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Blended Learning as a Catalyst: A Mixed-Method Study on Its Influence on Student Engagement and English Comprehension in a Batam Vocational School

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A B S T R A C T

Blended learning, integrating traditional face-to-face instruction with online components, is increasingly recognized for its potential to transform English Language Teaching (ELT) by offering flexibility and enhancing engagement. This study aimed to investigate the impact of blended learning on students' engagement and English reading comprehension within a vocational high school in Batam. Employing a mixed-methods sequential explanatory design, quantitative data from pre-tests, post-tests, and questionnaires were collected from 80 second-grade students, supplemented by qualitative insights from semi-structured interviews with six students. Results indicated that blended learning significantly improved students' English reading comprehension, with the experimental group showing a substantial increase in scores compared to the control group. Student engagement levels were generally moderate to high, particularly in behavioural and technological aspects (students' comfort and interaction with the digital platform and tools used for learning, including their ease of use and the perceived effectiveness of online materials), though emotional and cognitive engagement variations were observed. Qualitative findings elucidated these nuances, revealing how confidence and preference for direct instruction influenced engagement. The study underscores blended learning's robust potential to enhance academic achievement and engagement, even with mixed engagement profiles. These findings provide strong empirical evidence for integrating well-structured blended learning in vocational ELT, bridging classroom learning with workplace demands and preparing students for global career challenges.

Keywords: *Blended Learning, Student Engagement, Reading Comprehension, Vocational Education, English Language Teaching.*

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INTRODUCTION

Globally, low student engagement and inadequate reading comprehension remain persistent challenges in vocational education. According to the OECD data in 2023, nearly 40% of vocational students across member countries demonstrate below-average reading proficiency, hindering their ability to master technical knowledge and succeed in workplace training (Devos, 2023). Similarly, UNESCO data in 2022 emphasizes that vocational learners often report lower motivation and limited classroom interaction compared to their peers in general education (Konstantinidou et al., 2023).

In Indonesia, the issue is equally pressing. PISA 2022 results reveal that Indonesian students scored an average of 359 in reading, far below the OECD average of 476, indicating a persistent struggle with comprehension and interpretation (Effendi & Wijirahayu, 2024). Particularly concerning is that, despite long-term participation in PISA since 2000, there has been no meaningful improvement in reading scores. Meanwhile, vocational high school students often experience instruction emphasizing rote memorization rather than practical application or critical understanding, diminishing engagement and literacy outcomes (Setyowati et al., 2023).

This challenge becomes especially critical in Batam, one of Indonesia's leading industrial hubs. Despite strong digital infrastructure, many vocational high schools here underutilize technological resources in English lessons (Pohan et al., 2025). Traditional teacher-centered methods remain dominant, leaving students disengaged and struggling to connect classroom English with workplace realities (Hernandez-Gantes, 2022).

As a global lingua franca, English is indispensable in today's interconnected world, facilitating international interactions across business, science, education, technology, and medicine (Nurlaily, 2021). Its clarity, adaptability, and widespread online dominance reinforce its position as the primary medium for global communication and cultural exchange (Manolescu, 2023). This pervasive influence underscores the critical need for English proficiency to bridge cultural differences and foster mutual understanding among diverse communities (Arumita, 2023). Consequently, the imperative to cultivate robust English language skills is universally acknowledged as a cornerstone for academic and professional success in the 21st century (Budiyanto et al., 2024).

In Indonesia, English education has a long history, dating back to the Dutch colonial period, when it was introduced as a foreign language (Suharjati, 2020). Over time, its significance grew, leading to its official incorporation into the national curriculum in the 1960s with increased investment in teacher training and learning materials (Zhang, 2024). Today, English is mandatory from elementary school to university, reflecting its continued importance in developing communication skills for navigating global demands (Rozi, 2023; Setyowati et al., 2023). This consistent emphasis highlights the nation's commitment to equipping its human resources with vital linguistic competencies (Haslina & Hamamah, 2023).

While English instruction is integral across all educational levels in Indonesia, senior high schools and vocational high schools adopt distinct pedagogical approaches. Senior high schools typically focus on general language skills, often employing student-centered methodologies that promote broad interaction and engagement (Sudarmiati & Prasida, 2020). In contrast, vocational high schools prioritize English for Specific Purposes (ESP), tailoring instruction to meet students' particular career needs and equipping them with practical language skills directly applicable to their future professions (Ma, 2023). This differentiated focus acknowledges vocational students' unique learning objectives and career trajectories.

The advent of blended learning, which seamlessly integrates traditional face-to-face instruction with online learning components, has gained considerable traction in English language teaching. This approach offers remarkable flexibility in content delivery, leveraging digital tools, multimedia resources, and interactive activities to enrich the learning experience (Al-Mamoori & Hosseinpur, 2024). Blended learning's capacity to accommodate diverse learner needs through differentiated instruction and foster greater engagement makes it a promising pedagogical innovation (Fehaima, 2023). It also significantly supports learner autonomy, enabling students to manage their learning independently while benefiting from essential teacher guidance and feedback (Albatti, 2023).

Before the COVID-19 pandemic, blended learning had already found adoption in various educational settings globally, including higher education institutions in the UK and medical education in Ukraine (Ruzhanska et al., 2024; Sawan et al., 2024). In Indonesia, certain institutions also began implementing blended strategies to enhance literacy and academic outcomes before the global health crisis (Eralita & Azzizzah, 2023; Kurniawan et al., 2023). However, the unprecedented challenges posed by the COVID-19 pandemic significantly accelerated its widespread integration, transforming it from an optional approach into an indispensable alternative to conventional classroom teaching (Ismawati et al., 2022). This forced shift underscored its vital role in ensuring educational continuity amidst disruptions.

Despite the growing prevalence and evident benefits of blended learning, a notable gap persists in its application, particularly within vocational high schools in Indonesia, such as those in Batam City. Vocational education prepares students with the practical and theoretical knowledge essential for specific career paths, necessitating a goal-oriented approach to English learning (Kalita, 2024). Traditional, teacher-dominated methods often fail to meet

these unique needs, leading to student disengagement and a perceived disconnect between classroom English and workplace demands (Hernandez-Gantes, 2022), especially critical in an industrial hub like Batam.

Despite possessing digital infrastructure, many vocational schools in Batam frequently underutilize these resources in English instruction, representing a missed opportunity for more engaging and effective learning (Pohan et al., 2025). The specific learning styles of vocational students, who often thrive on hands-on practice, interactive activities, and real-life applications, are usually neglected by conventional methods (Mavluda, 2024). Therefore, exploring whether blended learning can bridge this critical gap between academic instruction and the demands of the modern workforce becomes paramount. Its flexibility, interactivity, and potential for content tailoring align well with the need for authentic and industry-specific language tasks.

While previous studies have extensively examined the impact of blended learning on student engagement and reading comprehension across various contexts, limited research focuses explicitly on Indonesian vocational high schools. Furthermore, there is a pronounced scarcity of studies conducted in a rapidly developing industrial city like Batam, where the demand for English-proficient vocational graduates continuously increases. This study aims to fill this critical research gap by rigorously investigating the impact of blended learning on students' engagement and English reading comprehension within the unique context of a vocational high school in Batam, thus providing nuanced insights specific to this under-researched setting.

METHOD

This study employed a Mixed Methods Research (MMR), specifically utilizing a sequential explanatory design. MMR integrates both quantitative and qualitative data to gain a more comprehensive understanding of a research problem, leveraging each method's strengths to offset the other's limitations (Creswell & Creswell, 2018). This approach supports methodological and data triangulation, enhancing the validity and credibility of the results by capturing diverse perspectives (Barahona et al., 2024). The sequential explanatory design, beginning with quantitative data collection followed by qualitative data to elaborate on the initial findings, is particularly suitable for educational research as it helps uncover both "what" and "why" phenomena occur (Adhikari & Timsina, 2024; Toyon, 2021).

Respondents

The research was conducted at a public vocational high school in Batam, explicitly focusing on students from the Computer and Network Engineering department. The population for this study comprised 240 second-grade students from six parallel classes in the Computer and Network Engineering major during the 2024–2025 academic year. From this population, 80 students were selected using cluster sampling, a method commonly employed in educational settings where students are naturally organised into intact classes. Two intact classes were randomly chosen from the six available to ensure fairness. One of these classes, which consisted of 40 students, was designated as the experimental group (receiving instruction through blended learning). The other class, comprising 40 students, served as the control group (receiving instruction through traditional face-to-face methods). This facilitated logistical efficiency and minimized potential selection bias.

Instruments

Three distinct instruments were utilized for data collection: a reading comprehension test, a student engagement questionnaire, and semi-structured interviews. The reading comprehension test, administered as a pre-test and post-test, comprised 20 multiple-choice items designed to assess literal, inferential, and evaluative comprehension, aligning with the vocational high school English curriculum. The student engagement questionnaire, adapted from Fadila (2023) and based on Fredricks et al.'s (2004) framework, consisted of 25 five-point Likert scale items capturing behavioural, emotional, cognitive, technological interaction, and overall satisfaction aspects of engagement. Lastly, semi-structured interviews with six

purposively selected students from the experimental group provided in-depth qualitative insights into their blended learning experiences.

Procedures

The data collection followed a sequential explanatory design over approximately five weeks during the second semester of the 2024/2025 academic year. Initially, administrative coordination and instrument validation were completed, and the reading comprehension pre-test was administered to both experimental and control groups. Subsequently, the experimental group underwent six 90-minute blended learning sessions integrating online platforms and digital materials, while the control group received traditional instruction covering the duplicate content. Post-intervention, both groups completed the reading comprehension post-test, and the experimental group additionally responded to the student engagement questionnaire, culminating in semi-structured interviews with selected experimental group students.

Data Analysis

The collected data underwent quantitative and qualitative analysis to provide a comprehensive understanding of the impact of blended learning. Quantitative data, derived from the pre-tests, post-tests, and engagement questionnaires, were analyzed using JASP (version 0.19.3.0) to perform descriptive statistics, paired t-tests, and independent t-tests. For the qualitative data from semi-structured interviews, thematic analysis was employed, as Miles et al. outlined. This involved data condensation through coding, data display via thematic categorization, and conclusion drawing/verification to identify recurring patterns and nuanced insights into student engagement experiences within the blended learning environment.

FINDINGS AND DISCUSSION

Quantitative Findings

Pre-test and post-test

The quantitative findings from the pre-test and post-test instruments provided strong evidence of blended learning's impact on students' reading comprehension. The experimental group, which received the blended learning intervention, showed a substantial increase in their average reading comprehension scores, rising from a pre-test mean of 61.13 to a post-test mean of 80.63. This marked improvement was significantly higher than the slight gain observed in the control group, which received traditional instruction. This significant improvement can be attributed to the combination of interactive digital resources and direct teacher guidance, which allows students to process text information more deeply and develop more effective reading strategies (Ashford, 2024). The effectiveness of blended learning in improving reading comprehension is also supported by its ability to offer personalized learning, allowing students to review material at their own pace, which improves retention and application of reading skills (Albatti, 2023).

Further statistical analysis confirmed these results. The Wilcoxon Signed-Rank Test significantly improved from pre-test to post-test scores ($p < .001$). The Mann-Whitney U test also revealed a significant difference in post-test scores between the two groups ($p < .001$), with the blended learning group outperforming the control group. This is reinforced by a strong effect size, underscoring the significant influence of the blended learning intervention on student performance. These findings suggest that blended learning instructional design, which combines the advantages of online and face-to-face learning, effectively facilitates cognitive improvement (Yuanyuan & Nagappan, 2025). These results reinforce the argument that blended learning allows greater flexibility in content delivery and personalization support, key factors in significant academic performance improvement (Hong, 2024).

These quantitative findings align with existing literature, such as studies by Tsegaye and Belihu (2024) and Lan and Minh (2023), which reported that blended learning effectively strengthens reading skills by integrating traditional and digital tools. Students in this study particularly benefited from online reading tasks and collaborative discussions, which fostered

a deeper engagement with the content. The improvements encompassed literal and inferential comprehension, as students were exposed to diverse texts and interactive strategies designed to enhance their understanding. This success can be explained by blended learning's ability to provide a media-rich learning environment, which supports various learning styles and enhances visual and auditory information processing (Fionasari, 2024). In addition, enhanced interaction through online platforms often facilitates social knowledge construction, allowing students to co-construct understanding and clarify complex concepts, which is crucial for developing deeper reading comprehension (Zhu et al., 2023).

The notable increase in reading ability in this study, with the experimental group's post-test scores being significantly higher, even surpasses the score increases reported in some previous studies. For instance, Rosalita (2022) recorded a 12-point increase; this study observed a more substantial gain. This suggests that even with moderate overall engagement levels, the specific design and context of the blended learning in this vocational setting were highly effective in promoting academic achievement in reading comprehension. This greater success may result from a curriculum highly tailored to students' vocational needs, making learning materials more relevant and motivating, a factor often associated with improved learning outcomes in specific contexts (Verma et al., 2024). In addition, the strategically integrated use of technology to support vocational field-specific English skills can accelerate reading comprehension, surpassing the effects of more generalized approaches (Liu, 2024).

Questionnaire

Regarding student engagement, the questionnaire data revealed that students in the experimental group generally exhibited moderate to high engagement. A significant portion of students (45%) consistently maintained regular attendance in both face-to-face and online sessions, indicating a foundational level of participation and commitment to the learning format. These findings align with recent research highlighting that flexibility and clear structure in blended learning can encourage students' consistent attendance and participation, as they feel more responsible for their learning process (Allendoerfer, 2022). This stable attendance is often an early indicator of deeper student engagement, forming the basis for further cognitive and emotional interactions in hybrid learning environments (Mbaka, 2021).

However, the quantitative findings also showed some variability in behavioral engagement. While 37.5% reported active participation in online activities, the mean score for this aspect (2.95) was the lowest among behavioral items, suggesting areas for improvement. Conversely, students' motivation to explore additional resources beyond the provided materials had the highest mean score (3.68), highlighting a proactive learning inclination in some students. These variabilities can be attributed to challenges such as the lack of in-person interactions, which might hinder students who prefer face-to-face collaborative learning environments, as highlighted by Eslit (2023). Additionally, differences in digital literacy and self-management abilities among students may affect their level of participation in asynchronous online activities, as Kayaduman et al. (2023) discussed.

Emotional engagement presented a more mixed picture, with over half (52.5%) of the students expressing enjoyment of the blended format, reflected in a mean score of 3.30. However, fewer students felt emotionally supported by their teacher or connected to their peers, with the lowest mean of 2.85 for perceived teacher support. These results underscore the importance of intentionally fostering social presence and emotional support within blended environments to enhance student well-being and engagement. These findings underscore the challenges of building interpersonal connections in blended learning settings, where opportunities for spontaneous interactions and non-verbal cues may be reduced (Pulgar et al., 2023). To address this, it is important for educators to actively create virtual and physical spaces for open dialogue and teacher-driven collaboration, as social support and teacher presence were shown to be strong predictors of students' emotional engagement (Li et al., 2025).

Regarding cognitive engagement, students showed mixed responses. While the mean score of 3.30 suggested perceived ease in applying learned knowledge to practical tasks, only

25% felt they could concentrate better in the blended format. This indicates a need for more structured academic support and strategies to help students maintain mental focus and deepen conceptual understanding in online and hybrid settings. Despite this, the blended format seemingly facilitated practical application, which is crucial for vocational students. These findings echo the challenges reported in the literature regarding maintaining cognitive focus in self-paced online learning environments, where distractions and time management are common obstacles (Wang, 2022). Strategies such as using interactive visual aids and structured face-to-face sessions to clarify complex concepts can help increase cognitive engagement, ensuring students apply and deeply understand the material (Blyznyuk & Kachak, 2024).

Technological engagement generally received positive feedback, with 52.5% of students agreeing that digital materials were appropriate and the format allowed them to learn at their own pace. The mean score for learning at one's own pace was the highest among all engagement items (3.33), highlighting the perceived flexibility and autonomy offered by the blended model. However, challenges persisted in navigating digital platforms and ensuring effective online communication. These findings indicate that while the potential of self-paced learning in blended environments is highly valued, institutions must continue to invest in improving students' digital literacy and providing adequate technical support (Wei, 2024). Platform navigation and online communication barriers can reduce flexibility benefits, so targeted interventions to improve digital competence are crucial for an optimal learning experience (Serwornoo et al., 2024).

Overall satisfaction with blended learning revealed that while 45% of students found it more enjoyable and engaging, only 32.5% would recommend it to others. This suggests that while students recognized inherent benefits, the experience may not have fully met all their expectations or addressed specific learning preferences. The qualitative findings from interviews further illuminated these nuances, showing varying experiences based on individual readiness and preferences. These findings reflect the complexity of achieving universal student satisfaction in blended learning environments, as different learning expectations and needs among individuals can significantly affect their perceptions (Duan, 2024). Therefore, personalization of learning and tailored support is crucial to improve recommendation rates and ensure a more satisfying student experience (Nazeef et al., 2024).

Qualitative Findings from Interviews

The qualitative interviews offered crucial insights that elucidated the quantitative findings, particularly concerning the observed disparity in engagement levels. Highly engaged students (Students 1 and 2) articulated their excitement and appreciation for the dynamic, interactive nature of blended learning, attributing their motivation to diverse digital tools and engaging tasks. This reinforces the idea that flexibility and variety inherent in blended learning can significantly enhance learner participation when aligned with student preferences. This congruence suggests that learning designs that allow for student autonomy and choice of materials can enhance intrinsic motivation and positive learning experiences (Hou, 2024). In addition, providing diverse digital content formats and interactive activities allows students to interact with the material in a way that best suits their learning style, encouraging deeper engagement (Idowu, 2024).

Conversely, students with low engagement (Students 5 and 6) expressed difficulties with focus and distraction during online activities, often preferring more direct instruction. This qualitative nuance explains why, despite overall moderate engagement in the quantitative data, some students faced challenges, suggesting that the success of blended learning is contingent on its alignment with individual learning styles and levels of independence. This also highlights the necessity for tailored support to address varied student needs, particularly in vocational contexts. This finding is reinforced by research showing that students with lower levels of self-regulation often struggle in self-directed learning environments, requiring more explicit structure and teacher guidance to stay focused (Randall et al., 2022). Therefore, strategies such as adaptive scaffolding and scheduling more frequent

synchronous sessions may help overcome concentration problems and improve the learning independence of less engaged students (Srinivasa et al., 2022).

The unique contribution of this mixed-methods study lies in its ability to clarify *why* variations in engagement occurred, beyond merely identifying the levels. The semi-structured interviews with students from different engagement categories provided rich, contextual data on factors such as confidence, comfort in speaking, and focus during online learning. This qualitative depth enriches the understanding of student engagement dynamics in blended learning, a dimension often generalized or underexplored in predominantly quantitative studies. This qualitative approach is crucial for uncovering students' subjective experiences, often not captured by quantitative data alone, thus providing a more holistic picture of engagement (Calicdan & Gementiza-Cubio, 2025). The ability to identify specific barriers, such as speech anxiety or difficulty maintaining attention in online environments, allows educators to develop more targeted and effective interventions to support all students in blended learning settings (Eslit, 2023).

The findings robustly support the premise that a well-structured blended learning model can effectively enhance student engagement and reading comprehension, particularly in vocational education settings. The study underscores the critical role of engagement in mediating learning outcomes, demonstrating that even with mixed engagement profiles, blended learning can lead to optimal academic achievement. This provides strong empirical evidence for the continued integration of blended learning in English Language Teaching, especially in contexts like Batam, where digital tools are increasingly accessible and can significantly bridge the gap between classroom instruction and workplace demands. This success resonates with the argument that adaptive blended learning designs, capable of accommodating the unique needs of vocational students, are critical to improving the relevance and effectiveness of English language learning (Gao & Tan, 2024). Therefore, continued investment in teacher capacity building and digital infrastructure is necessary to maximize the full potential of this learning model in preparing students for the demands of the global job market (Nathan et al., 2025).

CONCLUSIONS

This research robustly supports the continued integration of blended learning models within English Language Teaching, especially in vocational school settings like Batam. The study reinforces that leveraging accessible digital tools and adaptive instructional designs is key to bridging the gap between traditional classroom instruction and the evolving demands of the global workforce. Continued investment in teacher capacity-building and digital infrastructure is necessary to maximize the full potential of this model in preparing students for their professional futures.

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