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Factors influencing Chinese Non-English majors' attitudes toward blended learning: The role of perceived relevance, online self-efficacy, and teachers' digital literacy

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Abstract: Chinese non-English majors frequently disengage from mandatory college English courses—a persistent challenge despite the widespread adoption of blended learning. This study investigates how students' attitudes toward these technology-enhanced environments are shaped by (1) perceived course relevance, (2) confidence in online learning (self-efficacy), and (3) perceptions of instructors' digital literacy. Surveying 300 students across six universities in Zhejiang Province, we analyzed responses using structural equation modeling (SEM). Results indicate that perceived relevance exerts the strongest influence on attitudes ($\beta = 0.38$, $p < 0.001$), followed by online self-efficacy ($\beta = 0.34$, $p < 0.001$) and perceived teacher digital literacy ($\beta = 0.27$, $p < 0.001$). Together, these factors explain 52.3% of the variance in student attitudes, underscoring that content relevance outweighs technological sophistication in driving engagement. These findings refine technology acceptance models and offer actionable insights for combating passive disengagement in college English courses.

Keywords: *Blended learning, China, English education, Non-English majors, Online self-efficacy, Perceived relevance, Teacher digital literacy, Technology acceptance.*

1. Introduction

The digital transformation of Chinese higher education has produced a paradoxical outcome in college English teaching: while technology-enhanced learning environments have proliferated, student engagement has simultaneously deteriorated [1]. This contradiction is particularly pronounced among non-English majors, who frequently exhibit what Bi [2] terms *tacit truancy*—physical presence but psychological absence—in mandatory English courses. Despite substantial investments in educational technology, the anticipated improvements in language learning outcomes remain elusive Xie, et al. [3] suggesting a critical need to reevaluate how blended learning is implemented for this population. In response to these global trends, China's educational system has undergone substantial transformation to address the needs and challenges of modern education. The Chinese government has implemented several strategic initiatives prioritizing technology integration in education. The 2010 National Medium- and Long-Term Education Reform and Development Plan explicitly identified information technology as a critical component for educational advancement [4]. Building on this foundation, the 2019 Implementation Opinions on the Construction of First-Class Undergraduate Courses positioned blended learning approaches as essential elements of high-quality higher education ([5]. These policy directives reflect the government's recognition that technology serves as a catalyst for educational innovation rather than merely a tool for addressing existing challenges.

As digital technologies transform education, educators must adapt instructional approaches to align with evolving student needs and technological capabilities [6]. Blended learning has emerged as an effective response to this challenge. Defined by Graham [7] as the systematic integration of classroom-based and technology-mediated instruction, this approach transcends traditional spatiotemporal

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limitations while preserving essential pedagogical elements. Staker and Horn [8] identify four primary blended learning models—rotation, flex, self-blend, and enriched-virtual—each offering distinct configurations of online and face-to-face components. These models demonstrate how institutions can strategically combine digital and traditional instruction based on their specific pedagogical objectives and institutional contexts. Rather than replacing conventional teaching, these approaches create synergistic learning environments that enhance flexibility while maintaining crucial human interaction and instructional expertise.

English education occupies a critical position in China's educational framework, serving as a core subject alongside Chinese and Mathematics in the National College Entrance Examination. Despite this emphasis, non-English majors frequently disengage from College English Courses (CEC) upon entering university, considering English peripheral to their academic priorities [9]. This presents a significant challenge as China's higher education system has expanded dramatically, with enrollment rates reaching 57.8% by 2021 [10]. College English Courses represent the most extensive educational offering in China's higher education system, yet struggle with student engagement and tacit truancy. The recent College English Curriculum Requirements Ministry of Education China [11] advocates for integrating online technology platforms to enhance language learning experiences [11]. However, implementing blended learning in College English Courses faces several challenges: courses often lack specialized content relevant to students' majors [12] while some instructors resist adopting technology-enhanced teaching approaches [3, 13]. These obstacles affect students' engagement and persistence in blended College English Courses.

This study investigates factors influencing Chinese non-English majors' attitudes toward blended English learning approaches and their continuance intentions. The research addresses questions regarding what factors contribute to student engagement and persistence in these technology-enhanced learning environments. By examining these dynamics, this study contributes to understanding technology acceptance in educational contexts and provides practical implications for improving blended learning implementation in college English education.

2. Literature Review

2.1. Blended Learning

Blended learning has been consistently chosen as a prominent area of research in the Horizon Report (Higher Education Edition) for six years in a row, spanning from 2012 to 2017. This report identifies significant trends in the acceptance of technology in education [14]. The evolution of blended learning has been accelerated by technological advancements and, more recently, by the COVID-19 pandemic, which forced educational institutions worldwide to adopt remote and hybrid teaching approaches. Vaughan, et al. [15] identified a pivotal moment in higher education when blended learning ceased to be viewed as merely supplementary and became recognized as an essential component of pedagogical innovation. They emphasized that this shift marked a significant turning point in the field of higher education when blended learning transitioned from being a mere supplement to teaching to becoming an essential and valuable component in the acceptance of new teaching methods [15].

In China, blended learning has gained significant traction in higher education over the past decade. The integration of online and offline instruction aligns with national educational reform initiatives aimed at modernizing teaching and learning practices. The China's Education Modernization 2035 plan emphasized the transformative potential of information technology in education [16] providing a policy foundation for the implementation of blended learning approaches.

Several theoretical frameworks underpin the implementation of blended learning in educational contexts. Socio-constructivism Vygotskij and Cole [17] emphasizes the critical role of collaborative knowledge construction and social interaction in the learning process, informing both the design of blended learning environments and the facilitation of collaborative activities [18, 19]. This theoretical perspective highlights the significance of students' perceptions regarding technology's role in fostering interaction, collaboration, and knowledge co-construction. The Zone of Proximal Development (ZPD)

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theory by Vygotskij and Cole [17] emphasizes that learners can achieve more with guided assistance, making it particularly relevant to the blended learning context. It guides the meticulous design of instructional materials and tasks to ensure they seamlessly align with students' current cognitive abilities, providing the necessary support and scaffolding to foster an environment where students feel both capable and motivated to persist in their studies. Social Cognitive Theory [20] contributes to our understanding of how students' beliefs in their ability to use technology effectively (online self-efficacy) impact their acceptance of technology within a blended learning setting. Additionally, it explains how students' behaviors and choices within the blended learning environment are influenced by their social surroundings, including peer influences and societal norms. For language education specifically, Krashen's Input Hypothesis posits the benefit of language input slightly above learners' proficiency. Blended learning, especially in language instruction, tailors online resources and activities to offer optimal input [21]. Its collaborative and communicative nature aligns with Krashen's emphasis on comprehensible input [22].

The implementation of blended learning in higher education, particularly in College English Courses, faces several challenges that can impact its effectiveness. During the COVID-19 pandemic, there was a notable surge in the development of blended learning methods, resulting in increased research on the topic. Most international research has focused on essential success elements for online learning during the pandemic [23-26].

However, blended learning is a complex system that combines online and face-to-face components, creating a holistic learning environment [27, 28]. The unique dynamics of blended learning necessitate considering additional aspects that underpin its effectiveness [29]. In China, blended learning also saw a surge in popularity during the pandemic; however, the conditions and circumstances affecting college English courses may vary in a blended learning setting [30]. The blended learning environment involves physical, social, and psychological factors [31, 32]. Which incorporate learners, instructors, course content, physical environment of blended learning, and the interaction between learners and instructors [33]. One significant challenge in implementing blended learning for College English Courses is the perceived relevance of course content to students' academic and professional goals. Dou [12] mentioned that one of the issues in college English courses is the lack of specialized English courses for specific purposes and cross-cultural communication, which leads to a decline in students' interest and enthusiasm for learning. When students do not perceive the course content as relevant to their needs, they are less likely to engage with the material and persist in the course. Online self-efficacy presents another challenge, as students' confidence in their ability to navigate digital learning environments affects their adaptation to blended learning components. Kassner [34] literature analysis illustrates the characteristics that contribute to the success of online students, including having a self-motivated mindset, proficiency in computer and Internet usage, and possessing self-discipline. These features are likely to be as relevant to blended learning students, as these communities consistently incorporate an online learning element. A third significant challenge relates to teachers' digital literacy. The effectiveness of blended learning environments hinges not just on the technology itself, but significantly on the digital literacy of educators and their ability to seamlessly merge these digital tools into their teaching methodologies Garzon and Garzon [35]. Xie, et al. [3] discovered that the majority of instructors in China's universities and colleges have an inadequate knowledge base of information technology, which can result in various issues during online teaching and impact students' learning attitudes negatively.

2.2. Acceptance Technology Models

Technology acceptance research has evolved significantly over decades, with several influential models developed to explain user adoption behaviors. Early social psychologists established that attitude significantly influences behavior Allport [36] and Fishbein and Ajzen [37] leading to frameworks such as the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), and eventually the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, et al.

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[38] (Fig. 1). The UTAUT model represents a comprehensive synthesis of eight previous technology acceptance theories, explaining approximately 70% of variance in behavioral intention and 50% in actual technology use. With its four key determinants (performance expectancy, effort expectancy, social influence, and facilitating conditions) and four moderators (gender, age, experience, and voluntariness), UTAUT has demonstrated superior predictive capability compared to earlier models [39]. This makes it particularly appropriate for educational contexts where organizational and institutional factors significantly influence technology adoption. While the original UTAUT excluded attitude as a mediating variable, subsequent research has validated reincorporating it, as attitude significantly mediates relationships between determinants and behavioral intentions [40, 41]. Attitude in this context refers to an individual's positive or negative feelings toward using specific technologies [37].

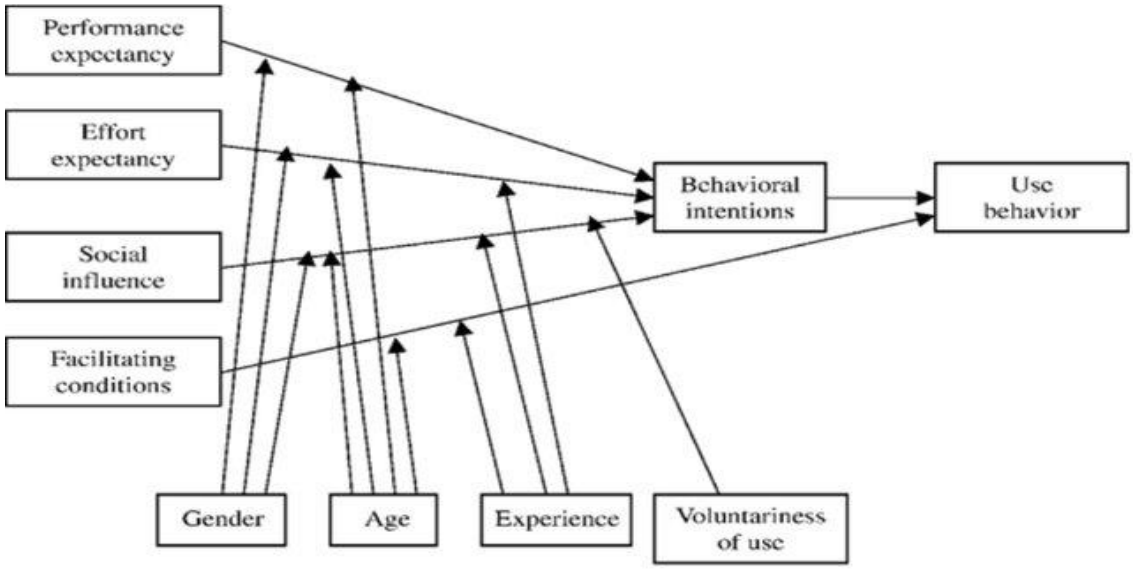

Figure 1.
The research model UTAUT.
Source: Venkatesh, et al. [38]

This study extends the UTAUT framework by incorporating three contextual variables particularly relevant to blended language learning environments for non-English majors. First, we integrate perceived relevance from Keller [42] ARCS motivational model, addressing the critical connection between course content and students' personal and professional goals—especially important for non-language majors who may not immediately recognize the value of language acquisition. Second, drawing from Bandura [43] social cognitive theory, we incorporate online self-efficacy as articulated by Artino Jr and McCoach [44] recognizing learners' confidence in navigating digital learning spaces as a key factor in technology adoption. Finally, we examine students' perceptions of their teachers' technological capabilities, drawing from research on technological pedagogical content knowledge (TPACK) by Koehler, et al. [45] and digital literacy in educational contexts by Tang and Chaw [46]. Our focus on these three specific factors—perceived relevance, online self-efficacy, and perceived teachers' digital literacy—stems from their particular salience in addressing the "tacit truancy" phenomenon among Chinese non-English majors. Previous research has identified these factors as potential barriers to engagement: non-English majors frequently disengage when course content lacks specialized relevance to their majors Dou [12]; inadequate confidence in navigating online environments undermines students' adaptation to blended components Kassner [34]; and instructors' insufficient digital competence creates implementation obstacles that negatively affect student attitudes [3]. By synthesizing these educational and psychological constructs with the established UTAUT

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framework and examining their collective influence on attitude formation, this study offers a more comprehensive understanding of technology acceptance in the specific context of language education for non-English majors, while maintaining a focused scope that enables meaningful analysis of the most critical factors in this educational context.

2.3. Perceived Relevance

Perceived relevance refers to students' perceptions of whether course content satisfies their personal needs, goals, and career aspirations [42]. In this study, it specifically denotes the degree to which non-English majors perceive blended college English courses as meaningful and pertinent to their academic and professional objectives. Research has shown that perceived relevance strongly correlates with concepts of value, purpose, benefit, and goal alignment [47]. When students recognize course relevance, they experience greater preparedness for future careers and enhanced learning motivation Neuhaus and Rach [48]. Keller [42] ARCS motivational model identifies relevance as a key component of motivation, suggesting that instruction must connect to students' personal needs and goals to be effective [49, 50]. Previous studies demonstrate that perceived relevance significantly influences student engagement and learning outcomes. Frymier and Shulman [51] found that perceived relevance positively affects student motivation, while Muddiman and Bainbridge Frymier [52] observed that students engage more with course material when they perceive it as relevant. Hooker [53] reported improved cognitive and affective learning when students perceive content relevance. Despite this established importance in traditional learning contexts, there remains a significant research gap regarding perceived relevance in technology-enhanced language learning environments, particularly for non-English majors in China. While studies have examined technological factors affecting blended learning acceptance, few have investigated how content relevance specifically influences attitudes toward blended approaches in mandatory language courses.

This knowledge gap carries particular significance in the Chinese higher education context. While previous studies have documented widespread disengagement among non-English majors in technology-enhanced college English courses, they have primarily focused on technological rather than content-related factors. As Dou [12] observes, the absence of discipline-specific content in college English curricula represents a critical yet understudied barrier to engagement. By examining perceived relevance quantitatively within a technology acceptance framework, this study addresses [3] call for research that explains persistent resistance to blended approaches despite substantial institutional investments. Understanding the relative influence of content relevance compared to technological factors may provide theoretical refinement to existing acceptance models while offering practical guidance for curriculum reform initiatives mandated by recent national policy directives [11].

2.4. Online Self-Efficacy

Online self-efficacy represents an individual's confidence in their ability to successfully navigate and learn in online environments [44]. This concept extends Bandura's self-efficacy—belief in one's capability to organize and execute courses of action required to attain designated performances [43]—to the specific context of online learning. In this study, online self-efficacy refers to non-English majors' confidence in their ability to effectively engage with and succeed in the online components of blended college English courses. Self-efficacy has been recognized as a significant predictor of student motivation and academic achievement across various learning contexts [43]. Research has demonstrated its substantial influence on performance, emotional states, decision-making, and task persistence [54-57].

In technology-enhanced learning environments, several studies have highlighted the importance of online self-efficacy. Jian, et al. [58] found that in MOOCs, individuals with higher web skills perceive learning as more manageable and enjoyable. Cantero, et al. [31] demonstrated that students' perceptions of their technological abilities influence their engagement in online business courses, while Bismala [59] showed that e-learning self-efficacy significantly affects user satisfaction and confidence.

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Despite this growing body of research, a significant gap exists in understanding how online self-efficacy specifically affects non-English majors in Chinese blended language learning contexts. Previous studies have primarily focused on Western educational settings or voluntary online courses, neglecting the unique challenges faced by students in mandatory language courses where technological self-confidence may be particularly consequential. This research gap is especially relevant given China's rapid implementation of blended learning approaches in college English education. While the Ministry of Education has advocated for technology integration Ministry of Education China [11] limited attention has been paid to students' psychological readiness for these new learning environments. As Kassner [34] suggests, self-motivated mindsets and computer proficiency significantly contribute to online learning success, yet these factors remain underexplored in the Chinese higher education context.

The examination of online self-efficacy among Chinese non-English majors contributes to both theoretical understanding and practical applications in educational technology. This construct remains understudied in mandatory language education contexts, particularly where cultural and institutional factors shape technology acceptance differently than in Western voluntary learning environments [60]. As Liu and Mantuhac [60] note, psychological barriers to technology adoption often persist even after infrastructural challenges are addressed, yet these factors receive insufficient attention in implementation research. By quantifying the relationship between online self-efficacy and attitudes toward blended learning, this study responds to calls for more nuanced applications of social cognitive theory in non-Western educational contexts [33]. Furthermore, in light of ongoing curriculum reforms mandated by recent policy directives, understanding psychological readiness factors becomes increasingly relevant for institutions seeking to address persistent disengagement in technology-enhanced language courses.

2.5. Perceived Teachers' Digital Literacy

Perceived teachers' digital literacy refers to students' perceptions and evaluations of their teachers' ability to effectively use and navigate digital technologies in educational contexts [46]. In blended learning environments, this construct encompasses students' assessment of their teachers' skills, knowledge, and competencies in leveraging digital tools and resources to facilitate and assess technology-enhanced learning experiences. The concept of teachers' digital literacy has gained increasing attention as educational institutions undergo digital transformation. Research consistently indicates that instructors are crucial elements in the successful deployment and utilization of technology in educational settings [61, 62]. Digital literacy is particularly important for teachers in the current educational landscape, as it directly impacts their ability to integrate technology effectively into their instructional practices [52].

Studies by Kraft, et al. [63], König, et al. [64] and Lei and So [65] have demonstrated that enhancing teachers' digital literacy has become a priority in numerous countries, particularly following the COVID-19 pandemic. Krumsvik, et al. [66] suggest that technology has evolved into a means for interpreting teachers' professional performance, while Koehler, et al. [45] emphasize the importance of technological pedagogical content knowledge (TPACK) in effective teaching. From students' perspective, their perceptions of teachers' digital literacy can significantly influence learning experiences. Alshaikh, et al. [67] found that when students perceive their teachers as digitally literate, it enhances their engagement, motivation, and satisfaction with the learning process. Conversely, Soomro, et al. [68] revealed that students may feel frustrated if they believe their teachers are not effectively using technology to support their learning.

Despite extensive research on teachers' digital competencies themselves, a significant gap exists in understanding how students' perceptions of these competencies influence technology acceptance in mandatory language courses. Most existing studies focus on measuring teachers' actual skills or examining their impact on learning outcomes directly, rather than investigating how students' subjective evaluations of these skills shape their attitudes toward blended learning approaches. This research gap is particularly relevant in Chinese higher education, where resistance to technology-

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enhanced teaching approaches has been documented among college English instructors [3, 13]. While these studies identify teachers' limited digital literacy as an implementation challenge, they do not examine how students' perceptions of these limitations affect their own technology acceptance.

This study's examination of perceived teachers' digital literacy contributes to the literature by addressing the intersection between instructor competence and student acceptance—a connection often overlooked in technology implementation research. While numerous studies document the importance of faculty digital skills [35, 63]. Few investigate how students' subjective evaluations of these skills influence their attitudes toward blended learning environments. This gap is particularly notable in mandatory language education contexts, where instructor-student dynamics differ significantly from elective courses. As Liu and Mantuhac [60] observe, students in Chinese college English courses frequently cite instructor-related factors when explaining resistance to technology adoption, yet these perceptions remain empirically underexamined. By quantifying this relationship within a technology acceptance framework, this study extends previous work on technological pedagogical content knowledge (TPACK) beyond its original instructor-centered focus to consider its reception and interpretation by students. Such insights may help explain why similar technological implementations yield varying levels of student engagement across different instructional contexts.

3. Methodology

This study employs a quantitative survey methodology to statistically analyze how three key factors—perceived relevance, online self-efficacy, and teachers' digital literacy—collectively influence Chinese non-English majors' attitudes toward blended English learning. The quantitative approach enables precise measurement of these variables' relative predictive power, while the survey method ensures adequate sample size (N=300) to represent diverse institutional contexts across Zhejiang Province. We specifically use structural equation modeling to test both direct effects among these factors.

The six universities were selected using stratified sampling to ensure representativeness across Zhejiang Province. First, the 36 eligible public institutions were divided into three geographical strata: Hangzhou City (18 institutions), Northern Region (12 institutions), and Southern Region (6 institutions). Then, institutions were proportionally selected from each stratum: three from Hangzhou, two from the Northern Region, and one from the Southern Region. This approach ensured geographical representation while maintaining manageable scope. Additionally, all selected institutions had implemented recognized Blended College English Courses that were designated as Provincial First-class Undergraduate Courses by the Education Department of Zhejiang Province in 2022, ensuring quality and consistency in the blended learning implementation being studied.

In collecting the data, a consent letter was attached with the online survey. A representative of each university was appointed to forward the online questionnaire to all of the non-English major students within their faculty. The questionnaire consisted of four main sections measuring perceived relevance (7 items), online self-efficacy (9 items), perceived teachers' digital literacy (7 items), and attitude toward blended learning (5 items). The items were adapted from previous studies [44, 46, 50, 69]. And modified to fit the context of blended English learning for non-English majors. All items were measured using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

The content and face validity of the instrument were validated by one English lecturer and two experts of educational technology. Meanwhile, reliability test was conducted to determine the Cronbach's Alpha value for each item in the questionnaires. The average Cronbach's Alpha obtained for items in perceived relevance was 0.952, for online self-efficacy was 0.956, for perceived teachers' digital literacy was 0.954, and for attitude was 0.866. All values meet the requirement of a high reliability coefficient [70]. In analyzing the data, three sets of statistical analyses were employed: confirmatory factor analysis (CFA), goodness of fit indices, and structural equation modeling (SEM).

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4. Results and Discussion

The measurement model was assessed through confirmatory factor analysis (CFA). As shown in Table 1, all factor loadings exceeded 0.6 (ranging from 0.845 to 0.891), and Average Variance Extracted (AVE) values were above the threshold of 0.5 (ranging from 0.724 to 0.789), confirming convergent validity. Composite Reliabilities (CR) of all constructs exceeded 0.60 (ranging from 0.918 to 0.962), indicating satisfactory internal consistency.

Table 1.
Confirmatory factor analysis (CFA) results.

	Item	Factor Loading	AVE (Above 0.5)	CR (Above 0.6)
Attitude (ATT)	I find using blended learning to learn English language is a good idea. (att1)	0.887	0.789	0.918
	I find the online learning system with face-to-face makes learning more interesting. (att2)	0.891		
	I find learning with the online learning system in addition to face-to-face is full of fun. (att3)	0.886		
	I like to learn with the online learning system to reach out to lecturer online after face-to-face sessions. (att4)	0.882		
	I am positive toward using the online learning system for learning and supporting face-to-face interaction. (att5)	0.879		
Online Self-Efficacy (OLSE)	I am confident that I can perform well in online activities such as virtual classes, digital assignments, and online assessments in blended college English courses. (olse1)	0.871	0.738	0.962
	I can continue learning even when facing technical issues (such as slow internet, software problems, or device issues) in online sections. (olse2)	0.841		
	I am confident I can learn effectively without constant assistance from lecturer in the online parts of blended college English courses. (olse3)	0.862		
	I can successfully complete all required online activities (assignments, quizzes, discussions) to meet course requirements. (olse4)	0.865		
	I am certain I can understand the most difficult material presented in the online components of blended college English courses. (olse5)	0.870		
	I can focus on learning online course materials even when facing common distractions (such as notifications, background noise, or other interruptions). (olse6)	0.858		
	I am confident I can successfully navigate through the online components of blended college English courses. (olse7)	0.848		
	I am confident I can successfully log in and use the online course management system for blended college English courses. (olse8)	0.863		
	I find it difficult to comprehend information presented in the online sections of blended college English courses. (olse9)	0.853		
Perceived Relevance (PR)	The learning materials (stories, pictures, examples) demonstrate the benefits of blended college English courses for me. (pr1)	0.858	0.724	0.959
	Completing blended college English courses is important for me. (pr2)	0.855		
	The course provides practical examples that show how English knowledge can be used in real situations. (pr3)	0.854		
	The content in blended college English courses is not relevant to my needs as I already knew most of it. (pr4)	0.845		
	The content presented in blended college English courses appears valuable and worth learning. (pr5)	0.848		

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	The content in blended college English courses is particularly relevant to my personal experiences as a non-English major studying in China's university. (pr6)	0.841		
	The content of blended college English courses will be useful for my study and future work. (pr7)	0.849		
Perceived Teachers' Digital Literacy (PTDL)	My lecturer can effectively handle technical issues with teaching equipment (such as computers, projectors, online platforms). (ptdl1)	0.845	0.732	0.961
	My lecturer can expertly use information-based teaching equipment (e.g., computers, projectors) to support the blended college English courses. (ptdl2)	0.859		
	My lecturer can expertly use at least one social media or web platform (e.g., Xue Xi Tong, e-mail, WeChat, MOOCs) to support our blended college English courses. (ptdl3)	0.873		
	My lecturer effectively integrates appropriate digital resources for different learning activities (such as lectures, practice sessions, assessments). (ptdl4)	0.880		
	My lecturer provides study recommendations tailored to students' varying English proficiency levels in blended college English courses. (ptdl5)	0.864		
	My lecturer chooses the appropriate information-based teaching modes (e.g., project-based learning, resource-based learning, blended learning) for the blended college English courses. (ptdl6)	0.823		
	My lecturer provides effective digital tools to support communication in our blended college English courses (e.g., learning guidance, progress tracking). (ptdl7)	0.852		

The model fit indices (Table 2) demonstrated good model fit. The chi-square/df ratio of 2.791 fell below the recommended threshold of 3.0, and the Comparative Fit Index (CFI) was 0.907, exceeding the minimum value of 0.90 required to ensure that misspecified models are not accepted [71]. The Root Mean Square Error of Approximation (RMSEA) was 0.093 (below the recommended threshold of 0.10), indicating acceptable fit. The structural equation modeling was conducted using maximum likelihood estimation in AMOS 26.0. Additional fit indices further supported the model fit: GFI = 0.92, AGFI = 0.90, NFI = 0.91, and TLI = 0.93, all exceeding the recommended threshold of 0.90.

Table 2.
Summary of fit statistics for measurement model

Name of Index Category	Name of Index	Index Value	Level of Acceptance	Comments
Absolute Fit	RMSEA	0.093	RMSEA 0.05 to 0.10 acceptable	The required level is achieved
Incremental Fit	CFI	0.907	CFI > 0.90	The required level is achieved
Parsimonious Fit	ChiSq/df	2.791	Chisq/df < 3.0	The required level is achieved

Discriminant validity was assessed by comparing the square root of AVE values with the correlations between constructs. As shown in Table 3, all AVE square roots (displayed on the diagonal) were larger than the corresponding correlation coefficients, demonstrating that each construct is empirically distinct.

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Table 3.
Discriminant Validity Assessment: Square Roots of AVE and Inter-construct Correlations.

	ATT	OLSE	PR	PTDL
ATT	**0.888**			
OLSE	0.538	**0.859**		
PR	0.472	0.252	**0.851**	
PTDL	0.515	0.341	0.221	**0.856**

The structural model assessment began with examining the model's explanatory power through R-squared values. As shown in Figure 2, the R-squared for attitude (ATT) was 0.523, indicating that the three independent variables (perceived relevance, online self-efficacy, and perceived teachers' digital literacy) collectively explained 52.3% of the variance in students' attitudes toward blended learning. This value indicates substantial explanatory power according to Hair, et al. [72] guidelines. The analysis of path coefficients (Table 4) revealed that all three independent variables had significant positive effects on attitude toward blended learning. Among these variables, perceived relevance emerged as the strongest predictor ($\beta = 0.38$, $p < 0.001$), followed by online self-efficacy ($\beta = 0.34$, $p < 0.001$) and perceived teachers' digital literacy ($\beta = 0.27$, $p < 0.001$).

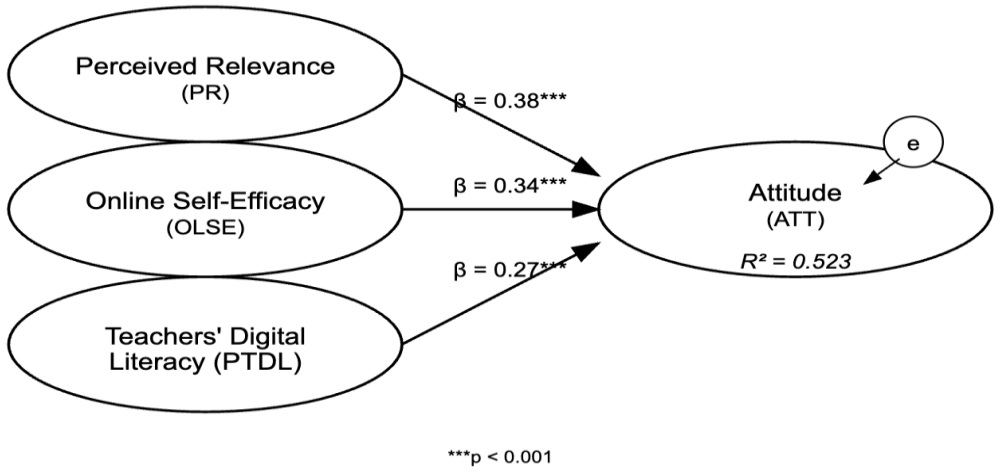

Figure 2.
Structural Equation Model with Standardized Path Coefficients (***p < 0.001).

Table 4.
The Coefficient Value for Structural Equation Modeling.

Construct	Standardized Coefficient (β)	Standard Error	t-value	p-value	95% CI	Result
ATT ← PR	0.38	0.07	5.43	< 0.001	[0.24, 0.52]	Significant
ATT ← OLSE	0.34	0.06	5.67	< 0.001	[0.22, 0.46]	Significant
ATT ← PTDL	0.27	0.05	5.40	< 0.001	[0.17, 0.37]	Significant

The standardized path coefficients (β) represent effect sizes, with values of 0.10, 0.30, and 0.50 indicating small, medium, and large effects, respectively [31]. The effect of perceived relevance ($\beta = 0.38$) and online self-efficacy ($\beta = 0.34$) approached medium effect sizes, while perceived teachers' digital literacy ($\beta = 0.27$) represented a small to medium effect, suggesting practical significance beyond statistical significance.

Hypothesis 1: Perceived Relevance and Attitude

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H_1: Perceived relevance has a significant effect on Chinese non-English major students' attitude in adapting blended English learning.

Our analysis not only confirms ($\beta = 0.38$, $p<0.001$) but significantly extends Frymier and Shulman [51] relevance-motivation hypothesis by demonstrating its amplified effect in blended learning contexts. While previous research established relevance's importance in traditional classrooms Muddiman and Bainbridge Frymier [52] our findings reveal its heightened role when mediated by technology - challenging the field's predominant focus on platform functionality. This suggests Chinese universities' blended English programs must first establish content relevance before investing in advanced technological features.

The result indicates that when non-English major students perceive the content of their blended English courses as relevant to their academic, personal, and professional goals, they develop more positive attitudes toward the blended learning approach. This finding aligns with Keller [73] ARCS motivational model, which emphasizes relevance as a crucial component of student motivation [73]. Another research on student motivation in English language learning also reveals diverse factors influencing engagement. Course relevance plays a significant role, with students showing higher instrumental motivation for practical language applications [74]. Research consistently shows that course relevance is a strong predictor of motivation in blended language learning contexts. When students perceive course content as relevant to their academic and career goals, they develop more positive attitudes toward the learning approach, regardless of technological complexity. This is particularly important for non-English majors who might otherwise view English courses as peripheral to their core studies.

Hypothesis 2: Online Self-Efficacy and Attitude

H_2: Online self-efficacy has a significant effect on Chinese non-English major students' attitude in adapting blended English learning.

This hypothesis was supported, as online self-efficacy showed a significant positive effect on Chinese non-English major students' attitude in adapting the blended English learning approach ($\beta = 0.34$, p-value < 0.001). This finding aligns with Bandura [43] assertion that individuals with high self-efficacy tend to approach tasks with confidence and positive expectations, which shapes their attitudes toward those tasks. In the context of blended learning, this suggests that students who feel confident in their ability to navigate online learning platforms, complete digital assignments, and participate in virtual discussions are more likely to develop positive attitudes toward blended learning approaches. This result is consistent with findings from Artino [75] who demonstrated that self-efficacy in online environments significantly predicted satisfaction and persistence in blended courses.

More recently, Liu and Mantuhac [60] found that online self-efficacy was a crucial factor in determining Chinese students' engagement with online learning components during the pandemic period. The relationship between self-efficacy and attitudes can be understood through Bandura's social cognitive theory, which posits that self-efficacy influences motivation and approach behaviors toward challenging tasks [43]. When students believe in their ability to navigate digital platforms and complete online activities, they experience less anxiety and frustration, leading to more positive attitudes toward blended approaches.

Hypothesis 3: Perceived Teachers' Digital Literacy and Attitude

H_3: Perceived teachers' digital literacy has a significant effect on Chinese non-English major students' attitude in adapting blended English learning.

This hypothesis was supported, as perceived teachers' digital literacy demonstrated a significant positive effect on Chinese non-English major students' attitude in adapting the blended English learning approach ($\beta = 0.27$, p-value < 0.001). This finding is consistent with research by Alshaikh, et al. [67] who found that when students perceive their teachers as digitally literate and skilled at integrating technology into teaching, it enhances their engagement, motivation, and satisfaction with the learning

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process. The result indicates that non-English major students who view their English teachers as digitally competent are more likely to develop positive attitudes toward the blended learning approach.

This finding supports research by Güneş and Adnan [76] who found that students' perceptions of instructor technological competence significantly influenced their satisfaction with online learning components.

Similarly, Liu and Mantuhac [60] found that teachers' digital literacy was strongly associated with student engagement in blended English courses in Chinese higher education. When instructors demonstrate proficiency with digital tools, they can create more engaging online content, provide clearer instructions, offer timely technological support, and seamlessly integrate online and offline components, all of which enhance the student experience and foster positive attitudes toward blended learning. The substantial explanatory power of the model (R^2=0.523) indicates that these three variables capture key factors influencing attitudes toward blended learning among non-English majors. While previous research has often examined these variables separately, this study demonstrates their combined influence, suggesting that institutions should address all three factors simultaneously to maximize the effectiveness of blended learning initiatives.

These results suggest that while all three factors play important roles in shaping students' attitudes toward blended learning, perceived relevance has the most substantial influence. This finding contributes to the growing literature on blended learning acceptance in language education contexts, extending traditional technology acceptance models by incorporating factors specifically relevant to educational environments.

5. Conclusion and Implications

This study confirms that perceived relevance, online self-efficacy, and perceived teachers' digital literacy all significantly influence Chinese non-English major students' attitudes toward blended English learning. Perceived relevance emerged as the strongest predictor ($\beta = 0.38$, $p < 0.001$), followed by online self-efficacy ($\beta = 0.34$, $p < 0.001$) and perceived teachers' digital literacy ($\beta = 0.27$, $p < 0.001$). Together, these three factors explain 52.3% of the variance in students' attitudes, providing a robust model for understanding technology acceptance in blended learning environments.

From a theoretical perspective, this study contributes to understanding technology acceptance in educational contexts by extending traditional models like UTAUT to incorporate factors specifically relevant to language education. The findings support and build upon Keller's ARCS model regarding the importance of perceived relevance, Bandura's self-efficacy theory, and emerging research on teachers' digital competence in technology-enhanced learning environments. By demonstrating the relative influence of these three factors within a single model, this study offers a more comprehensive framework for understanding students' attitudes toward blended learning in mandatory language courses. The findings have several important implications for practice. The predominant influence of perceived relevance suggests that enhancing content meaningfulness should take priority over technological sophistication when designing blended learning environments. For Chinese universities, this means developing discipline-specific materials that connect language learning to students' academic and professional goals. Engineering students might analyze international patents, business majors could evaluate global market reports, while medical students practice researching in English-language medical journals. Such transformation necessitates collaboration between English departments and academic disciplines through team-teaching initiatives and joint curriculum design. The significant impact of online self-efficacy indicates the importance of developing students' confidence in navigating digital learning environments. Institutions should consider implementing orientation programs and ongoing technical support specifically designed for students with limited technology experience. Scaffolded learning activities that gradually increase in technological complexity may help build this confidence over time. The influence of perceived teachers' digital literacy underscores the need for comprehensive faculty development programs focused not only on technical skills but also on

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pedagogical applications of technology. Universities should invest in training that helps instructors effectively integrate online and offline components while demonstrating digital fluency to their students.

Future research could explore additional factors such as learning analytics integration, personalized learning paths, and social learning components that may also influence students' attitudes toward blended learning. Longitudinal studies could provide valuable insights into how these attitudes evolve over time, particularly as students progress through multiple semesters of blended learning. Additionally, comparative studies across different regions of China could help identify contextual factors that might moderate the relationships identified in this study. As China's higher education system continues to embrace blended learning approaches, particularly in College English Courses, understanding the factors that shape students' attitudes becomes increasingly important. By focusing on enhancing course relevance, building students' online self-efficacy, and developing teachers' digital literacy, institutions can create more effective and engaging blended learning experiences that better meet the needs of non-English major students and address the persistent challenge of disengagement in mandatory language courses.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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