

The Effectiveness of Team-Based Learning Integrated with Canvas LMS in Enhancing Students' Reading and Critical Thinking Skills

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Received: 13/06/2025

Revised: 04/08/2025

Accepted: 08/09/2025

Abstract

This research investigates the effectiveness of the implementation of Team-Based Learning (TBL) combined with technology, in this case is the Canvas Learning Management System (Canvas LMS), to improve reading skills and critical thinking skills among students from English as a Foreign Language (EFL) classrooms. Using a quasi-experimental design, the study involved 112 third-semester students in Critical Reading courses. The sample was determined through cluster random sampling, which consisted of a C class that consisted of 28 students of the English Department in the State Islamic Institution of Ponorogo. Pre-test and post-test were administered, and data were analyzed using a paired sample t-test. The findings showed a significant enhancement in reading skills due to the integration of Canvas LMS into TBL ($\text{sig} = 0.000 < 0.005$), as evidenced by the increased scores on the mean scores of pre-test and post-test from 62.57 to 80.61. Students also showed an increase in their critical thinking skills. The implications of these findings provide further insights into the effectiveness of integrating TBL with the use of technology to improve academic reading and critical thinking in EFL settings and a suggested strategy for developing such essential skills in university contexts.

Keywords

Canvas LMS; Critical Reading Course; Critical Thinking Skills; Reading Skills; Team-Based Learning

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1. INTRODUCTION

In Indonesia's English as a Foreign Language (EFL) context, developing students' reading and critical thinking skills is more pressing than ever. These competencies are explicitly emphasized in the *Merdeka Belajar-Kampus Merdeka* (MBKM) curriculum framework launched by the Ministry of Education, Culture, Research, and Technology, which advocates for critical thinking, collaboration, and lifelong learning to prepare students for global challenges (Kusumawardani et al., 2024). However, despite strong policy backing, developing critical reading and thinking skills remains a persistent challenge across Indonesian higher education institutions.

This concern is reflected in the Programme for International Student Assessment (PISA) 2022 results, which revealed that Indonesian students continue to underperform in reading literacy.



Indonesia ranked below the OECD average, with a significant proportion of students struggling to interpret, evaluate, and reflect on written texts—core critical reading components. The data showed that only 29% of Indonesian students reached the minimum proficiency level (Level 2) in reading, indicating difficulty in making basic inferences and recognizing main ideas when not explicitly stated (Pusmendik, 2024). Although PISA assesses 15-year-olds, the findings expose foundational weaknesses often carried forward into higher education, especially in EFL academic reading contexts. This learning gap limits students' academic success and hinders their readiness for a professional world that increasingly demands strong English reasoning, analysis, and decision-making skills.

Team-based learning (TBL) has filled gaps in pedagogy by shifting the focus from teacher-directed to student-centered learning, emphasizing active and collaborative engagement (Burgess & Matar, 2020). TBL groups students into permanent teams, which remain consistent throughout the course, allowing for the development of trust and identity within the group (Michaelsen et al., 2011). Teams are created to promote varying thinking styles and technical skills, which leads to rich discussions and a collaborative approach to problem-solving. TBL starts with the individual readiness assurance test (iRAT); students take a quiz individually to see how much they understand the material. After that, the same test is given as a team readiness assurance test (TRAT), where students work together to answer the questions, reinforcing their knowledge by interacting and discussing with their peers. After the readiness assessments, students perform application exercises to work on real-world problems they must solve critically and collaboratively. Such exercises give students practice negotiating, communicating, and making decisions, as they must collaborate to settle on an agreement. This makes them understand the material much better and strengthens their cognitive abilities (Dnyanesh et al., 2024). This is where the peer and self-assessment part of TBL comes into play to give teams immediate feedback on their performance to reflect on and improve. The application of knowledge to real-life experiences with continuing feedback improves students' critical thinking and decision-making ability (Sweet & Michaelsen, 2023).

Along with the emergence of TBL, the availability of technology has changed the educational scene and opened new opportunities for improving learning outcomes (Bozkurt et al., 2021). Integrating technology in education contributes to a flexible, accessible, and interactive learning environment (Koh & Kan, 2021; Pinto & Leite, 2020). For example, Canvas Learning Management System (LMS) is a robust platform for course material, discussion, and instant feedback (Marachi & Quill, 2020). Furthermore, the Canvas LMS facilitates group assignments, student tracking, and asynchronous and synchronous engagement with course content, enabling teachers to build courses designed for the distributed education routine (Al Khoeri et al., 2021). These traits are required for critical thinking since they allow students to hyperlink with the data to examine and think about content, to have meaningful conversations, and receive personalised feedback (Müller & Mildenerger, 2021). Digital content published on platforms like Canvas LMS also promotes various ways of learning, resulting in a better way to serve up the unique needs of students effectively. Canvas LMS is versatile enough to support students in person and working collaboratively.

Integration of TBL with technology-based platforms such as Canvas LMS can become an ideal transformation in critical reading courses (Fadhli et al., 2023; Nikitina et al., 2024). Critical reading itself is dependent on collaborative and reflection processes (Bjorn, 2024), requiring students to analyze arguments, the quality of evidence, and identify biases in texts (Nalbandyan, 2023). Teachers use Canvas to provide reading materials and assignments to students who can access content at any hour of the day or night. Students then submit their tasks at this platform where both their peers and the instructor can see their work for reviewing. With Canvas LMS, students can also collaborate in discussion forums to build a collaborative atmosphere where they share insights and post reflections, promoting peer learning and critical analysis. The platform helps refine that process by offering a space for students to give and receive feedback on one another's responses to the readings. Within Canvas, teachers can reply to submissions, provide personalized feedback, and monitor progress (Santiana et al., 2021).

Despite the growing global interest in digital TBL applications and the increasing adoption of LMS platforms in higher education, studies specifically investigating the integration of TBL and Canvas LMS within critical reading courses in Indonesian EFL classrooms remain scarce. While prior research has examined either TBL (Espey, 2018) or the use of Canvas LMS independently (Santiana et al., 2021) There is limited empirical evidence exploring their combined implementation in promoting students' critical reading and thinking skills in the Indonesian EFL context. This study addresses that gap by investigating how integrating TBL with Canvas LMS can enhance students' reading performance and critical thinking skills in a technology-enhanced academic reading environment. Doing so offers a novel perspective on digital collaborative pedagogy tailored to Indonesia's demands of 21st-century EFL education.

The present study seeks to fill this gap by exploring the effectiveness of implementing TBL and Canvas LMS in enhancing reading and critical thinking skills in the Critical Reading course. The specific objectives of this study are the following two: i) to examine the effectiveness of integrating TBL and Canvas LMS on the students' reading skills in the Critical Reading course; and ii) to analyze the effectiveness of integrating TBL and Canvas LMS on the students' critical thinking skills within the context of the Critical Reading course. The results will add to the literature on new approaches in teaching higher education, providing educators with take-away recommendations on promoting reading and critical thinking skills through collaborative and technology-enhanced learning frameworks.

2. METHODS

The Design of the Study

This present study employed a quasi-experimental design using a one-group pretest-posttest design to investigate the effectiveness (Creswell, 2023) of integrating TBL and Canvas LMS in improving reading skills and fostering critical thinking skills among EFL students. Furthermore, the design used a one-group pretest-posttest. A one-group pretest-posttest design is an experimental research design that uses one group of participants to make measurements before and after treatment (Sugiyono, 2018). The one-group pretest-posttest is shown in Figure 1.

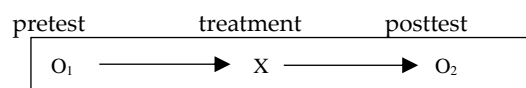


Figure 1. One-group pretest-posttest (Sugiyono, 2018)

Subjects of the Study

The research subjects were 112 students from 4 classes enrolling in the Critical Reading for the EFL students at one of the Indonesian Islamic Higher Education institutions, the State Islamic Institute of Ponorogo. The sampling for the study utilized the random sampling method, where groups or classes are chosen randomly to participate in the study instead of individuals (Stockemer, 2019). All classes in the Critical Reading course were treated as clusters, specifically, from the pool of students enrolled in the course. C class, consisting of 28 students, was selected using a random selection from available student clusters to ensure a representative and unbiased sample. This process was systematic and random, and ensured that no selection bias occurred and that each class had a fair chance of being chosen as the experimental group (Adeoye, 2023). C and A class students were adequately informed regarding the aims and methods of the research and the data processing process, thereby ensuring transparency. They have given informed consent when registering for the Critical Reading courses to participate in this research. The characteristics of the study participants are presented in Table 1.

Table 1. Demographic information of research participants

Participants	Gender	Frequency	Percentage	Semester Enrolled	English Proficiency
Experimental group	Male	8	28.6	3 rd	Low to high
	Female	20	71.4	3 rd	Low to high
	Total	28	100		

The Research Procedure

This fourteen-week study explores the effectiveness of TBL integrated with Canvas LMS in enhancing reading and critical thinking skills in Critical Reading Courses. The study began with a pre-test to assess students' baseline knowledge, followed by an introduction to Canvas LMS and the enrollment of students into the system. After familiarizing students with Canvas, the practical framework of TBL was explained. TBL was then implemented across ten different topics, as outlined in the framework presented in Figure 2.



Figure 2. The Frame of Team-Based Learning (Sweet & Michaelsen, 2023)

The first part of this process involved establishing diverse and stable teams of five students using Canvas's group management tools, which promote balanced collaboration, clearly defined expectations, and facilitate team roles. Students also completed pre-class preparedness tasks and took an iRAT through Canvas quizzes, which determined their level of understanding of the material. The in-class session was then conducted, where teams worked collaboratively, taking the same quiz, to encourage discussion and consensus within teams in a TRAT. Next was application exercises, in which teams of students had to solve complex, real-world problems and worked together on the application through Canvas collaborations and discussions. These exercises led to a deeper comprehension by fostering interactions with peers, by asking them to apply their reading and critical thinking skills. After completing the group work, the students completed peer evaluations using Canvas's peer review tools to provide feedback on each other's contributions and maintain individual accountability while increasing reflective learning. During this stage, the instructors gave ongoing individualized feedback with Canvas's in-line grading tools and comments, establishing a feedback loop for individual improvement and academic growth.

Data Collection

The data collection technique of this study was through a subjective test that included 12 questions with 2 reading passages. They made it for reading skills and critical thinking skills. To establish its validity, this test was reviewed and validated by two experts in the field. The pre-test and post-test were given to all the participants at the beginning and end of the course to detect the improvement in reading and critical thinking skills. Quantitative assessment in this study was adapted from Brookhart's (Brookhart, 2013) rubric to evaluate reading skills and Facione's (2015) framework to evaluate critical thinking. The types of instruments chosen above were chosen because they cover all the skills assessed.

We established content validity via expert review, and the scoring procedure utilized three raters who scored students' tests.

Once students were evaluated based on their reading skills through the rubric presented above, the data were analyzed to determine their critical thinking skills within the context of TBL, as defined by Facione (Facione, 2015).

Data Analysis

After the final scores of the reading skills and critical thinking skills were obtained, a normality test was performed for the appropriate comparative analysis method (Creswell, 2023). The results of the normality test are shown in Table 2.

Table 2. The result of the normality test

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Post-test reading skill	.093	28	.200*
Post-test critical thinking	.113	28	.200*

a. Lilliefors Significance Correction

The results of the Kolmogorov-Smirnov normality test presented in Table 4 show that both the post-test reading skill and post-test critical thinking variables do not significantly deviate from normality. For both variables, the Kolmogorov-Smirnov statistics are 0.093 for post-test reading skills and 0.113 for post-test critical thinking, with significance values of 0.200. These significance values are greater than the commonly accepted threshold of 0.05, indicating that both variables follow a normal distribution. With these results, it can be concluded that the data for both post-test reading skills and post-test critical thinking meet the assumption of normality, allowing for the use of parametric statistical methods in further analysis (Creswell, 2023). Then, a parametric statistical approach was applied using the paired sample t-test. The paired t-test was used to compare two related groups: the t-test can reliably compare pre-test and post-test means, provided normality assumptions are met (Creswell, 2023)

3. FINDINGS AND DISCUSSIONS

The Effectiveness of Integrating TBL and Canvas LMS on the Students' Reading Skills in the Critical Reading Course

The study investigated how integrating TBL and Canvas LMS improves students' reading skills. Based on various quantitative data analyses, integrating TBL and Canvas LMS can improve students' reading skills. The study with 28 participants showed significant improvement based on a statistical analysis of pre-and post-test scores of the students' reading skills as shown in Table 3 below:

Table 3. Descriptive Statistics of Reading Skills

	Reading_pre	Reading_post
Mean	62.5714	80.6071
Median	62.0000	79.5000
Std. Deviation	16.07259	11.07329
Range	64.00	46.00

Table 3 highlights the impact of the integration of Canvas LMS into TBL on reading skills, revealing a clear improvement across participants. The mean score increases from 62.57 in the pre-test to 80.61 in

the post-test, showcasing a substantial boost in reading skills. The median scores mirror this trend, rising from 62.00 to 79.50, further confirming the positive effect of the intervention. Notably, the standard deviation drops from 16.07 to 11.07, indicating that the post-test results are more consistent, with less variation in participants' performance. Additionally, the range narrows from 64.00 to 46.00, suggesting that integrating Canvas LMS into TBL improved reading skills and led to more uniform progress among the participants. These findings collectively demonstrate that the intervention was effective.

Following the descriptive statistics, the next step was to test a hypothesis to see if the apparent increase in reading skills was significant. Hypothesis testing results can be seen in Table 4 below:

Table 4. Paired sample t-test for reading skills

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% confidence interval of the difference				
				Lower	Upper			
Pre-test reading skill	-18.03571	16.63215	3.14318	-24.48499	-11.58644	-5.738	27	.000
Post-test reading skill								

Table 4 presents the results of a paired sample t-test for reading skills, comparing pre-test and post-test scores, which reveal a significant improvement in students' reading skills. The mean difference of -18.04 shows a marked increase in post-test scores compared to pre-test scores, with participants demonstrating considerable progress. The standard deviation of 16.63 indicates the variability in the changes observed among participants, while the standard error of the mean of 3.14 suggests a precise estimate of the mean difference. The 95% confidence interval for the difference, ranging from -24.48 to -11.59, does not include zero, providing further evidence of a significant improvement. The t-value of -5.738, with 27 degrees of freedom, and the p-value of 0.000, well below the 0.05 threshold, support the conclusion that the intervention had a statistically significant positive effect on reading skills. In conclusion, the results confirmed that the intervention was successful and yielded a meaningful and constant increase in reading skills among the participants.

Table 4 indicates that the implementation of TBL along with Canvas LMS has a remarkable impact on the reading skills of EFL students in the Critical Reading course. The intervention significantly improved students' skills to comprehend texts, incorporate evidence, and write clearly. This implies that the effectiveness of integrating TBL and Canvas LMS enhances students' reading skills. As highlighted by Fakoya et al. (2023), Goh et al. (2020), and Liu et al. (2024) TBL integrated with technology is an engaging student-centered teaching strategy that promotes active involvement with the subject matter and their peers. Specifically, students participate in collaborative reading group activities, which have been shown to heighten reading engagement by providing collaborative opportunities and allowing students to discuss text-based evidence (Efthymiou & Sidiropoulos, 2024).

These improvements align with recent studies that highlight how EFL students gain reading and inferencing skills through interactive and collaborative approaches (Dnyanesh et al., 2024). Collaborating in group work enables students to discuss and analyze texts, directly influencing their greater use of evidence in their writing. In addition, the Canvas LMS platform serves as a key support for TBL as it provides students with the flexibility of a digital environment, allowing them to access numerous resources, engage with the content, and receive instant feedback (Burrack & Thompson, 2021; Khatser & Khatser, 2022; Oudat & Othman, 2024). This digital environment amplifies the benefits of TBL by allowing students to continue learning outside of the classroom, thereby providing additional opportunities to refine their analytical skills and reinforce their understanding of complex texts. In

addition, the results show that enhanced students' reading skills align with the dual characteristics offered by both TBL and Canvas LMS. The combination of collaborative learning and technology helps students make sense of texts and gives them tools in the real world to back up their argument with a text. This is critical in developing reading skills for students to analyze and be part of the text. Furthermore, Al-Ataby (2021) Also states that the ability to review non-classroom resources helps to consolidate the learners' analytical process, which resonates with the findings of this study.

Furthermore, integrating technology into TBL enhances reading skills even more, as a study conducted by Xie et al. (2025) They are aligned with the use of Canvas LMS in this study because they posit that digital resources improve learning and other interactions through feedback and collaborative learning, not just in a classroom, but also outside of it. This is very useful in the current educational environment, which requires remote learning and collaboration online. As AlZaabi (2023) and Pek et al. (2020) noted, the TBL's digital component allows students to interact with the content differently, as it can be accessed in different forms, promoting better understanding and better reproduction of information. About reading, Canvas LMS aids the students in dealing with the texts more thoroughly and analytically, which leads to improved reading skills.

The Effectiveness of Integrating TBL and Canvas LMS on the Students' Critical Thinking Skills Within the Context of the Critical Reading Course

To investigate how integrating Canvas LMS into TBL enhances critical thinking skills among EFL students within the Critical Reading course, Table 5 presents the descriptive statistics of the students' pre-test and post-test critical thinking scores. These statistics provide a preliminary overview of the improvement in critical thinking skills, which will be further analyzed in the following sections to determine the statistical significance of these changes.

Table 5. Descriptive statistics of critical thinking skills

	Pre-test critical thinking	Post-test critical thinking
Mean	57.6429	77.4643
Median	60.0000	76.0000
Std. Deviation	16.29636	10.86442
Range	65.00	36.00

Table 5 presents the descriptive statistics for critical thinking skills before and after the intervention. The mean score increases from 57.64 in the pre-test to 77.46 in the post-test, indicating a clear improvement in critical thinking skills. The median values show a similar trend, rising from 60.00 to 76.00, which further reinforces the positive effect of the intervention on most participants. The standard deviation decreases from 16.30 in the pre-test to 10.86 in the post-test, suggesting that the post-test scores are more consistent, with less variation among participants' critical thinking skills. The range also narrows, from 65.00 in the pre-test to 36.00 in the post-test, indicating a reduction in the spread of scores and a more uniform improvement across participants.

After analysing the descriptive statistics, a hypothesis test was performed to check if there had been a statistically significant improvement in critical thinking skills. Below, Table 6, presents the results of this hypothesis test.

Table 6. Paired sample t-test for critical thinking skills

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% confidence interval of the difference				
					Lower	Upper			
Pre-test	critical thinking skill -	-19.82143	14.74990	2.78747	-25.54084	-14.10201	-7.111	27	.000
Post-test	critical thinking skill								

Table 6 presents an analysis of the impact of the intervention on critical thinking skills, as evidenced by the results of the paired sample t-test. The mean difference of -19.82 highlights a substantial improvement in critical thinking skills from the pre-test to the post-test, showing a clear and meaningful gain in participants' skills. The standard deviation of 14.75 reflects the variation in the extent of improvement across participants. In contrast, the standard error of the mean of 2.79 suggests that the estimate of the mean difference is precise and reliable. The 95% confidence interval for the difference, ranging from -25.54 to -14.10, does not cross zero, providing strong statistical evidence that the improvement is not due to random chance. With a t-value of -7.111 and degrees of freedom (df) of 27, the results underscore the strength of the effect, further supported by a p-value of 0.000, which is well below the conventional alpha level of 0.05. This robust result confirms that the intervention led to a statistically significant improvement in critical thinking skills. In summary, the findings from Table 6 highlight the success of the intervention in significantly enhancing critical thinking skills. The consistent and substantial improvement across participants demonstrates the effectiveness of the intervention.

The findings from the hypothesis test for critical thinking, shown in Table 6, correspond with previous research on the usefulness of TBL for critical thinking skills. This notable growth in critical thinking skills reported in this study is consistent with those conducted by Burgess and Matar (2020) and Sweet and Michaelsen (2023), showing the ability of TBL to engage students and promote deeper cognitive engagement. This study underlines TBL's collaborative environment with individual accountability, leading to ideal conditions conducive to critical thinking skills, whereby students strengthen their capacity to analyze and evaluate the evidence and apply their knowledge in meaningful contexts. While such features of TBL are beneficial overall, they are especially relevant in EFL contexts where critical thinking is crucial for instilling critical reading (Brannan et al., 2019; Dnyanesh et al., 2024).

Furthermore, technology use also strengthens TBL's efficacy, as shown in this study. As Canvas LMS offers, digital tools can leverage continuous engagement and feedback mechanisms for performance assessment and detailed analysis. These findings are in line with Mpungose and Khoza (2022) and Nalyvaiko and Vakulenko (2021), who stated that the role of technology in ensuring real-time feedback, dialogue, and case-based analyses is critical for technology to play in teaching and learning contexts, whilst promoting interactive learning and critical analysis. Digital tools that enable immediate response and immersive learning environments are even more important for preserving student involvement and encouraging deeper cognitive skills (Boltsi et al., 2024; Meirbekov et al., 2022).

In addition, the findings corroborate Hughes et al. (2018) and Silberman et al. (2021) that TBL, along with similar active learning strategies such as problem-based learning, is a significant contributor to developing students' ability to assess information and develop well-reasoned conclusions and opinions critically. It is worth mentioning that TBL combined with technology would be an effective pedagogical tool to enhance critical thinking skills in an EFL context because there were significant enhancements in critical thinking skills after technology integration into TBL. The integration of these approaches not only encourages collaboration, responsibility, and the use of knowledge in flexible

learning spaces to foster critical thinking skills, but it also provides students with the fundamental skills they need to interpret and critically engage with complex texts.

4. CONCLUSION

This study indicates the success of integrating TBL with Canvas LMS to promote EFL Students' reading and critical thinking skills in the Critical Reading course. The quantitative findings revealed statistically significant improvements in students' post-test scores for reading and critical thinking skills, indicating the impact of the intervention in determining deeper understanding, critical reflections, and effective collaboration. Canvas LMS was primarily used here to foster an interactive and reflective learning space where students could interactively learn through course materials. While the study produced useful results, limitations include a small sample size, a specific educational context, and missing qualitative data that would have provided more insights into participants' lived learning experiences. Either way, these results add some evidence about technology-integrated pedagogy, further demonstrating the efficacy of digital tools for equitable and purposeful learning outcomes. Future research should be conducted in more diverse educational settings with larger samples and incorporate qualitative and longitudinal approaches to deeply explore how technology-integrated TBL shapes students' cognitive, behavioral, and affective learning outcomes.

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