Experimental Study of a Blended Learning Approach in Teaching English to Non-Linguistic Students in Vietnam

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Abstract

Blended learning has attracted increasing scholarly attention in language education; however, empirical evidence regarding its effectiveness for non-linguistic learners in Vietnamese higher education remains limited. This study addresses this gap by investigating the implementation of a blended English teaching model for military medical students at Vietnam Military Medical University. A total of 156 non-linguistic students with varying levels of English proficiency participated in the study. Using a within-subject quasi-experimental design with repeated measures, students' English learning outcomes under traditional instruction (Terms 1 and 2) were compared with those under blended learning (Term 3) based on end-term examination scores. In addition, learners' attitudes toward blended learning were examined through a questionnaire grounded in Davis's (1989) Technology Acceptance Model. The findings indicate that blended learning was associated with improved English learning outcomes and more positive learner attitudes. Participants reported increased learner autonomy and overall satisfaction with the blended learning approach, suggesting that blended learning represents a viable instructional approach for teaching English to non-linguistic students in similar higher education contexts.

Keywords: blended learning, EFL instruction, higher education, non-linguistic students

1. Introduction

Blended learning (BL) has gained increasing attention as a pedagogical approach that integrates online learning components with traditional face-to-face classroom instruction. By combining digital technologies with in-person teaching, this hybrid model offers greater flexibility in content delivery and promotes student-centered learning (Marsh, 2012, pp. 3–4; Ma'arop & Embi, 2016, p. 41). In the context of English language teaching, blended learning has been shown to support the development of core language skills and enhance learner engagement through the effective integration of technological tools and instructor guidance (Liu & Chano, 2025, pp. 83–84).

A growing body of empirical research highlights the positive impact of blended learning on students' academic performance, engagement, and satisfaction (Means et al., 2013, p. 8; Alammary, Sheard, & Carbone, 2014, p. 441; Alajwaleen, 2024, p. 2806). For learners of English as a Foreign Language (EFL), blended learning provides opportunities to interact with authentic materials, practice language skills beyond classroom time, and receive ongoing instructional support within a structured learning environment (Vičič, 2020, p. 221; Alkhannani, 2023, p. 63). However, most existing studies have focused on linguistic majors or educational contexts outside Southeast Asia, leaving a research gap regarding non-linguistic learners in Vietnamese higher education.

Despite the documented benefits of blended learning, non-linguistic students often face limited exposure to English and substantial disciplinary demands, which may influence both learning outcomes and attitudes toward language learning. Addressing this gap is essential for developing instructional approaches that are responsive to the needs of this learner population.

To address these issues, the present study investigates the impact of blended learning on English language learning outcomes and learner attitudes among non-linguistic students in Vietnam. In addition, the study examines the perceived benefits and challenges associated with implementing blended learning in English language instruction within Vietnamese higher education. By focusing on a military medical university context, this research aims to provide context-sensitive insights that may inform curriculum development, instructional design, and educational policymaking, thereby contributing to more effective EFL practices for non-specialist student populations (Ruthven-Stuart, 2003, p. 160; Alammary, 2024, p. 4).

Research Questions

This study seeks to address the following research questions:

1. What effect does blended learning have on the learning outcomes of non-linguistic students?

2. How does the use of blended learning in English language teaching affect non-linguistic students' attitudes toward learning English?

3. What are the perceived benefits and challenges of using blended learning in teaching English to non-linguistic students?

Hypotheses

Based on findings from previous research (Alajwaleen, 2024, p. 2806; Alammary, 2024, p. 12; Liu & Chano, 2025, pp. 84–85), this study hypothesizes that blended learning will positively influence non-linguistic students' English learning outcomes and their attitudes toward English language learning. It is further anticipated that blended learning will offer benefits such as increased flexibility, learner motivation, and autonomy (Alammary et al., 2014, p. 442; Alkhannani, 2023, p. 65), while also presenting challenges related to infrastructure, digital competence, and instructional design (Allen & Seaman, 2013, p. 5; Ma'arop & Embi, 2016, p. 45). Overall, it was expected that the advantages of blended learning would outweigh its challenges, supporting its viability as an effective approach to teaching English to non-linguistic students in Vietnam.

2. Literature Review

2.1 Definition of Blended Learning and Its Benefits

Blended learning has emerged as a prominent instructional model that combines traditional face-to-face teaching with online components to create a more flexible and effective learning environment. Scholars generally agree that blended learning involves the integration of multiple educational technologies, including synchronous and asynchronous tools, mobile learning, and distance learning formats (Alajwaleen, 2024, p. 2806; Graham, 2013, p. 340). It is not limited to merely supplementing classroom instruction with digital content but represents a strategic fusion of learning modalities tailored to both institutional goals and learner needs (Alammary, Sheard, & Carbone, 2014, p. 441).

The popularity of blended learning stems from its potential to enhance the learning experience by providing flexibility, supporting diverse learning styles, and encouraging student-centered learning (Alammary, 2024, p. 2–3; Jdaitawi, 2019, p. 672-674; Marsh, 2012, p. 3–4). Clark (2015, p. 100) found that blended and flipped classroom approaches increased student engagement and academic performance, particularly in skill-based disciplines. Topping et al. (2022) conducted a systematic review across educational settings and concluded that blended models consistently improve learning outcomes, foster personalization, and promote critical thinking and metacognitive development.

In the field of English as a Foreign Language (EFL), blended learning supports multimodal interaction, self-paced study, and access to authentic materials, all crucial for language acquisition (Liu & Chano, 2025, pp. 83–84). Vičič (2020, pp. 220–221) highlights that digital integration allows for more dynamic and collaborative language classrooms, encouraging learner autonomy and continuous engagement. Ruthven-Stuart (2003, pp. 160–162) similarly found that the integration of ICTs in language programs not only reduced stress in classroom environments but also promoted independent learning and flexible access to materials.

Importantly, several studies have confirmed that blended learning is particularly effective for non-linguistic learners or students in specialized disciplines. Yao (2019, p. 120) demonstrated that adult learners with no linguistic background benefited from the structured flexibility of blended models. Yuan (2021, p. 22) found that non-English majors reported higher motivation and vocabulary retention when taught using blended strategies. This highlights the adaptability of blended learning across educational contexts and its potential to support English language instruction even in highly specialized academic environments.

Means et al. (2013, pp. 8–10) further affirmed through meta-analysis that blended learning outperforms both traditional and online-only instruction in enhancing English language proficiency. As such, the approach not only addresses diverse learner needs but also prepares students for digital literacy demands in academic and professional settings. These documented benefits suggest that blended learning holds particular promise for non-linguistic learners who require both structured guidance and flexible learning opportunities.

2.2 Previous Studies on Blended Learning in Teaching English to Non-Linguistic Students

Over the past decade, the implementation of blended learning (BL) has gained considerable attention in English language instruction, especially for non-linguistic students who often lack foundational exposure to English. Several studies have highlighted its cognitive impact, affective benefits, and institutional adaptability, forming a solid theoretical foundation for the present investigation.

Cognitively, blended learning has been shown to significantly improve linguistic competence. Alajwaleen (2024) found that a BL model integrating multimedia and face-to-face instruction resulted in improved vocabulary acquisition and more effective retention among EFL learners. Supporting this, Alkhannani (2023) observed substantial gains in reading and grammar skills among undergraduates enrolled in a hybrid English course at Ha'il University. Liu and Chano (2025, pp. 85–86), through a systematic literature review, further demonstrated that non-English majors in higher education consistently experienced improved outcomes in vocabulary, comprehension, and self-efficacy across BL environments. In a similar vein, Vičič (2020) reported that the integration of in-class and digital tools fostered more dynamic peer interaction and learner autonomy—factors that are particularly crucial for learners from non-linguistic backgrounds.

From an affective perspective, learner engagement and satisfaction emerge as central themes. According to Alharbi and Basiouni (2025), students' satisfaction with BL was strongly tied to the design quality and responsiveness of instructional materials. Clark (2015) echoed these findings in his study on flipped classrooms, noting heightened student motivation and positive perception of instructional delivery. Meanwhile, Yao (2019, pp. 116–117) emphasized the role of BL in improving adult learners' confidence and writing fluency, highlighting its transformative impact on learner attitudes.

In terms of scalability and institutional alignment, several broader studies have addressed the feasibility of BL across varied educational contexts. Means et al. (2013, p. 10) confirmed through meta-analysis that BL outperforms both traditional and purely online instruction across disciplines, while Staker et al. (2011) and Topping et al. (2022) identified infrastructural and strategic factors as decisive for successful adoption. In addition, Yuan (2021) provided a case study of BL application among non-English majors in China, underscoring the model's adaptability to local pedagogical needs and technological readiness.

Despite its promise, blended learning also presents operational challenges. As noted by Ma'arop and Embi (2016, p. 45), institutional constraints such as limited faculty training, time investment, and uneven digital infrastructure can hinder effective implementation. Allen and Seaman (2013) similarly cautioned that while online and hybrid learning formats are increasingly strategic in higher education, faculty resistance and resource disparities remain barriers to mainstream integration.

Taken together, these findings converge on the consensus that blended learning offers a viable, impactful, and increasingly necessary pedagogical approach for non-linguistic learners of English. Yet, the success of such initiatives relies heavily on how institutions navigate contextual variables—ranging from learner needs and digital access to instructor preparedness and curriculum design. Within the Vietnamese military medical education context, where discipline-specific demands and learner diversity are pronounced, the evidence justifies an exploration of how BL can be localized and optimized.

2.3 The Levels of Teaching Organization Applying the Blended Learning Mode

To provide a theoretical basis for selecting an appropriate blended learning model in the present study, blended learning can be categorized into different organizational levels. The blended learning model combines traditional classroom instruction with online learning components. Depending on the needs, infrastructure, and context of the training institution—including class sizes, classroom settings, the program's objectives, and the digital literacy of both teachers and students—blended learning can be implemented at different organizational levels (Alammary et al., 2014, p. 443) as follows (Table 1).

Table 1. Organizational levels of blended learning implementation (adapted from Alammary et al., 2014, p. 443)

Requirement	Level 1	Level 2	Level 3
Face-to-Face	Play a leading role	The activities include practice, experience, discuss, and answer questions.	Implement level 2 systematically, including testing and evaluation according to the output standards of the whole course, but live classes will still be maintained to answer learners' questions.
E-learning	Integrate in the form of web-based learning tasks, self-study via the internet according to instructions	Focus on self-study process, self-study content, test, evaluation, and discussion in virtual classroom...	

These levels demonstrate increasing reliance on e-learning components while maintaining varying degrees of face-to-face instruction, depending on pedagogical goals and institutional capabilities.

2.4 Some Teaching Models Implementing Blended Learning

Given that foreign language classes typically include learners with diverse proficiency levels, language abilities, and interests, the integration of traditional teaching and technology in blended learning can vary significantly. Teachers can select from a variety of blended learning models, depending on their learners' needs and institutional context.

Staker et al. (2011, p. 7) synthesized and categorized six core blended learning models that can be applied in educational contexts. These models provide different ways to implement the blended approach based on time, space, instructional responsibility, and student agency as shown in Figure 1.

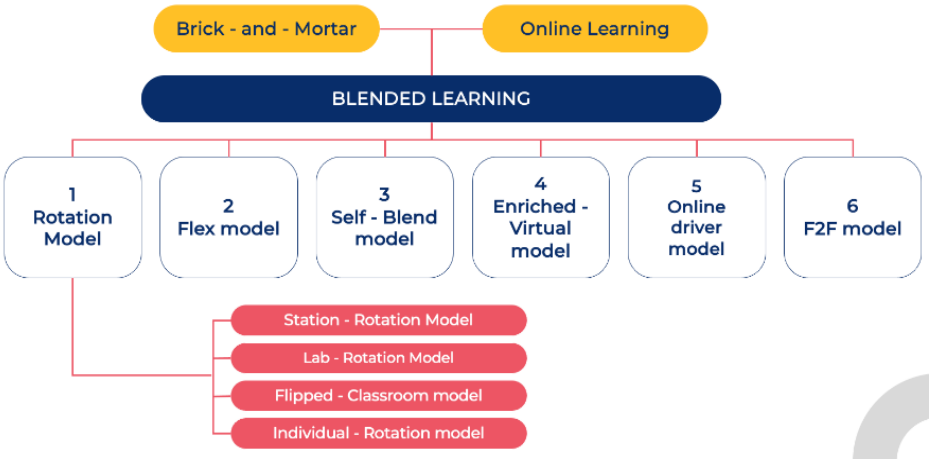


Figure 1. Models of blended learning (adapted from Staker et al., 2011, p. 7)

Figure 1 illustrates the structural differences among the six blended learning models, highlighting variations in the balance between online and face-to-face instruction as well as levels of teacher guidance and learner autonomy. These blended learning models are flexible and can be combined in various ways, and they are not mutually exclusive. In practice, institutions and instructors may adopt one or several models depending on pedagogical strategies and institutional conditions. Thus, the choice of a combined teaching model to bring efficiency and success to the teaching process depends on many factors, in which teachers need to understand learners' needs and instructional goals. Blended learning provides an additional technological dimension to language instruction. Table 2 below shows the characteristics and applicability of the six blended learning models.

Table 2. Blended learning models (adapted from Staker et al., 2011, p. 7)

Model	Characteristics	Applicability
Rotation model	The model is designed to alternate between face-to-face and online classes. Each group of learners will have a different schedule	- The learning environment is adaptable to meet varying needs. - Teachers have greater capacity to offer personalized support based on individual student needs.
Flex model	Learners mainly learn online. The teacher primarily serves as a guide and consultant while answering students' questions during in-person meetings in the classroom.	This model facilitates learner independence, collaboration, and engagement through its approach to online learning and personalized schedules.
Face-to-Face Driver model	The traditional classroom model plays a dominant role. Teachers integrate technology into regular classroom activities.	This model is appropriate for heterogeneous classes where students differ in ability and levels of understanding because the teacher will lead and monitor each student, support weak students to be able to keep up with the lecture.
Lab model	Learning takes place entirely online in a dedicated computer lab.	Appropriate for students who do not own the required electronic devices to study online or need extra supervision during the learning process.
Self-Blend model	Learners take online courses according to their individual needs, outside of the mainstream curriculum.	Appropriate for individuals with varying educational requirements, including enhancing their qualifications and developing personal skills.
Online Driver model	Learners use an online management platform to participate in the learning process, including receiving instructions and materials from teachers	Appropriate for learners who require flexibility in their daily schedules or in circumstances where they are unable to attend school due to illness, epidemics, natural disasters, etc.

As summarized in Table 2, each blended learning model differs in its instructional focus and applicability, allowing teachers to select or combine models based on learner needs and institutional conditions. These blended teaching modes typically combine online and face-to-face instruction to varying degrees, creating a learning environment that extends beyond physical classroom boundaries and is not limited by space or time and tailored to the needs, interests, and circumstances of each learner. These models offer diverse opportunities for interaction through multimodal learning materials such as images, videos, diagrams, and texts, while also facilitating interaction with classmates, peers from other classes, and teachers. Among these models, the Rotation model was selected for the present study due to its suitability for the course content, learner characteristics, and institutional conditions at Vietnam Military Medical University.

3. Methodology

3.1 Research Design

This study employed a within-subject quasi-experimental design with repeated measures and a survey-based attitudinal investigation. A single intact cohort of 156 non-linguistic students was followed across three consecutive academic terms, allowing comparison between traditional instruction (Terms 1 and 2) and blended learning (Term 3). This design is suitable for educational settings where intact classes are used, as each participant serves as their own control, reducing between-group variability and strengthening internal validity (Creswell & Creswell, 2018).

Learners' perceptions of blended learning were examined using Davis's (1989) Technology Acceptance Model (TAM). The integration of achievement data and TAM-based attitudinal measures enabled methodological triangulation, enhancing the validity of the findings (Jiang & Li, 2012; Liu & Chano, 2025).

3.2 Research Participants

The participants consisted of a single intact cohort of 156 first- and second-year military medical students (aged 18–20) enrolled in the long-term English program at Vietnam Military Medical University (VMMU). The same 156 students participated in all three academic terms, enabling direct within-subject comparison between traditional instruction (Terms 1 and 2) and blended learning (Term 3).

Accordingly, the analysis was based on 156 paired observations per instructional condition, which reduced between-group variability and

strengthened internal validity. Although gender, major specialization, and initial English proficiency were not controlled as independent variables, the repeated-measures design mitigated the influence of individual differences.

3.3 Data Collection Methods

A survey questionnaire was employed, developed based on Davis's (1989) Technology Acceptance Model (TAM). It comprised three core constructs—perceived usefulness, perceived ease of use, and behavioral intention to use—measured using a five-point Likert scale. TAM has been widely applied to examine learners' acceptance of technology-enhanced and blended learning environments (Jiang & Li, 2012; Liu & Chano, 2025).

In addition, a pretest–posttest experimental approach was used to evaluate the effects of blended learning on students' reading, writing, listening, and speaking skills. Learning outcomes under the blended learning condition (Term 3) were compared with those obtained under traditional instruction (Terms 1 and 2), allowing within-subject comparison of learner performance across instructional modes (Alajwaleen, 2024).

3.4 Research Instruments

The questionnaire was adapted from Davis's (1989) Technology Acceptance Model and measured perceived usefulness, perceived ease of use, and behavioral intention using a five-point Likert scale. Prior validation of the TAM instrument in blended learning research supports its construct validity (Jiang & Li, 2012; Liu & Chano, 2025).

Achievement tests assessing reading, writing, listening, and speaking skills were aligned with the course syllabus. Both instruments underwent content validation through expert review by three senior English lecturers, and minor revisions were made for clarity and alignment.

3.5 Research Procedures

Traditional face-to-face instruction was implemented in Terms 1 and 2, while blended learning was applied in Term 3 using the same cohort of students. To assess instructional impact, students' final exam scores in Term 3 were compared with those from Terms 1 and 2, with course content, assessment criteria, and instructors kept consistent across all terms in accordance with institutional training regulations.

3.6 Data Analysis

Paired-samples t-tests were conducted to compare students' exam scores under traditional instruction (Terms 1 and 2) and blended learning (Term 3), as the same participants were measured repeatedly across instructional conditions. The level of statistical significance was set at $\alpha = 0.05$.

3.7 Ethical Considerations

Ethical approval for the study was granted by Vietnam Military Medical University. All participants were informed of the purpose of the research and their right to withdraw at any time without academic penalty. Participation was voluntary, and written informed consent was obtained prior to data collection.

To ensure confidentiality, student identities were anonymized, and all data were reported in aggregated form. Examination scores and questionnaire responses were used solely for research purposes and were stored securely by the research team.

3.8 Research Location and Duration

The study was conducted over eight weeks at the Vietnam Military Medical University during the 2023–2024 academic year (Terms 1 and 2) and the first term of 2024–2025 (Term 3). The military medical context provided a specialized setting for examining blended learning among non-linguistic students, consistent with previous research on context-specific implementation (Liu & Chano, 2025). However, the findings may have limited generalizability beyond military medical education settings.

4. Implementation of Blended Learning at Vietnam Military Medical University (VMMU)

4.1 Availability of Facilities

Regarding technological infrastructure, VMMU meets basic requirements for implementing blended learning and is equipped with computers, projectors, computer laboratories, multimedia classrooms with Internet access, and an institutional e-learning platform. In addition, the university has a team of young, technologically competent instructors, and its students are primarily digitally literate young adult learners who can readily engage with online learning resources.

4.2 Organizing an Experimental Lesson Using the Blended Learning Model at VMMU

The application of blended learning models and levels of blended learning implementation in English teaching sessions at VMMU is conducted flexibly, taking into consideration the content and characteristics of each lesson. For the experimental teaching session illustrated in this paper, the Rotation model was chosen specifically, as it aligns with the content, characteristics, and objectives of the Respiratory system lesson. The Rotation model facilitates personalized learning, active engagement, and skill development as students rotate through different stations to enhance their understanding of respiratory organs, illnesses, and symptoms. This approach optimizes class time, encourages English language use, and supports collaborative activities in clinical situations. The Rotation model allows for the

learning content requiring the cognitive levels of remembering, understanding, and applying of Bloom's taxonomy to be distributed to students to finish by themselves at home before class. In-class instructional time, which allows students to seek timely support from teachers and peers, is primarily allocated to learning activities that involve higher-order cognitive processes, namely analyzing, evaluating, and creating. Furthermore, prior studies have endorsed the Rotation model in similar contexts. For example, Liu and Chano (2025, pp. 85–86) found that the Rotation model improves learner motivation, academic achievement, and active engagement. Similarly, Vičič (2020, p. 224) reported that this model supports self-paced learning and meaningful collaboration between students and teachers.

Below is an illustration of a teaching session using the Rotation model, specifically the Station Rotation and Flipped Classroom models (see Figure 2).

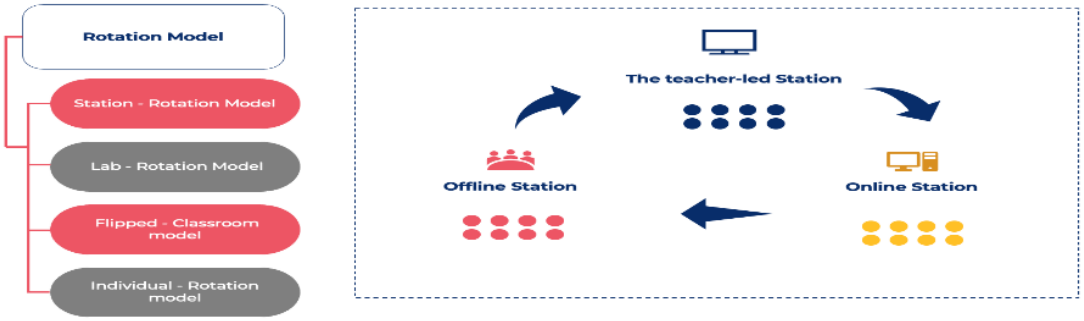


Figure 2. Rotation model used in the experimental blended learning session

Figure 2 illustrates how the Station Rotation and Flipped Classroom models were integrated within a single teaching session to support both individual preparation and in-class interaction. The two teaching models have been applied in the teaching session of Unit 7, *Respiratory System* taken from the textbook titled *Career Path Medical*. The aims of the lesson are: (1) In terms of knowledge, in addition to spelling and using words and phrases to describe the respiratory system and its organs after studying this lesson, learners must name some common respiratory illnesses and their symptoms mentioned in the lesson. (2) About skills, learners are expected to apply listening and reading skills well: scanning for details and skimming for gist; and take part in pair-work or group-work activities positively and productively. (3) The attitudinal objectives aim to encourage active use of words, phrases, and expressions in clinical role-play situations; and to be excited about using only English in English lessons. The distribution of knowledge for the experimental teaching session based on the Bloom's taxonomy is described in the Figure 3 below.

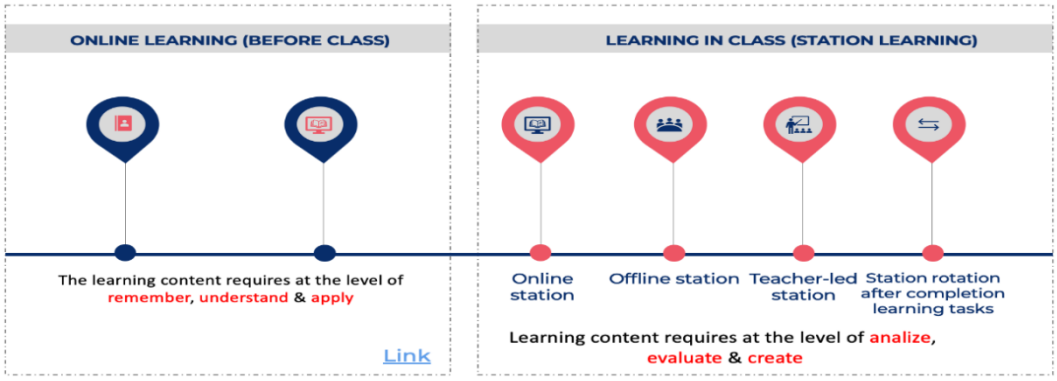
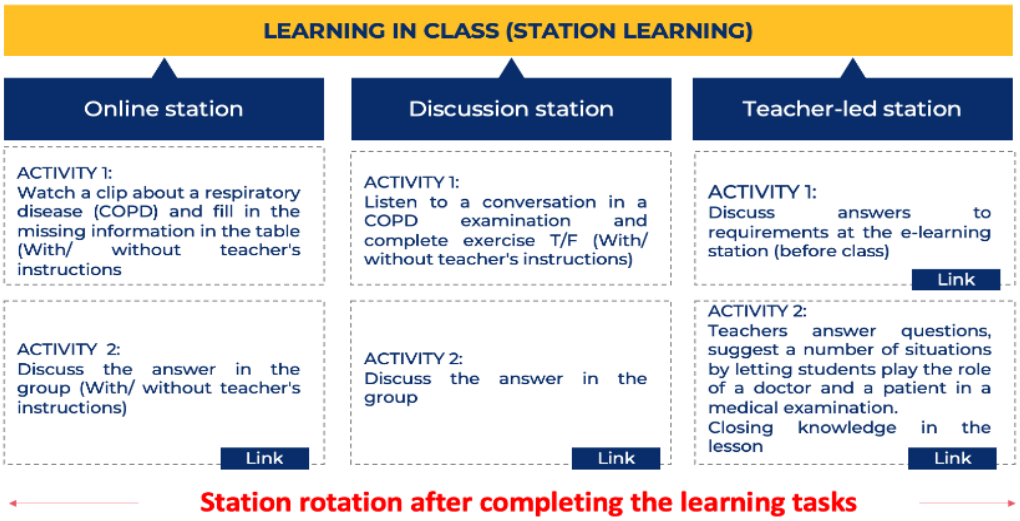


Figure 3. Distribution of learning activities based on Bloom's taxonomy

Figure 3 demonstrates how learning activities were aligned with Bloom's taxonomy, distinguishing between lower-order cognitive tasks completed before class and higher-order tasks addressed during face-to-face sessions. As stated in Figure 3, the lesson content is divided by the teacher into two parts for students to complete at home and in class. In class, students are divided into three groups working in different stations of *Online station*, *Discussion station*, and *Teacher-led station*. The learning content assigned in activities in face-to-face class is rotated in the form of rotation model for each student group to complete. The learning progress is presented in Table 3 below:

Table 3. Description of an experimental blended learning session



As outlined in Table 3, learning activities were systematically distributed across stations to ensure balanced participation and progressive skill development. Activities concretized in each station are presented in the below figure (see Figure 4). Each student group will move to the next station after completing their given tasks in the previous station.

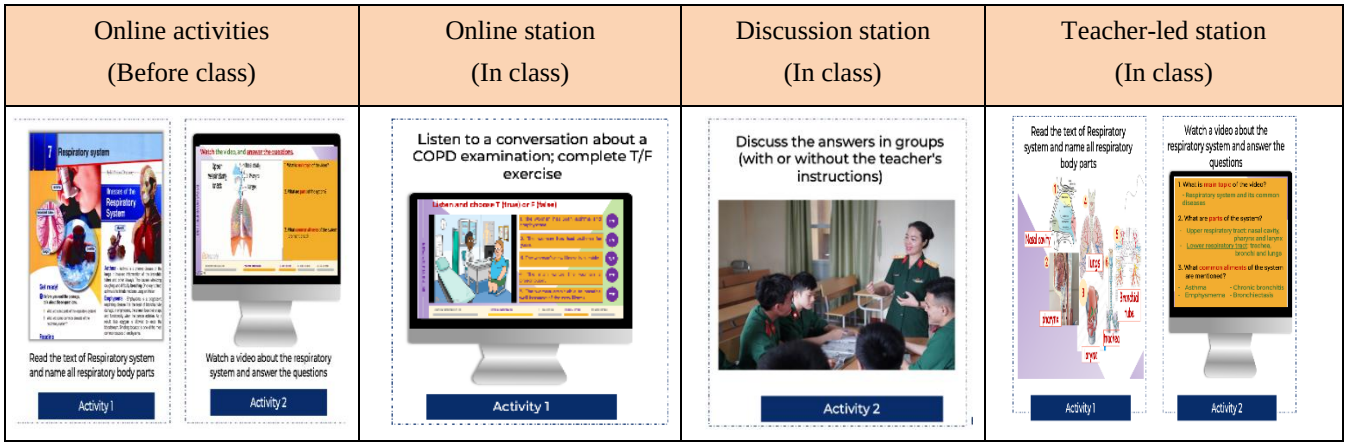


Figure 4. Learning activities assigned to different stations in the blended learning session

Figure 4 presents specific learning activities assigned to each station, illustrating the rotation process and task differentiation across learning modes. For classes with fewer than 30 students, the teacher typically divides the class into three groups. For larger classes, the class may be divided into four to six groups, with two groups following the same learning sequence and alternately completing tasks at the online learning and discussion stations. After all groups have completed their assigned tasks at each station, the teacher coordinates the lesson by answering questions, facilitating discussion, and consolidating key learning points. During station-based activities conducted in parallel, the teacher assumes a supervisory and supportive role, providing guidance as needed. To implement this teaching mode effectively, teachers are required to possess basic information technology skills and experience in e-learning instruction. In this context, blended learning is implemented at Level 2 (see Table 1).

5. Results

This section presents the results of the study in relation to the three research questions. Quantitative data were obtained from students' end-of-term English examination scores, while attitudinal and perception data were collected through a post-intervention survey administered after the blended learning implementation.

5.1 Effects of Blended Learning on Learning Outcomes (RQ1)

Research Question 1 examined whether the blended learning approach had an impact on students' English learning outcomes. Terms 1 and 2 were conducted using traditional face-to-face instruction, whereas blended learning was implemented in Term 3.

Descriptive results showed a gradual increase in students' mean examination scores across the three terms, with the highest mean recorded

in Term 3. A paired-samples t-test comparing Term 1 and Term 3 revealed that students' examination scores in Term 3 (M = 7.63, SD = 0.60) were significantly higher than those in Term 1 (M = 7.36, SD = 0.71), $t(155) = -5.16$, $p < .001$. The effect size, as measured by Cohen's d (d = 0.41), indicated a small-to-moderate practical impact of blended learning on students' English learning outcomes.

An additional paired comparison between Term 2 and Term 3 also indicated a statistically significant improvement ($p = .002$), although the magnitude of this difference was smaller than that observed between Term 1 and Term 3. The effect size for the comparison between Term 2 and Term 3 was small (Cohen's d = 0.23), indicating a modest but consistent improvement following the implementation of blended learning.

Overall, the results suggest that students' English learning outcomes improved following the adoption of the blended learning approach.

5.2 Students' Attitudes toward Blended Learning (RQ2)

Research Question 2 examined whether students' attitudes toward English learning changed after the implementation of blended learning. Overall attitude scores were compared before and after the intervention using a paired-samples t-test.

The results indicated a significant increase in students' overall attitudes following the blended learning intervention. The mean attitude score increased from the pre-intervention phase (M = 3.50, SD = 0.33) to the post-intervention phase (M = 4.16, SD = 0.50), t(155) = –3.65, p = .006. These findings suggest that students developed more positive attitudes toward English learning after experiencing the blended learning approach.

5.3 Perceived Benefits and Challenges of Blended Learning (RQ3)

To address Research Question 3, students' perceptions of the benefits and challenges of blended learning were examined using descriptive statistics based on survey responses. Table 4 summarizes the key perceived benefits and challenges as reported by the participants.

Table 4. Students' perceived benefits and challenges of blended learning

Category	Survey item	Mean	SD
Benefit	Flexibility in learning time and pace	4.21	0.61
Benefit	Access to learning materials	4.18	0.58
Benefit	Support for self-study	4.05	0.64
Benefit	Learner autonomy	3.97	0.69
Challenge	Time management for online tasks	3.62	0.78
Challenge	Self-discipline in self-study	3.55	0.81
Challenge	Technical issues (e.g., internet connectivity)	3.41	0.85

Note. Responses were measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

5.3.1 Perceived benefits of blended learning

As shown in Table 4, students reported generally positive perceptions of the benefits of blended learning. The highest mean scores were observed for flexibility in learning time and pace (M = 4.21, SD = 0.61) and access to learning materials (M = 4.18, SD = 0.58), indicating that students particularly valued the ability to manage their learning more independently. Support for self-study (M = 4.05, SD = 0.64) and learner autonomy (M = 3.97, SD = 0.69) also received relatively high ratings. These results suggest that blended learning was widely perceived as facilitating more efficient learning practices and greater control over the learning process among non-linguistic students.

5.3.2 Perceived challenges of blended learning

Despite the overall positive evaluations, students also reported several challenges associated with blended learning. As presented in Table 4, issues related to time management for online tasks (M = 3.62, SD = 0.78) and maintaining self-discipline during self-study (M = 3.55, SD = 0.81) received moderate mean scores, suggesting that these difficulties were relatively common. Technical issues, such as unstable internet connectivity (M = 3.41, SD = 0.85), were also reported, although to a lesser extent. These findings indicate that while blended learning offered notable benefits, its implementation also posed practical challenges that required students to adapt their learning strategies.

6. Discussion

This section interprets the findings in relation to the research questions within the context of existing literature.

Regarding Research Question 1, a statistically significant, though modest, improvement in students' English learning outcomes was observed during the blended learning phase. This pattern is consistent with the meta-analytic findings of Means et al. (2013), who reported that blended learning generally yields higher academic achievement than traditional instruction, typically with moderate effect sizes rather than large gains.

Similar incremental improvements have been documented in recent EFL studies involving non-English-major learners. Alajwaleen (2024) and Alkhannani (2023) both reported gradual gains in language performance following blended learning implementation, suggesting that such models support learning progression through extended practice and flexible access to instructional materials. The present findings align with this trend, indicating steady rather than dramatic improvement. The observed improvement was modest in magnitude; however, the effect size suggests that the learning gains were educationally meaningful for non-linguistic learners within a highly structured

instructional context. Moreover, the small-to-moderate effect size is consistent with previous blended learning studies in EFL contexts, particularly those involving non-linguistic learners and short-term interventions, where incremental yet educationally meaningful gains are typically observed.

From a contextual perspective, the results also resonate with Liu and Chano (2025), who emphasized that the effectiveness of blended learning is highly context-dependent. In addition, Vičič (2020) argued that digital integration facilitates self-paced learning and deeper cognitive engagement, which may contribute to sustained improvement over time. These mechanisms appear relevant to the current study, where learning gains emerged within a highly structured instructional environment.

In contrast, Yuan (2021) reported more pronounced achievement gains among non-English majors in less constrained learning contexts, while Yao (2019) found mixed outcomes, with positive perceptions but limited performance change. Compared with these studies, the present findings suggest that institutional constraints and limited exposure to English may moderate the magnitude of learning gains. Nevertheless, the observed improvement remains pedagogically meaningful for non-linguistic learners operating under such conditions. Beyond cognitive learning outcomes, the implementation of blended learning also influenced students' affective responses toward English learning.

With respect to Research Question 2, the findings indicate a statistically significant increase in students' overall attitudes toward English learning after exposure to blended learning. Although the increase in attitudinal scores was moderate in magnitude, the observed change suggests a meaningful shift in learners' perceptions of English learning within a blended learning environment. This result is consistent with studies by Alajwaleen (2024) and Alkhannani (2023), which reported improved learner motivation and satisfaction in blended EFL contexts, particularly among non-English-major students.

The present findings also align with Vičič (2020) and Marsh (2012), who highlighted the role of multimedia resources and self-paced learning in enhancing learner autonomy and engagement. These features appear to have supported more positive learner attitudes in the current study, especially for students managing intensive academic workloads.

However, previous research has also reported more nuanced attitudinal outcomes. Yao (2019) found that positive perceptions of blended learning did not always translate into strong attitudinal change, particularly among learners with limited self-regulation. Compared with these findings, the clearer attitudinal shift observed in the present study may be attributed to the structured design of blended activities and assessment requirements.

In line with the Technology Acceptance Model (Davis, 1989), the results suggest that perceived usefulness and ease of use may play an important role in shaping students' acceptance of blended learning. Overall, the findings indicate that blended learning can support positive attitudinal change even within highly regulated, non-linguistic educational contexts. Beyond attitudinal change, it is also important to consider how students perceived the specific benefits and challenges associated with the blended learning approach.

The findings related to Research Question 3 suggest that students perceived both meaningful benefits and notable challenges in the implementation of blended learning. Because Research Question 3 aimed to explore learners' perceived benefits and challenges rather than to test group differences, descriptive statistics were considered appropriate for capturing overall perception trends. Regarding perceived benefits, students' positive evaluations of flexibility, access to learning materials, and support for self-study align with previous research emphasizing the pedagogical value of blended learning environments. Marsh (2012) and Vičič (2020) highlighted that blended learning enables learners to engage with content beyond classroom constraints, thereby fostering learner autonomy and sustained engagement. Similar observations were reported by Liu and Chano (2025), who found that blended learning offers extended learning opportunities for students with limited exposure to the target language outside formal instruction. The present findings further support this view, particularly in contexts where learners face intensive academic demands.

At the same time, the challenges identified in this study underscore important implementation-related issues. Difficulties related to time management, self-discipline, and technical infrastructure have been widely documented in blended learning research. Alammary et al. (2014) and Ma'arop and Embi (2016) emphasized that successful blended learning requires not only instructional innovation but also adequate institutional support, digital infrastructure, and learner readiness. In addition, Jiang and Li (2012) noted that individual factors such as self-regulation capacity significantly influence learners' ability to adapt to blended environments. This concern is echoed in Al-Sabab (2023), who reported that learners often struggle with digital self-discipline in blended formats and benefit from clearer structure and guidance.

From a pedagogical perspective, these findings suggest that the effectiveness of blended learning may depend not solely on the mode of delivery but also on the quality of instructional design and institutional support. As argued by Graham (2013) and Allen and Seaman (2013), technological integration must be accompanied by pedagogically sound content and a supportive learning ecosystem. In this regard, the present study extends existing research by illustrating that blended learning can be adapted to a military medical context, where English is a secondary competency and learning conditions are highly structured. While challenges remain, the perceived benefits indicate that blended learning can function as a viable and flexible approach when thoughtfully designed and supported.

7. Limitations and Delimitations

This study has several limitations. First, the sample consisted of 156 students from a single institution, which may limit the generalizability of the findings. Second, the duration of the blended learning intervention was relatively short and may not capture

long-term learning effects. Third, individual learner variables such as gender, major specialization, and initial English proficiency were not controlled, which may have influenced learning outcomes.

Regarding delimitations, this study intentionally focused on a single intact cohort of non-linguistic students within a military medical university in order to maintain contextual consistency. In addition, the study was delimited to examining English learning outcomes and learner attitudes toward blended learning rather than broader institutional or technological variables. These delimitations helped maintain a focused research scope within the specific instructional context of VMMU.

8. Conclusion

This study examined the effectiveness of blended learning in English language instruction for non-linguistic students at Vietnam Military Medical University (VMMU). Drawing on examination results and post-intervention survey data, the findings indicate that the implementation of blended learning was associated with modest but meaningful improvements in students' English learning outcomes, more positive learner attitudes toward English learning, and clear perceptions of both benefits and challenges related to the blended learning approach.

With respect to learning outcomes, the results suggest that blended learning supported incremental academic gains rather than dramatic improvement. Although the magnitude of change was small to moderate, these gains are pedagogically meaningful for non-linguistic learners operating within a highly structured educational context. In terms of affective outcomes, students demonstrated more positive attitudes toward English learning following exposure to blended learning, indicating improved motivation, engagement, and acceptance of technology-enhanced instruction. These attitudinal shifts appear to be closely linked to perceived usefulness, ease of use, and opportunities for autonomous learning.

In addition, students reported notable benefits of blended learning, particularly in relation to flexibility, access to learning materials, and support for self-study. At the same time, challenges related to time management, self-discipline, and technical constraints were also identified. These findings highlight that the effectiveness of blended learning depends not only on the mode of delivery, but also on the quality of instructional design, learner readiness, and institutional support.

Taken together, the findings suggest that blended learning can function as a viable and context-appropriate approach for teaching English to non-linguistic students in specialized and highly regulated educational environments. While challenges remain, careful planning, targeted teacher training, and adequate technological infrastructure may help maximize the benefits of blended learning. However, the findings should be interpreted with caution due to the contextual scope and duration of the intervention.

Future research should involve larger and more diverse learner populations, longer implementation periods, and additional learner-related variables in order to further examine the long-term impact and scalability of blended learning in English language education.

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Authors' contributions

The authors contributed to this study as follows. The first author was responsible for the study design, data collection, data analysis, and manuscript preparation. The second author contributed to data collection and provided feedback on the manuscript. The corresponding author supervised the research process, contributed to the interpretation of the findings, and critically revised the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Informed consent

Informed consent was obtained from all participants involved in the study.

Ethics approval

The study was conducted in accordance with the ethical guidelines of Vietnam Military Medical University, where the research was carried out.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available

due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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