Implementing Team-Based Learning of Blended Learning Method in Concept-Based Curriculum

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This study investigates the impact of Team-Based Learning (TBL) on Information Systems students. A total of 61 participants, majoring in the Information Systems program at Bina Nusantara University, Indonesia, were included. The research employed a quasi-experimental design, with the first assessment derived from midterm test results, and the second assessment obtained from final test results. Data were analyzed using descriptive statistics, while mean differences were examined using t-tests. In contrast to most TBL research, the mean students' test scores were found to decrease in the final test compared to the midterm test. This outcome may be attributed to three factors: (1) an unidentified adjustment period transitioning from regular learning activities to TBL classroom activities, (2) insufficient time for the full implementation of TBL, and (3) differences in difficulty between pre- and post-midterm course materials. This finding is crucial for the TBL research knowledge base, as it presents a divergent and contradictory result that warrants further exploration in future studies.

Keywords: blended, learning strategy, concept curriculum

INTRODUCTION

Face-to-face learning methods commonly employed at universities in Indonesia can be divided into two types: traditional, in which online content is not provided, and hybrid (blended), which includes online content (Allen & Seaman, 2011). The traditional model is predominantly used in the Indonesian education system (Pardamean et al., 2017). Bina Nusantara University is an example of an institution that adopts the blended learning method. In this model, students can access lecture materials through websites, in addition to attending face-to-face meetings (Graham, 2006). The implementation of the blended model has demonstrated positive effects on students' learning effectiveness (Eryilmaz, 2015; Banyen et al., 2016). Students have responded positively to the blended learning model and participated fairly actively (Prabowo et al., 2018). They consider this model useful and conducive to enhancing their understanding (Ridwan et al., 2020). However, both traditional and blended models can limit students' ability to develop initiative in scientific research due to their face-to-face nature (Taraban et al., 2007).

Team-Based Learning (TBL) is considered an effective method for facilitating the learning process. TBL implementation in classrooms increases students' enthusiasm for independent learning and active expression of their ideas (Pardamean et al., 2014). TBL reinforces the role of study groups in disseminating knowledge among members (Michaelsen et al., 2008). The objective of these study groups is to derive positive outcomes from students' contributions to problem-solving through discussion (Chan et al., 1997). Through group discussions, students experience increased engagement in class, resulting in positive impacts on instructors (Michaelsen et al., 2004). Positive verbal interactions between instructors and students play a crucial role in face-to-face classroom sessions (Pardamean & Suparyanto, 2014). Studies conducted by Mentzer, Cryan, and Teclehaimanot (2007) and Summers, Waigandt, and Whittaker (2005) have found that these positive interactions can enhance students' motivation to attend class.

The benchmark for measuring the effectiveness of the learning process at most universities remains focused on students' scores (Dresel & Rindermann, 2011), which are influenced by various factors (Galbraith et al., 2012). Several studies have identified motivation as a variable in these measurements (Leen & Lang, 2013; Roseth et al., 2011; Shroff & Vogel, 2009), as well as students' satisfaction with attending lectures (Gibson, 2008; Hostetter & Busch, 2006; Alruwaih, 2015; Naaj et al., 2012). Exam results in these measurements serve as indicators of student assessment (Mentzer et al., 2007; Summers et al., 2005).

### Concept-Based Teaching and Learning

A concept-based curriculum is an educational approach that emphasizes the generalization of disciplinary concepts and fundamental principles. This approach focuses on fostering conceptual understanding and knowledge transfer. Instructors prioritize the use of facts and generalizations as a foundation for deepening students' comprehension and facilitating synergies in their understanding of the material. Within a concept-based curriculum, students are encouraged to collaborate in groups to promote critical thinking and problem-solving skills (Erickson, 2012).

Team Based Learning (TBL) as the New Proposal for Modern Education

The learning strategy in Team-Based Learning (TBL) differs from conventional group-based learning. It requires the formation of high-performing teams rather than rotating teams. Immediate grading is essential, as prolonged anticipation of scores can shift students' focus from correcting mistakes to simply knowing their grades. In this context, timely feedback is crucial for improvement and achieving optimal learning management.

TBL can be implemented across various courses, provided that they contain a substantial body of information and ideas. Additionally, one of the course objectives should be for students to apply the content through problem-solving. The primary goal of TBL is to develop high-performing teams capable of engaging in rigorous learning activities (Michaelsen et al., 2004). To accomplish these objectives, Michaelsen, Knight, and Fink proposed a framework outlining the flow and process of TBL, as illustrated in Figure 1.

FIGURE 1
THE FLOW AND PROCESS OF TBL
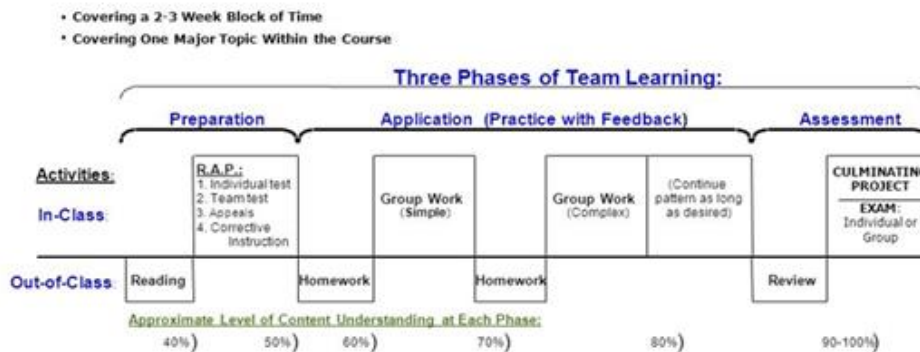
During the preparation phase, students read the materials to be covered in class at home. They then commence their first in-class activity, the Readiness Assurance Process (RAP), which involves taking an individual test based on their assigned readings. Upon completing the individual test, students submit their answers and proceed to work on an identical test with their team. In this collaborative setting, students can freely communicate within their team and consult references to validate their answers. The Immediate Feedback Assessment Test (IF-AT) sheet is used during this phase to provide immediate validation of answers, enabling teams to evaluate and improve their performance swiftly.

Students answer the IF-AT sheet by scratching the surface of their chosen response. If the answer is correct, a star image is revealed; otherwise, the section remains blank. A medium-sized IF-AT typically comprises 25 questions, each with four answer choices.

While students work on the group assignment, the instructor assesses the individual tests. After the group assignment concludes, scores are shared, and students have the option to challenge their scores if they wish. The instructor must then provide justifications for the scores. By the end of the preparation phase, students should have grasped approximately 50% of the course material.

In the application phase, the content derived from the RAP is utilized to solve problems, provide explanations, perform analyses, and accomplish other course objectives. Throughout this phase, students are presented with increasingly challenging questions in each session. The instructor collects different answers from each team, compares them, and provides feedback to refine the responses. By the end of this phase, each student is expected to have learned about 80% of the course material.

The assessment phase, or the final phase, consists of a final review and assessment to measure students' understanding of the course content. Students are tested on problems they have previously solved. Upon completion of this phase, students are expected to have mastered 90 to 100 percent of the current course material. The class can then move on to the next major topic and integrate their acquired knowledge to gain a comprehensive understanding of the course.

Previous Works in Team Based Learning

Numerous studies have demonstrated that TBL improves academic performance in computer science, medical, and business subjects (Koles et al., 2010; Almasi & Zhu, 2019; Makalew & Pardamean, 2017; Pardamean et al., 2017). This improvement can be attributed to the diversified learning activities and the inherent peer support system. Variations in TBL implementation have emerged across different institutions and majors. Some classroom activities incorporate a "flipped classroom" instructional strategy, Massive Online Open Course (MOOC) methods, and the use of multimedia for delivering course materials (Pardamean et al., 2014; Demetry, 2010; Ghadiri et al., 2013).

All these variations in TBL implementation aim to achieve the same goal: enhancing academic performance. This can be accomplished by improving related aspects such as motivation, engagement, and

class participation. However, some results have shown differing and contradictory outcomes. For instance, a study by Makalew and Pardamean (2017) concluded that there was no significant improvement in students' motivation and engagement, while the original concept by Michaelsen et al. (2004) posited that motivation and engagement should be areas that can be improved using TBL. These findings underscore the differences in TBL implementation across countries, institutions, and majors. To identify the most effective model, extensive research must be conducted and thoroughly analyzed.

Aim of the Work

Currently, there is a research gap regarding the measurement of Team-Based Learning implementation in Information Systems students. This study aims to address this gap using a quantitative research method, specifically a quasi-experimental design. While numerous studies have been conducted for other majors, there is a lack of research on Information Systems students, particularly quantitative studies in private universities in Indonesia. As previously mentioned, to be fully accepted as a universal learning strategy, a substantial knowledge base spanning different countries, institutions, and majors is essential.

The objective of this work is to determine whether there is an improvement in students' academic performance. The results will contribute to the knowledge pool required for further analysis of TBL's benefits and application scope in higher education. The findings from this study will be critical in establishing TBL's usefulness as one of many determining factors. More importantly, the results will serve as a foundation for consideration by decision-makers in higher education when a transformative learning strategy is necessary.
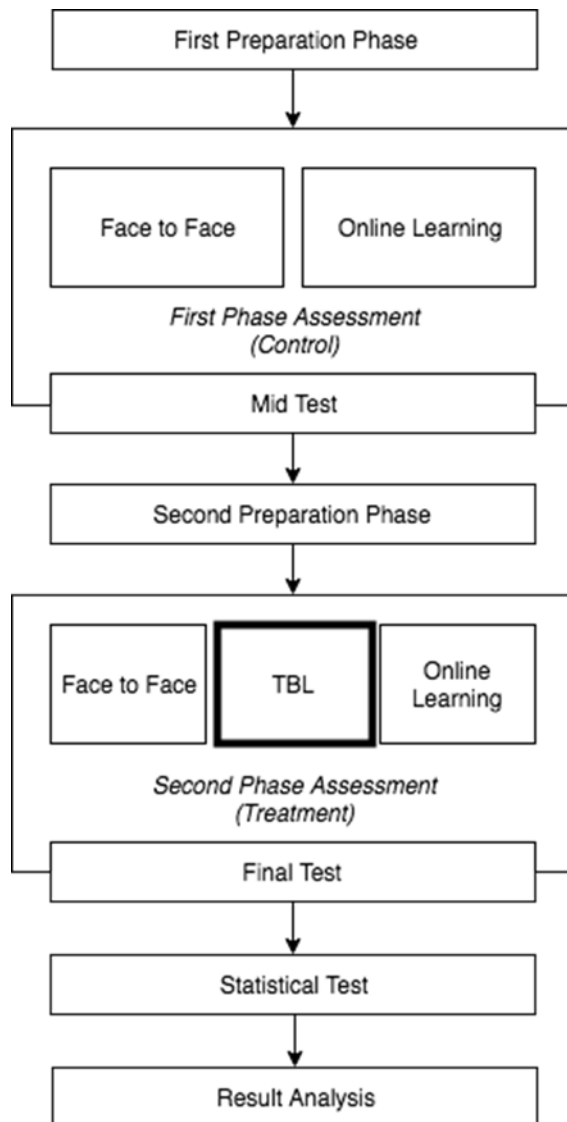
METHOD

General Background of Research

This research study was conducted in the Enterprise System course at Bina Nusantara University, comprising 63 third-semester Information System major students. This course is one of the main subjects for Information System students at Bina Nusantara University. Within this concept-based curriculum, students learn about information system applications as business process support in companies, with a focus on Enterprise Resource Planning (ERP) applications. This includes understanding the basic concepts, the role of ERP in supporting company business processes, and collaboration with Customer Relationship Management (CRM) and Supply Chain Management (SCM).

During the semester-long lecturing process, which consists of 13 meetings, the blended learning method was applied to the first half of the semester, while TBL was implemented in the second half. Blended learning at Bina Nusantara University includes face-to-face meetings between lecturers and students, as well as the provision of lecture materials through an integrated online learning management system (LMS) (Munir, 2010). The LMS can be accessed via a website by both lecturers and students and is equipped with a discussion forum for online interactions. The results of the mid-term and final-term assessments serve as indicators of student performance.

This study employs the t-test quantitative method to compare the mid-term and final-term results, using a non-experimental research design with research stages depicted in Figure 2.

FIGURE 2
RESEARCH STAGES

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│         First Preparation Phase          │
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│  ┌──────────────┐    ┌──────────────┐    │
│  │ Face to Face │    │Online Learning│   │
│  └──────────────┘    └──────────────┘    │
│        First Phase Assessment            │
│              (Control)                   │
│  ┌─────────────────────────────────┐     │
│  │           Mid Test              │     │
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│        Second Preparation Phase          │
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│ ┌──────────┐ ┌──────┐ ┌──────────┐       │
│ │Face to   │ │ TBL  │ │ Online   │       │
│ │Face      │ │      │ │ Learning │       │
│ └──────────┘ └──────┘ └──────────┘       │
│       Second Phase Assessment            │
│             (Treatment)                  │
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│ │          Final Test             │      │
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│           Statistical Test               │
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│           Result Analysis                │
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Sample of Research

In the initial preparation phase, research participants were identified and a regular learning strategy was developed. This strategy included both regular face-to-face materials and online learning materials.

Instrument and Procedures

Following the initial preparation phase, students participated in standard blended learning activities, which served as the control for evaluating the study's conclusions. The first assessment was conducted in the form of a mid-semester test. In the second half of the semester, students were exposed to TBL as a different teaching approach. This treatment lasted for three months, providing sufficient data to measure the impact of TBL. A second preparation phase was carried out to determine how TBL would be implemented in the weekly classes, along with the necessary materials and tests. A significant distinction between the second half of the semester and the first half was the introduction of TBL activities. It is important to note that regular face-to-face activities and online learning activities were still conducted and not eliminated during this period.

Data Analysis

Finally, the second quantitative result, used for comparison, was obtained from students' final tests. Both the mid-term and final tests were analyzed using t-tests to determine any significant differences in the means. The results were then synthesized to draw objective conclusions that would provide insights into the effectiveness of TBL in improving academic performance for Information Systems students.

RESULT AND DISCUSSION

Descriptive Statistics

The descriptive statistics presented in Table 1 display the test results. It is evident that there were no dropouts during the study.

TABLE 1
DESCRIPTIVE STATISTICS OF TESTS RESULT

Test	N	Min	Max	Mean	SD
Midterm	61	55	97	83.26	7.943
Final	61	60	91	72.39	8.993

TABLE 2
PEARSON CORRELATION RESULT

	Final
Midterm	0.474 ($p < 0.05$)

TABLE 3
T-TEST RESULT

Variable	Alpha/CI	df	p-value	Result
Test	0.05/95%	118.2	< 0.05	Significant

As depicted in Table 3, a t-test was conducted on two samples, with the calculation of degrees of freedom using the Welch-Satterthwaite formula. This formula is frequently used in cases where variances are not homogeneous, enabling a comparison between the two groups. The result of the formula yields df equal to 118.2, and the obtained p-value is less than 0.05. Consequently, it can be concluded that the means of the two groups are significantly different. In conclusion, the null hypothesis (H0) of equality of means is rejected, and the means are determined to be significantly different.

It is also evident from the result that the means decrease when compared to the mid-test result. The mean of scores dropped from 83.26 in the midterm test to 72.39 in the final term test. The assumptions regarding why this occurred will be further discussed in the next section.

Synthesis and Interpretation

The correlation results in Table 2 display a moderate correlation, which suggests that the data used for this analysis is relevant and should be valid enough to provide objective outcomes. Furthermore, there were no missing data points in the analysis.

Discussion

The descriptive statistics reveal that the mean of the final test assessment is lower than the mean of the mid-test assessment. Although this outcome is rare, it provides valuable insight into the fact that TBL may not always yield positive results in every case, specifically in the Information Systems major. Several mediating variables could play a significant role in the obtained results. First, there might be an unidentified adjustment period for students, given that they were previously taught using regular blended learning. Second, the duration of TBL treatment might have been insufficient. Third, there could be potential bias due to the fact that the materials taught after the mid-term period may have been more challenging than the previous materials.

It is crucial to note that these findings contradict previous research that demonstrated significant improvements in academic performance for classes utilizing TBL. This contradiction highlights the need for further exploration into the causes, conditions, and constraints for effective TBL implementation. The findings from this study will undoubtedly enrich and provide a valuable foundation for initiatives aimed at enhancing the TBL process.

CONCLUSION

This study examined the impact of TBL on Information Systems students. Although TBL is a powerful and innovative learning strategy, further conclusive research is necessary to fully understand its implications in higher education practices. Currently, there is a lack of research on Information Systems students, particularly in private universities in Indonesia. This study addresses this research gap using a quantitative, quasi-experimental method. Two test results were compared: the mid-test and the final test. The mid-test served as the control result, while the final test served as the treatment result, as pre-mid classroom activities were conducted without TBL, and post-mid classroom activities incorporated TBL.

Upon analyzing the data, the findings revealed a decrease in the means between the final and mid-tests. The final test showed a lower mean result than the mid-test. This outcome is intriguing because it contradicts most previous research, which generally indicates that academic performance increases when TBL is implemented.

A qualitative assessment and analysis suggest that there might be three factors affecting this outcome. First, there may be an unknown adjustment period for students to become accustomed to TBL learning activities. Second, there may be an insufficient period for implementing TBL, given that only approximately two months of TBL implementation occurred. Lastly, a moderating variable may exist, where a difference in difficulty between pre-mid test and post-mid test materials is present. This means that post-mid test materials taught in the classroom might be significantly more challenging than pre-mid test materials. These findings should contribute significantly to the knowledge pool of TBL implementation, as they provide an unconventional conclusion and open the door for future research to either disprove or confirm the outcomes presented in this study.

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