

Apply the blended learning model in national defense and security education for university students in Viet Nam

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Article Info

Article history:

Received Oct 7, 2025

Revised Feb 23, 2026

Accepted Mar 10, 2026

Keywords:

Blended learning

Digital transformation

National defense-security education

Teaching innovation

University students

ABSTRACT

Despite the growing global consensus supporting the efficacy of blended learning, research remains scarce regarding its optimal application within specialized, practical disciplines like national defense and security education (NDSE) in Viet Nam higher education. This study addresses this empirical gap by analyzing the implementation, challenges, and impact of the blended learning model in NDSE for university students in Viet Nam. The study employed a mixed-methods design, encompassing a comprehensive literature review, the development of a theoretical model, and a quantitative survey of 312 students from several universities. Data were rigorously analyzed using structural equation modeling (SEM) to test the relationships among implementation factors, engagement, and learning outcomes. The findings indicate that technological infrastructure and digital competence are crucial preconditions for blended learning application, which enhances students' interaction, learning interest, and ultimately, positive learning outcomes. However, limitations were identified, including insufficiently uniform technological infrastructure and the need to mitigate the increased workload for lecturers. These results provide broader policy implications for curriculum design, requiring targeted investment in IT infrastructure and systematic development of faculty digital literacy to effectively support the digital transformation of specialized military and security education in Viet Nam.

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1. INTRODUCTION

In the context of digital transformation and international integration, Vietnamese higher education is facing an urgent need to innovate teaching methods in order to improve training quality, meet learning outcomes, and respond to societal demands [1]–[3]. This mission of innovation relates directly to each subject. Alongside political theory courses, the subject of national defense and security education (NDSE) plays an important role in fostering students' sense of responsibility, political awareness, and basic military skills, thereby contributing to the development of a generation of citizens with patriotism and readiness to defend the nation [4]–[6]. The development of information technology and online learning environments has created opportunities to integrate face-to-face teaching with online instruction, leading to the emergence of the blended learning model. Globally, many studies have confirmed that blended learning generates positive effects, not only enhancing flexibility but also improving self-study capacity, critical thinking, and the engagement between learners and instructors [7].

In the context of ongoing reform and educational breakthroughs in Vietnamese higher education, applying the blended learning model to NDSE is regarded as a promising approach to improve teaching effectiveness, overcome the limitations of traditional methods, and align with the current trend of digital transformation. Against this backdrop, the present study aims to analyze the application of blended learning in NDSE for university students in Viet Nam, thereby evaluating its advantages and limitations, as well as discussing key issues to enhance its effectiveness [8].

International studies: the blended learning model has been widely recognized by international scholars as one of the dominant trends in higher education innovation in the 21st century [9], [10]. There is an argument that blended learning is not merely a combination of online and face-to-face instruction, but a pedagogical model that fosters learners' active engagement and creativity within diverse learning environments [11]. Empirical studies have demonstrated that blended learning improves student participation, enhances self-study capacity, and better supports the development of critical thinking and collaboration skills [12], [13]. In specialized fields such as military and defense education, several studies suggest that integrating online and face-to-face modes can enhance training effectiveness, particularly in theoretical components, thereby allocating more time for practical exercises [14], [15]. This highlights the potential of blended learning in disciplines that require both theoretical knowledge and practical skills [16], [17].

Studies in Viet Nam: blended learning has attracted increasing scholarly attention in recent years, especially after the COVID-19 pandemic. There is a study asserted that blended learning contributes to improving training quality, enabling students to develop self-study capacity and adapt to digital learning environments [18]. There is also a study that emphasized blended learning not only enables lecturers to innovate their teaching methods but also encourages students to develop technological skills and strengthen collaborative learning [19]. In addition, another research highlighted that combining online and face-to-face learning expands access to knowledge and better supports students in personalizing their learning process [20]. However, most of these studies have focused on fields such as economics, business administration, medicine, or information technology. Research directly related to NDSE remains limited. This creates a gap that warrants further exploration, as NDSE is a distinctive subject that requires both theoretical knowledge and military training, posing unique challenges for the implementation of blended learning.

The literature review indicates that blended learning has been confirmed to be effective both internationally and in Viet Nam. Nevertheless, in the field of NDSE, existing research is still scarce, with a lack of empirical evidence regarding its effectiveness in higher education. Therefore, this study focuses on applying the blended learning model in NDSE for university students in Viet Nam, aiming to provide data and contribute to both theory and practice. The research questions posed are:

- i) How is the blended learning model applied in NDSE for university students in Viet Nam?
- ii) What impacts does the application of this model have on teaching and learning activities?
- iii) What challenges and obstacles should be addressed to improve its effectiveness?

NDSE, which mandates the integration of academic theory with rigorous physical and military training, presents a unique pedagogical challenge for blended learning implementation compared to purely theoretical disciplines. Maximizing learning effectiveness requires a model that seamlessly connects online theoretical study with high-stakes, hands-on, face-to-face practical exercises. Against this backdrop, the main research problem addressed by this study is the lack of empirical evidence and a validated framework to assess the application, challenges, and impact of the blended learning model specifically within the context of NDSE for university students in Viet Nam.

2. METHOD

2.1. Theoretical foundation

The blended learning model is grounded in constructivist theory, in which learners play a central role, actively constructing knowledge through interaction and experience [2], [3]. In addition, experiential learning theory emphasizes the importance of integrating theory with practice in the learning process [21]. This provides the basis for applying blended learning in NDSE, a subject that encompasses both theoretical knowledge and specialized military practice [22], [23]. Furthermore, the community of inquiry (CoI) framework is also employed to analyze the effectiveness of blended learning [24]. This framework highlights three critical elements in a learning environment: cognitive presence, social presence, and teaching presence. These elements are closely interconnected, creating coherence in blended teaching and learning activities. In the scope of this study, the "application of the blended learning model in NDSE for university students in Viet Nam" is understood as the process of organizing NDSE courses through the integration of face-to-face classroom learning and online learning on digital platforms. This application involves leveraging information technology infrastructure, enhancing the digital competencies of lecturers and students, and combining teaching methods to increase participation, learning interest, self-study ability, and the effectiveness of acquiring NDSE knowledge and skills.

2.2. Research model

Based on the theoretical foundation of blended learning and the particular characteristics of NDSE, this study develops a research model comprising three main components. First, the input factors include information technology infrastructure and the digital competencies of lecturers and students, which are prerequisites for implementing blended learning. Second, the mediating factors are the level of blended learning application and students' interaction and learning interest. Third, the output factor is reflected in the learning outcomes of NDSE. This model enables an analysis of the relationships among implementation conditions, the extent of application, and the learning experience, thereby evaluating the impact of blended learning on NDSE learning outcomes. Based on the theoretical foundation and the proposed hypotheses, the hypothesized relationships are visually represented in the conceptual model in Figure 1. Drawing from the theoretical foundation and research model, the author proposes five hypotheses as:

- H1: information technology infrastructure positively influences the level of blended learning application in NDSE.
- H2: the digital competencies of lecturers and students positively influence the level of blended learning application.
- H3: the application of blended learning positively influences students' interaction and learning interest.
- H4: students' interaction and learning interest positively influence NDSE learning outcomes.
- H5: the application of blended learning has a direct positive effect on NDSE learning outcomes.

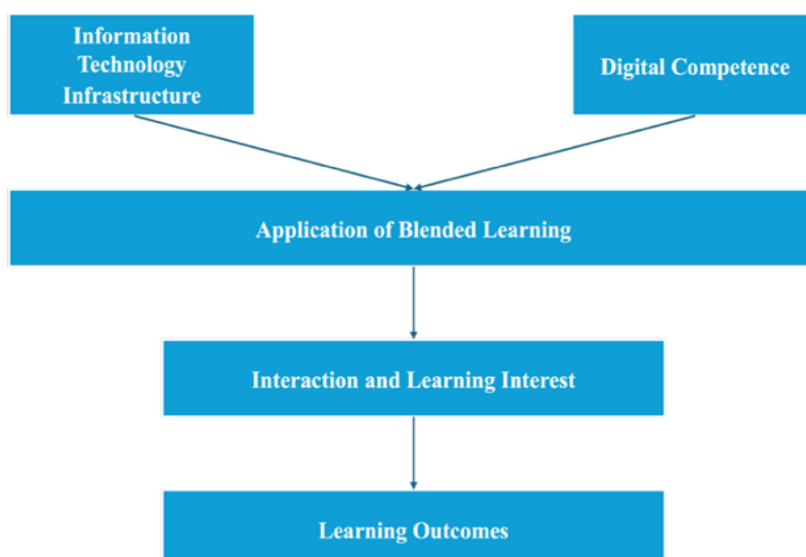


Figure 1. Proposed research model

2.3. Research methodology

This study employed a mixed-methods approach. In the initial stage, a qualitative method was applied through document analysis to develop the theoretical model, formulate research hypotheses, and design preliminary measurement scales. Based on this foundation, the subsequent stage implemented a quantitative method to test the model and hypotheses. Qualitative data were analyzed using thematic analysis. The results helped refine the theoretical model, propose research hypotheses, and construct preliminary measurement scales for latent variables, thereby providing the basis for the quantitative phase.

Prior to the main survey, the measurement scales were subjected to pilot testing with 50 students. Content validity was established through expert review by three NDSE pedagogy specialists. Construct validity was subsequently confirmed using exploratory factor analysis (EFA), followed by confirmatory factor analysis (CFA), ensuring the scales' reliability and validity.

The sample was obtained using a probability sampling approach. Specifically, a multi-stage cluster sampling technique was employed to select 312 students from a representative group of universities in Viet Nam that officially implement blended NDSE courses. The selection criteria ensured that participants had completed at least one blended NDSE module, maximizing the relevance of their feedback.

3. RESULTS AND DISCUSSION

3.1. Survey sample collection results

The survey was conducted with a valid sample of 312 students from universities in Viet Nam who had participated in the NDSE course through blended learning, using probability sampling methods. Among them, 47.2% were male and 52.8% were female. The proportion of first- and second-year students accounted for 51.9%, while third-year students and above accounted for 48.1%. The demographic characteristics of the sample are summarized in Table 1, showing a relatively balanced distribution by gender and year of study.

The descriptive statistics, as in Table 2, indicate that the mean values of the variable groups range from 3.81 to 3.96, reflecting a relatively high level of student agreement. The standard deviations range from 0.74 to 0.81, suggesting a moderate degree of data dispersion. Skewness and kurtosis values fall within ± 1 , indicating that the data are approximately normally distributed and suitable for factor analysis and structural equation modeling (SEM).

Table 1. Characteristics of the survey sample

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	147	47.2
Female	165	52.8
Year of study		
Year 1–2	162	51.9
Year 3 and above	150	48.1
Total	312	100.0

Table 2. Descriptive statistics of observed variable groups

Variable groups	Mean	SD	Skewness	Kurtosis
Information technology infrastructure	3.89	0.79	-0.40	-0.18
Digital competence	3.81	0.81	-0.41	-0.20
Application of blended learning	3.96	0.74	-0.38	-0.17
Interaction and learning interest	3.91	0.79	-0.40	-0.21
Learning outcomes	3.91	0.79	-0.35	-0.22

3.2. Reliability testing of the measurement scales

The measurement scales were evaluated using Cronbach's alpha coefficients. The results show that all scales achieved alpha values ranging from 0.78 to 0.91, indicating good reliability. The corrected item-total correlation coefficients for all observed variables were greater than 0.3, and thus no items were eliminated. The reliability testing results, summarized in Table 3, confirm that all measurement scales possess good internal consistency, with Cronbach's alpha coefficients exceeding the recommended threshold of 0.7.

3.3. Exploratory factor analysis

The EFA results indicate that the Kaiser-Meyer-Olkin (KMO)=0.903 (>0.6) and Bartlett's test was statistically significant (Sig. <0.001), confirming that the data were suitable for factor analysis. Five factors were extracted, consistent with the theoretical model, explaining 67.8% of the total variance. All observed variables had factor loadings greater than 0.5. The results of the EFA, as presented in Table 4, validated the factor structure of the conceptual model, explaining 67.8% of the total variance.

Table 3. Reliability testing results of the measurement scales

Variable groups	Number of items	Cronbach's alpha
Information technology infrastructure	5	0.82
Digital competence	6	0.85
Application of blended learning	5	0.88
Interaction and learning interest	4	0.78
Learning outcomes	5	0.91

Table 4. Results of EFA

Factors	Eigenvalue	Variance extracted (%)
Information technology infrastructure	3.21	18.2
Digital competence	2.98	16.9
Application of blended learning	3.45	19.6
Interaction and learning interest	2.67	14.5
Learning outcomes	3.05	18.6
Total	–	67.8

3.4. Confirmatory factor analysis

The CFA results show that the measurement model fits the survey data well: chi-squared per degree of freedom (χ^2/df)=2.15 (<3), comparative fit index (CFI)=0.951 (>0.9), Tucker–Lewis index (TLI)=0.944 (>0.9), root mean square error of approximation (RMSEA)=0.058 (<0.08). These indices indicate a good model fit. All standardized factor loadings were greater than 0.6 and statistically significant ($p < 0.001$), confirming convergent validity. Discriminant validity was also established, as the average variance extracted (AVE) of each factor was greater than the squared correlations with other factors. The fit indices and standardized factor loadings from the CFA are detailed in Table 5, confirming the convergent and discriminant validity of the measurement scales. Thus, the measurement scales in the research model achieved internal consistency, composite reliability, convergent validity, and discriminant validity, providing a solid foundation for the subsequent SEM analysis.

Table 5. CFA results of the measurement scales

Variable groups	Factor loading (λ)	CR	AVE	Cronbach's α
Information technology infrastructure	0.72-0.83	0.84	0.57	0.81
Digital competence	0.68-0.85	0.86	0.60	0.83
Application of blended learning	0.70-0.88	0.89	0.62	0.85
Interaction and learning interest	0.73-0.87	0.88	0.64	0.86
Learning outcomes	0.71-0.84	0.87	0.59	0.84

3.5. Testing the research model and hypotheses

SEM analysis shows that the theoretical model fits the data well (χ^2/df =2.23; CFI=0.947; TLI=0.939; and RMSEA=0.061). The hypothesis testing results indicate the following: information technology infrastructure and digital competence positively influence the application of blended learning ($\beta=0.34$; $p < 0.01$). The application of blended learning has a direct effect on learning interest ($\beta=0.41$; $p < 0.001$) and NDSE learning outcomes ($\beta=0.27$; $p < 0.01$). Learning interest plays a mediating role between the application of blended learning and learning outcomes ($\beta=0.19$; $p < 0.05$). The hypothesis testing results derived from the SEM analysis, including path coefficients (β) and significance levels (p -values), are comprehensively presented in Table 6. Figure 2 illustrates the SEM model structure and the standardized path coefficients among the study constructs, showing the relationships between IT infrastructure, digital competence, blended learning, learning interest, and learning outcomes. Thus, all research hypotheses were supported, confirming the effectiveness of applying blended learning in NDSE at universities in Viet Nam.

Table 6. SEM results of the research model

Hypotheses	Path coefficient (β)	p-value	Result
H1: IT infrastructure \rightarrow Blended learning	0.31	<0.01	Supported
H2: Digital competence \rightarrow Blended learning	0.34	<0.01	Supported
H3: Blended learning \rightarrow Learning interest	0.41	<0.001	Supported
H4: Learning interest \rightarrow Learning outcomes	0.27	<0.01	Supported
H5: Blended learning \rightarrow Learning outcomes	0.19	<0.05	Supported

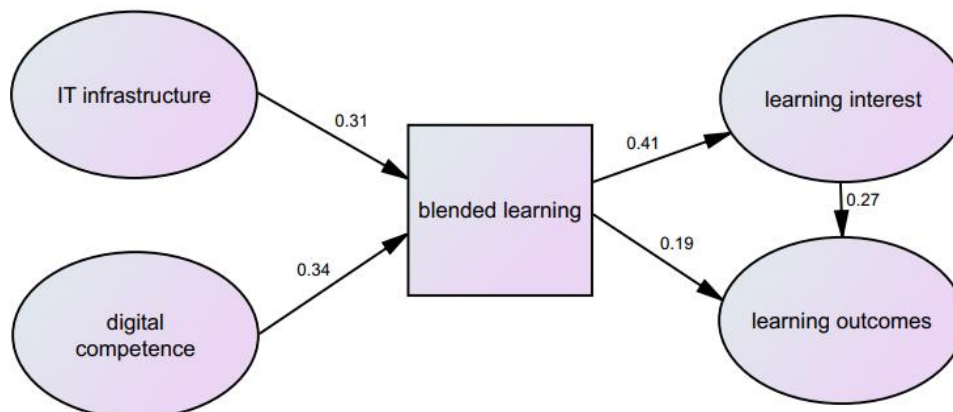


Figure 2. SEM model structure (using analysis of moment structure (AMOS))

3.6. Discussion

The findings of this study indicate that the blended learning model in teaching NDSE is appropriate and generates positive effects for students. Information technology infrastructure and the digital competencies of lecturers and students are crucial factors influencing the successful implementation of the model [25], [26]. This aligns with international studies, which affirmed that technical infrastructure and digital competence form the foundation for the effective application of blended learning [9], [11]. A noteworthy point is that students' learning interest plays a mediating role in the relationship between the application of blended learning and learning outcomes. This result is consistent with who argued that blended learning not only improves academic performance but also enhances learners' motivation and engagement [12]. In the Vietnamese context, it reported blended learning fosters greater student interest and self-directed learning. Moreover, the results suggest that applying blended learning in NDSE requires changes in lecturers' teaching approaches. Beyond integrating technology, lecturers need to design diverse learning activities that closely combine face-to-face and online modes in order to maximize students' self-study capacity and interaction [27], [28]. This presents both a challenge and an opportunity for innovation in NDSE teaching - a subject that has often been considered rigid and overly theoretical.

From a practical perspective, the study highlights three key implications. First, universities should continue to invest in and upgrade information technology infrastructure, including internet connectivity, learning management systems (LMS), and supporting software. Second, emphasis should be placed on enhancing the digital competencies of both lecturers and students to ensure effective access to and use of online teaching and learning tools. Third, supportive policies for lecturers are needed to reduce workload pressure and encourage creativity in applying blended learning [29]. However, the study also acknowledges several limitations. First, data were collected from selected universities, which may not fully represent the diversity of institutions nationwide. Second, the study mainly focused on quantitative analysis with SEM, while factors affecting blended learning implementation may be more complex and require further exploration through qualitative methods.

Overall, the findings reinforce evidence that blended learning is an appropriate approach for innovating NDSE instruction. At the same time, the study offers policy and management implications, underscoring the importance of integrating technology with pedagogical innovation to enhance teaching and learning quality in the context of digital transformation in Viet Nam higher education. Furthermore, these findings carry broader implications for educational policy and curriculum design. Policy-makers must proactively address potential barriers such as resistance to change among veteran faculty members who are accustomed to traditional teaching methods, or resource constraints in less affluent institutions [30]. This requires not only immediate technology upgrades but also formalized training, incentives, and structural support to reduce workload and encourage the sustained adoption of innovative pedagogical models in NDSE.

4. CONCLUSION

This study tested the application of the blended learning model in teaching NDSE for university students in Viet Nam. The results confirm that information technology infrastructure and digital competence positively influence the implementation of blended learning. At the same time, blended learning not only improves learning outcomes but also enhances students' learning interest. Academically, the study contributes empirical evidence on the effectiveness of blended learning in NDSE-a highly specialized subject. Practically, the results highlight the need to invest in technology infrastructure, develop digital competencies, and innovate teaching methods to improve training quality. The main limitations of the study lie in the sample scope and methodological approach; therefore, future research should expand the sample and incorporate qualitative methods to gain a more comprehensive understanding. This will help strengthen the scientific and practical foundation for applying blended learning in NDSE. Academically, the study makes a unique and essential contribution by providing empirical evidence validating the effectiveness of blended learning specifically within the context of NDSE-a highly specialized discipline known for its rigid structure and requirement for high-stakes practical skill acquisition. This demonstrates that blended learning is a viable, high-impact approach even for highly specialized, practical curricula. Therefore, future research should expand the sample scope to include diverse institutional types (military academies versus civilian universities) and incorporate qualitative methods (in-depth interviews with lecturers and administrators) to gain a more comprehensive understanding of pedagogical challenges and policy implementation barriers. This dual approach will further strengthen the scientific and practical foundation for applying blended learning in NDSE.

FUNDING INFORMATION

This research was funded by Ho Chi Minh City University of Education.

Apply the blended learning model in national defense and security education for ... (Nguyen Linh Phong)

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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Nguyen Linh Phong	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tran Tuan Canh		✓	✓			✓	✓				✓			✓
Ngo Gia Bao	✓							✓		✓		✓		

C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The author confirms that the data supporting the findings of this study are available within the article.




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