 respondents. The application of TBL can improve nursing students' learning outcomes. Therefore, the TBL method can be recommended in nursing education.

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