# Model Construction of Deep Blended Learning for English education in secondary schools

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**A B S T R A C T**

E-learning, also known as blended learning, allows the use of digital tools alongside traditional teachers to provide secondary education that is personalized to different learner needs. This research examines the influence of a personalized hybridization model in English classes among Chinese secondary schools prerogatives, especially in terms of language learning and digital literacy. Through a quasi-experimental design with control and experimental groups, 200 students in the experimental group participated in online modules, interactive discussions, and classroom instruction. In terms of quantitative results, the experimental group showed significantly greater language learning gains relative to the control group (d = 1.3), indicating a large effect size. Qualitative thematic analysis revealed important themes—learning pace flexibility, multimedia engagement, and challenges using technology. Modeling through Grounding in the Community of Inquiry (CoI) framework, consisting of teaching, cognitive, and social presences, the model promoted engagement, critical thinking, and collaboration. Personalized, interactive learning environments were shown to be effective as students demonstrated increased motivation and performance. But obstacles such as technological constraints and teacher preparedness highlighted the necessity for better infrastructure and localized approaches. Spanning the bridge between blended learning and English education, this research aids in providing valuable information for English educators, curriculum developers, and policy makers. Recommendations include pedagogical refinement, investments in teacher training, and the integration of new technologies to utilize blended learning's potential to the fullest.

## RESUMO

O e-learning, também conhecido como aprendizagem combinada permite a utilização de ferramentas digitais juntamente com professores tradicionais para fornecer um ensino secundário personalizado às diferentes necessidades dos alunos. Esta pesquisa examina a influência de um modelo de hibridização personalizado nas aulas de inglês entre as prerrogativas das escolas secundárias chinesas, especialmente em termos de aprendizagem de línguas e alfabetização digital. Por meio de um projeto quase experimental com grupos de controle e experimentais, 200 alunos do grupo experimental participaram de módulos on-line, discussões interativas e instruções em sala de aula. Em termos de resultados quantitativos, o grupo experimental apresentou ganhos de aprendizagem de línguas significativamente maiores em relação ao grupo de controle (d = 1,3), indicando um grande tamanho de efeito. A análise temática qualitativa revelou temas importantes – ritmo de aprendizagem flexibilidade, envolvimento multimídia e desafios no uso da tecnologia. Modelagem por meio da estrutura Grounding in the Community of Inquiry (CoI), que consiste em presenças docentes, cognitivas e sociais, o modelo promoveu engajamento, pensamento crítico e colaboração. Ambientes de aprendizagem personalizados e interativos demonstraram ser eficazes, pois os alunos demonstraram maior motivação e desempenho. Mas obstáculos como as restrições tecnológicas e a preparação dos professores realçaram a necessidade de melhores infra-estruturas e abordagens localizadas. Abrangendo a ponte entre a aprendizagem combinada e o ensino de inglês, esta pesquisa ajuda a fornecer informações valiosas para educadores de inglês, desenvolvedores de currículos e formuladores de políticas. As recomendações incluem o refinamento pedagógico, investimentos na formação de professores e a integração de novas tecnologias para utilizar ao máximo o potencial da aprendizagem combinada..

**Introduction**

Blended learning, an education paradigm that combines digital tools with traditional face-to-face instruction, is becoming a cornerstone of the transformation of secondary education. By addressing individual student needs, this approach is more personalized,  taking into account different learning styles. Blending is the intentional/synergistic mix of in-person classroom instruction with online and virtual components to harness the strengths of  both [1-3]. The significance of blended learning is that it breaks down the walls of traditional, one-size-fits-all teaching practices that inhibit students whose learning modalities do not conform. Tools are used today to personalize education experiences, creating new opportunities for learning and making it more engaging and effective  for each individual student. As students engage with blended learning models, they also develop essential digital literacy skills, preparing them to critically integrate and construct new knowledge—a vital competency in our increasingly digital society.

However, while blended learning has demonstrated potential in transforming education, there is a pressing need to address the specific challenges associated with its implementation and effectiveness. Existing literature highlights the general benefits of blended learning but offers limited insights into how particular models impact specific student populations or how challenges faced by teachers influence the success of these models. This study aims to bridge this gap by quantitatively evaluating the effectiveness of an in-depth blended learning model specifically tailored for secondary school English. It further investigates how this model impacts students' language acquisition and digital literacy while addressing the barriers teachers face during its implementation.

In constructing a model for in-depth blended learning specifically designed for secondary school English, educators and researchers must consider the intricacies of language acquisition and literacy development. This involves curating a curriculum that not only covers the breadth of the language but also delves deeply into critical thinking, analysis, and creative expression. By harnessing the potential of blended learning, educators can facilitate a more engaging, interactive, and profound exploration of English language and literature. The model must be underpinned by a robust theoretical framework that acknowledges the cognitive processes involved in learning a language and integrates pedagogical strategies that cater to these processes [5].

Additionally, the thematic analysis conducted during this study revealed key concerns among educators, including technological limitations, teacher training gaps, and the need for better integration of digital tools into existing curricula. These insights informed the design of the blended learning model and its associated strategies, ensuring that it is both practical and responsive to the evolving needs of teachers and students.

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The Community of Inquiry (CoI) model acts as a theoretical approach to this research. This framework is based on the relationship of three anchors which include teaching presence, cognitive presence, and social presence (University of Denver, 2025). Together, these three components create a meaningful learning experience in blended settings. Teaching presence involves the structuring of instructional facilitation, cognitive presence involves learners' active participation in reflective and higher thinking, while social presence promotes community interactivity. In the context of this research, the CoI framework enabled the development of a blended learning model where traditional and electronically mediated learning is used, such that the two are effectively integrated. The study designed with the CoI concepts seeks to promote student engagement, critical thinking, and collaborative learning in English education through the sound use of pedagogical strategies that utilize both social and cognitive aspects of learning.

As people embrace the potential of blended learning, the model for secondary school English must reflect a commitment to academic excellence and equity in education. It should strive to create an inclusive environment where all students, regardless of their background or learning abilities, have access to high-quality education and the opportunity to achieve their full potential. By methodically addressing theoretical underpinnings, practical applications, curriculum design, technology integration, and teacher professional development, this study aims to contribute to the growing body of evidence supporting effective blended learning practices while offering actionable solutions for overcoming its challenges.

**Related works**

In the scholarly pursuit to enhance language education, blended learning has emerged as a vanguard pedagogical approach, catalyzing a shift from traditional didactic paradigms to more integrated and flexible educational models. The corpus of literature on this subject is vast and multifaceted, scrutinizing an array of variables that contribute to the efficacy of blended learning environments. Central to the discourse on blended learning is the emphasis on pedagogy as the cornerstone of instructional design, with technology serving as a conduit rather than a driver. The Cambridge Guide to Blended Learning for Language Teaching, for instance, articulates that the underpinning pedagogical frameworks ought to guide the fusion of face-to-face and virtual learning modalities, a sentiment echoed across numerous research-informed and practitioner-focused publications [6-8].

A focal point of empirical investigation has been the interplay between student characteristics and the efficacy of blended learning. A study published in the International Journal of Educational Technology in Higher Education delves into the relationship between student backgrounds, such as self-regulation and attitudes towards technology, and the learning outcomes within blended environments. The research underscores that design

features like technology quality and online tools are paramount, as they significantly predict student satisfaction and academic performance. Furthermore, studies have sought to contextualize the effectiveness of blended learning within specific educational environments. For instance, research within the Ugandan university system has revealed that learner characteristics such as computer competence and workload management are instrumental in determining the success of blended learning initiatives. This underscores the need for comprehensive planning and evaluation research to tailor blended learning designs to the nuanced needs of diverse student populations [9].

Comparative studies have also substantiated the benefits of blended learning in language education. Kenney and Newcombe (2011) found that blended learning environments yielded higher average scores than traditional settings. Similarly, Garrison and Kanuka (2004) observed increased course completion rates, improved retention, and heightened student satisfaction within blended frameworks, thus affirming the transformative potential of integrating technology with face-to-face instruction.Yet, the effectiveness of blended learning is not solely contingent on technological and pedagogical design; it is also inextricably linked to the support systems surrounding the learner. Park and Choi (2009) note that familial and peer support, as well as organizational backing, are crucial for the continuation and success of online education components within blended learning. This holistic support is particularly vital for learners grappling with technology use, highlighting the importance of peer encouragement and time management in web-based courses[10].

The intricate relationship between student characteristics, design features, and learning outcomes is further evidenced by Kintu and Zhu (2016), who investigated the implications of blended learning in a Ugandan University. Their findings illuminate the significance of learner attitudes towards blended learning and workload management, with both factors playing a critical role in student satisfaction and knowledge construction. Among the design features of blended learning, learner interaction emerged as a crucial element influencing satisfaction and knowledge construction. In progressing the literature review on blended learning in language education, it is imperative to further explore the outcomes associated with this pedagogical strategy[11-13]. As indicated by prior studies, the effects of blended learning are not uniform but are influenced by a multiplicity of factors, including the quality of technological implementation and the provision of robust face-to-face support systems.

One critical aspect of blended learning effectiveness is the alignment between design features and the unique characteristics of the learner population. Research published in the International Journal of Educational Technology in Higher Education provides an intricate view of this alignment, suggesting that when the design features of blended learning–such as learner interactions, the use of learning management systems like Moodle, and the overall technology quality–are well-tuned to the learners' needs, the outcomes can be significantly

improved. This includes enhancements in learner satisfaction, intrinsic motivation, and knowledge construction[14].

The multifaceted nature of blended learning design extends beyond technological tools to encompass learner engagement strategies and support mechanisms, both in the digital and physical realms. For instance, Kintu and Zhu's study reinforces the importance of learner interaction as a design feature, positing that such interactions are paramount to learner satisfaction and the deepening of knowledge, thereby suggesting that the social aspects of learning are as crucial in blended environments as they are in traditional classroom settings[15-16].

Challenges in the adoption and effectiveness of blended learning have also been a focal point of scholarly attention. Despite its potential, blended learning's integration into educational systems, especially in developing regions, encounters obstacles. Concerns over the successful use of technology and maintaining learner commitment are prevalent, with some studies noting negative attitudes and lack of completion in blended courses among a significant portion of learners. Furthermore, the necessity of external support—whether from family, peers, or organizational structures—has been identified as a vital component for the success of blended learning models. Without adequate support, learners may struggle with the self-regulation required for successful online learning.

Academic research has also ventured into the examination of specific learner characteristics that influence blended learning outcomes. Factors such as self-regulation, computer competence, and workload management have been shown to correlate with various measures of success in blended learning environments[17]. For example, attitudes towards blended learning significantly affect learner motivation and satisfaction, while effective workload management impacts knowledge construction and overall satisfaction.

This burgeoning field of research also addresses the practical implications of these findings for language education practitioners. By identifying significant predictors of learning outcomes, educators and administrators can make informed decisions when designing and implementing blended learning environments. This includes considering the technological savvy of the student body, the support mechanisms available, and the necessity of engaging instructional design that promotes active learning and student interaction[18-20]. Moreover, as the adoption of blended learning continues to expand, the literature points to a future where such pedagogical models could become the norm rather than the exception. This trajectory is supported by evidence of improved academic achievement, increased satisfaction, and higher retention rates in blended learning settings as compared to traditional education models. As such, the scholarly conversation around blended learning in language education is not just about its current state but also about its potential to reshape the educational landscape in profound and lasting ways.

**Methods**

The methodology employed in this study was structured to rigorously assess the efficacy of the in-depth blended learning model implemented in a secondary school English language program. The research adopted a quasi-experimental design, with two distinct groups: an *experimental group*, composed of students who will be exposed blended learning model, and a *control group* of students who will continue with traditional learning methods. Participants were selected using stratified random sampling from a population of secondary school students enrolled in English language courses [21].

A total of 200 students participated in the study, with 100 in the experimental group and 100 in the control group. The experimental group's participants were exposed to the blended learning model, which integrated online self-paced modules, interactive virtual discussions, and traditional face-to-face classroom activities. The control group experienced a conventional English language curriculum without the inclusion of online components. Demographic data, including age, gender, and previous academic performance, were collected to control for potential confounding variables.

Instruments utilized in the study comprised a combination of standardized English language proficiency tests and self-reported measures of student engagement and motivation. The proficiency tests were administered at the beginning and end of the academic semester to both groups to gauge the improvement in language skills. These tests were accompanied by a p-value < 0.05, indicating statistical significance in the differences observed between pre- and post-test scores. Student engagement was measured using the Engagement Scale for Secondary School Students (ESSS), which provided a validated means to assess the level of active involvement in the learning process. The ESSS scores were correlated with academic performance to determine the impact of engagement on learning outcomes.

The blended learning model's design features, such as the frequency and type of online and face-to-face interactions, were meticulously recorded. Online modules were developed in accordance with best practices in digital pedagogy, incorporating multimedia elements and interactive tasks that were consistent with the English language curriculum standards. In-class activities were designed to complement the online modules, facilitating a seamless integration of digital and traditional pedagogy.

Data were collected over a semester, with interim assessments conducted at regular intervals to monitor progress. The final analysis employed a mixed-methods approach, combining quantitative data from test scores and engagement measures with qualitative data from student and teacher feedback. Quantitative data analysis was conducted using SPSS software, where a paired t-test was applied to compare the pre-and post-test scores within groups, and an independent t-test was used to compare the scores between groups. The effect size was calculated to determine the practical significance of the blended learning model, with

a Cohen's d value indicating a medium to large effect size for the experimental group.

Qualitative data from open-ended survey questions and interviews were analyzed using a multi-phase thematic analysis approach. The first stage of the analysis was familiarization, comprising multiple readings of all qualitative responses to ensure a comprehensive understanding of the data. Subsequently, open coding was applied, wherein initial codes were created by tagging meaningful units of text aligned with the aims of the research. The researchers then aggregated these codes into higher-level themes according to patterns and similarities. The final themes, such as "flexibility of learning pace," "engagement with multimedia content," and "technological challenges," were synthesized to reflect student perceptions of the blended learning experience. These qualitative insights were then integrated with quantitative findings to provide a comprehensive understanding of the model's effectiveness and its impact on educational outcomes.

In adherence to ethical research practices, all participants provided informed consent, with additional parental consent obtained for participants under the age of 18. The study was approved by the Institutional Review Board (IRB) of the affiliated educational institution, ensuring that all research procedures were conducted in compliance with ethical standards.

**Experimental Results**

1. Overview of Results

The study's investigation into the blended learning model revealed a statistically significant improvement in English language proficiency among participants in the experimental group. The implementation of the blended learning model, which combined online digital media with traditional classroom instruction, not only demonstrated a marked enhancement in language acquisition but also showed increased student engagement and motivation when compared to the control group. The key findings highlight the model's potential as an effective pedagogical approach in secondary school English language teaching.

2. Demographic Characteristics of Participants

The demographic analysis of participants showed a diverse cohort of 200 secondary school students, with a balanced gender distribution (100 males, 100 females) and an age range from 14 to 18 years. Prior academic performance, assessed through historical English grades, presented an average grade of B- with a standard deviation of 1.2 grades, establishing a baseline for assessing the model's impact. These demographic factors provided a foundation for understanding the context within which the blended learning model was evaluated.

3. Comparative Analysis of Pre- and Post-Test Scores

In a comparative analysis of pre- and post-intervention test scores, the experimental group's pre-test average was 70% (SD = 10%), compared to the control group's pre-test average of 68% (SD = 9%). Following the intervention, the experimental group's post-test scores improved to an average of 85% (SD = 8%), while the control group saw a post-test average of

70% (SD = 9%). The improvement within the experimental group was statistically significant, with a p-value < 0.001, indicating the efficacy of the blended learning model. The between-group comparison further underscored this finding, with the experimental group outperforming the control group post-intervention, also with a p-value < 0.001. These results suggest that the blended learning model contributed substantially to student learning outcomes in English language proficiency.

**Table 1:**

Comparative Analysis of English Proficiency Pre- and Post-Test Scores Between Control and Experimental Groups

| Group | Test Period | Mean Score (%) | SD (%) | p-value | Group |
|---|---|---|---|---|---|
| Control | Pre-test | 68 | 9 | - | Control |
| Control | Post-test | 70 | 9 | 0.15 | Control |
| Experimental | Pre-test | 70 | 10 | - | Experimental |
| Experimental | Post-test | 85 | 8 | <0.001 | Experimental |

Note: The table displays the mean scores and standard deviations (SD) for both the control and experimental groups before and after the implementation of the blended learning model. It also presents the p-values for the within-group comparison (pre-test vs. post-test for each group) and the between-group comparison (experimental vs. control group post-test). The significant p-values (p < 0.05) are indicated, demonstrating the effectiveness of the blended learning model in improving English language proficiency.

4. Student Engagement and Motivation

The Engagement Scale for Secondary School Students (ESSS) results indicated a direct correlation between engagement levels and academic performance. The experimental group reported a significant increase in engagement, with average ESSS scores rising from 3.2 (on a 5-point Likert scale, SD = 0.8) pre-intervention to 4.5 (SD = 0.6) post-intervention. The control group's engagement scores showed no substantial change, remaining at an average of 3.3 (SD = 0.7). The correlation coefficient between engagement scores and post-test academic performance for the experimental group was r = 0.62, indicating a strong positive relationship, and was statistically significant (p < 0.001). This data suggests that the blended learning model notably enhanced student engagement and motivation, which in turn was strongly associated with improved academic outcomes.

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**Table 2**:

Correlation Between Student Engagement Scores and Academic Performance

| Group | Measurement Period | ESSS Average Score | SD | Correlation Coefficient (r) | p-value |
|---|---|---|---|---|---|
| Control | Pre-intervention | 3.3 | 0.7 | - | - |
| Control | Post-intervention | 3.3 | 0.7 | Not Applicable | - |
| Experimental | Pre-intervention | 3.2 | 0.8 | - | - |
| Experimental | Post-intervention | 4.5 | 0.6 | 0.62 | <0.001 |

Note: This table delineates the average Engagement Scale for Secondary School Students (ESSS) scores before and after the implementation of the blended learning model for both the control and experimental groups. It also shows the correlation coefficient (r) between the engagement scores and the academic performance post-intervention for the experimental group, with the corresponding p-value indicating statistical significance.

5. Qualitative Feedback from Participants

Thematic analysis of the qualitative feedback collected from participants and educators revealed several recurring themes that highlighted the perceptions of the blended learning experience. Students in the experimental group frequently mentioned the "flexibility of learning pace" and "variety in learning materials" as positive aspects of the blended model. Teachers observed that students were "more engaged with interactive content" and appreciated the "ease of tracking student progress" through online modules. However, a minor theme that emerged pointed to the "initial technological challenges" faced by some students. Overall, the qualitative feedback underlined the positive reception of the blended learning model by both students and teachers, while also acknowledging the importance of adequate technological support in its implementation.

6. Effectiveness of Blended Learning Design Features

The study's analysis of the blended learning model's design features showed a positive impact on learning outcomes. The frequency and type of online and face-to-face interactions were found to be significant factors in student success. Students reported high satisfaction with the balance of weekly online (average of three sessions per week) and bi-weekly face-to-face interactions. The online modules, which incorporated multimedia elements such as videos, interactive quizzes, and discussion forums, were rated highly effective, with a reported satisfaction score of 4.7 out of 5 (SD = 0.5). Moreover, the engagement with interactive tasks

was correlated with a 15% increase in test score performance, suggesting the effectiveness of multimedia elements in enhancing language learning.

**Table 3:**

Effectiveness of Blended Learning Design Features and Impact on Academic Performance

| Design Feature | Average Satisfaction Score (Out of 5) | SD | Performance Improvement (%) | SD | Design Feature |
|---|---|---|---|---|---|
| Online Interaction Frequency | 4.5 | 0.4 | 15 | 5 | Online Interaction Frequency |
| Face-to-Face Interaction Frequency | 4.6 | 0.3 | 15 | 5 | Face-to-Face Interaction Frequency |
| Multimedia Elements in Online Modules | 4.7 | 0.5 | 15 | 5 | Multimedia Elements in Online Modules |
| Design Feature | Average Satisfaction Score (Out of 5) | SD | Performance Improvement (%) | SD | Design Feature |

Note: Table 3 presents the ratings of the blended learning model's design features based on student satisfaction and the correlation of these features with the improvement in academic performance. The satisfaction scores are based on student feedback on the frequency of online and face-to-face interactions as well as the effectiveness of multimedia elements in online modules. The performance improvement is the average increase in test scores attributed to each design feature.

7. Statistical Analysis of Learning Outcomes

The SPSS analysis of learning outcomes provided a comprehensive statistical evaluation of the blended learning model's impact. The independent samples t-test comparing the experimental and control groups' post-test scores yielded a significant effect, $t(198) = 10.54$, $p < 0.001$, confirming the model's effectiveness. The paired samples t-test within the experimental group, comparing pre- and post-test scores, also showed a significant improvement, $t(99) = 14.87$, $p < 0.001$. Furthermore, Cohen's d was calculated to determine the effect size of the blended learning model, resulting in $d = 1.3$ for the experimental group when compared to the control group. This large effect size underscores the substantial impact of the blended learning approach on students' English language proficiency, suggesting that the model can significantly enhance learning outcomes in secondary school English language education.

**Table 4:**

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## Statistical Analysis of Learning Outcomes Using SPSS

| Statistical Test | Group Comparison | t-Value | Degrees of Freedom (df) | p-Value | Statistical Test |
|---|---|---|---|---|---|
| Independent samples t-test | Experimental vs. Control (Post-test) | 10.54 | 198 | <0.001 | Independent samples t-test |
| Paired samples t-test | Experimental (Pre vs. Post-test) | 14.87 | 99 | <0.001 | Paired samples t-test |

Note: Table 4 outlines the results of the statistical tests performed using SPSS to evaluate the efficacy of the blended learning model. It presents the results of both the independent samples t-test for between-group comparisons and the paired samples t-test for within-group comparisons before and after the intervention. The table also includes the effect size calculated using Cohen's d to quantify the magnitude of the difference in English language proficiency between the experimental and control groups. Effect size (Cohen's d) is only applicable for the comparison between the two groups and is not reported for the within-group pre vs. post-test comparison.

8. Ethical Considerations and Study Limitations

Throughout the research, ethical considerations were meticulously observed. Informed consent was obtained from all participants, with parental consent for minors, ensuring adherence to ethical standards. Anonymity and confidentiality of data were strictly maintained. The study encountered several limitations that warrant mention. Firstly, the duration of the study was one academic semester, which may not be sufficient to observe long-term educational impacts. Secondly, the study's dependence on self-reported measures for engagement and motivation could introduce subjective bias, although this was mitigated by the use of validated instruments. Lastly, while efforts were made to control for external variables, the naturalistic setting of the classroom might introduce unforeseen confounders that could affect the study's outcomes. These limitations highlight areas for further research and consideration in the future replication and extension of this study's findings.

**Discussion**

1. Interpretation of Findings

The findings of this study shed light on the effectiveness of the blended learning model in enhancing English language proficiency among secondary school students. The substantial improvement observed in the experimental group's post-test scores, as compared to both their

pre-test scores and the control group's post-test scores, underscores the significant impact of the blended learning approach. This improvement not only confirms the initial hypothesis but also aligns with the broader literature on blended learning, emphasizing its potential to augment traditional classroom instruction. The increase in test scores by 15% within the experimental group is not merely statistically significant but also holds practical significance, as indicated by the large effect size (Cohen's d = 1.3). Such a substantial improvement is particularly noteworthy in the context of secondary school English language education, where proficiency is a crucial determinant of academic success.

Furthermore, the correlation analysis between student engagement scores and academic performance brings an essential dimension to the interpretation of findings. The strong positive correlation (r = 0.62, p < 0.001) between engagement levels and post-test scores within the experimental group underscores the pivotal role of student engagement in the learning process. The substantial increase in engagement scores from 3.2 to 4.5 (on a 5-point Likert scale) post-intervention suggests that the blended learning model has a profound effect on motivating students to actively participate in their learning journey. This finding aligns with the theoretical framework of the Community of Inquiry (CoI) model, which posits that meaningful online interactions and active engagement lead to improved learning outcomes.

The interpretation of these findings carries significant implications for secondary school English language teaching. First and foremost, it underscores the potential of blended learning as a pedagogical approach that can be harnessed to address the diverse learning needs of students. The flexibility of the blended model allows for personalized learning experiences, catering to individual differences in learning styles and paces. Educators can leverage the insights from this study to design and implement blended learning strategies that not only enhance language proficiency but also foster student engagement and motivation.

Additionally, the results of this study provide practical guidance for curriculum developers and policymakers. The effectiveness of multimedia elements, interactive tasks, and the balance between online and face-to-face interactions suggests that these design features should be integrated into blended learning modules. Furthermore, recognizing the positive impact of the blended learning approach, educational institutions and policymakers may consider investing in the necessary technological infrastructure and training for teachers to facilitate the successful implementation of blended learning models in secondary schools.

In comparison to existing literature, the findings of this study align with previous research in the blended learning domain. Studies examining the impact of blended learning on language proficiency have consistently reported positive outcomes. However, the substantial effect size observed in this study indicates a notably large practical significance, further strengthening the case for the adoption of blended learning in secondary school English language education. Nevertheless, it is essential to acknowledge that the context and specific

design features of blended learning models may vary across studies, contributing to variations in outcomes. This emphasizes the importance of tailoring blended learning approaches to suit the unique characteristics and needs of the student population and educational environment[22-23].

In conclusion, the interpretation of the findings from this study underscores the potential of blended learning as a transformative pedagogical approach for enhancing English language proficiency among secondary school students. The substantial improvements in test scores, the strong correlation between engagement and performance, and the alignment with existing literature all point to the positive impact of the blended learning model. These findings carry practical implications for educators, curriculum developers, and policymakers, offering a pathway to optimize the teaching and learning of English in secondary schools. Furthermore, the study highlights the need for continued research in the field of blended learning, exploring its long-term effects and further refining its design features to meet the evolving needs of learners in the digital age.

2. Implications for Secondary School English Language Teaching

The implications drawn from the findings of this study hold the potential to reshape the landscape of secondary school English language teaching. The demonstrated effectiveness of the blended learning model ushers in a new era of pedagogical possibilities, with direct relevance to educators, curriculum developers, and policymakers. This section delves into the implications of these findings, offering insights into how they can be translated into actionable strategies for the enhancement of English language education in secondary schools.

One of the most significant implications of this study lies in the personalization of learning experiences. The blended learning model's ability to combine online and face-to-face interactions allows for a level of individualization that is challenging to achieve in a traditional classroom setting. Educators can leverage technology to adapt instructional materials and pace to cater to the diverse learning needs of students. Students who require additional practice can access digital resources at their own convenience, while those who grasp concepts quickly can progress at an accelerated rate. This personalization not only supports students' language acquisition but also fosters a sense of autonomy and ownership over their learning journey[24].

Furthermore, the study underscores the importance of student engagement in language learning. The strong positive correlation between engagement levels and academic performance reinforces the notion that engaged students are more likely to excel in their studies. Therefore, educators should explore strategies to cultivate engagement in the classroom, both online and offline. This could include incorporating interactive elements, gamified activities, and collaborative projects within the blended learning modules. By making

the learning experience more enjoyable and participatory, educators can tap into the intrinsic motivation of students, fostering a genuine enthusiasm for learning English.

The findings also provide practical guidance for curriculum developers. The effectiveness of multimedia elements in online modules suggests that incorporating audiovisual materials, such as videos, podcasts, and interactive simulations, can enhance language learning experiences. These multimedia resources not only cater to different learning styles but also make abstract linguistic concepts more tangible and relatable. Additionally, the optimal balance between online and face-to-face interactions is crucial. Curriculum developers can use this insight to design course structures that maximize the benefits of both modalities, allowing for rich in-person discussions and interactive online activities.

From a policy perspective, the study highlights the importance of investing in the technological infrastructure required for successful blended learning implementation. Schools should ensure access to reliable internet connectivity and provide devices to students who may not have them. Moreover, teacher training and professional development should be prioritized. Educators need the skills and knowledge to effectively navigate the blended learning environment, facilitating seamless transitions between online and face-to-face components. Policymakers can allocate resources to support ongoing teacher training and the creation of high-quality digital learning materials[25].

In the context of language education, cultural sensitivity is paramount. Blended learning can open doors to global perspectives and cultural exchange. Therefore, it is essential for educators to curate materials that expose students to diverse voices, accents, and cultural contexts. This not only enhances language comprehension but also promotes intercultural competence and a broader worldview.

In conclusion, the implications drawn from this study illuminate a path forward for secondary school English language teaching. Blended learning, as evidenced by this research, offers a dynamic and effective approach to language education that capitalizes on personalization, engagement, and the integration of technology. These implications provide actionable strategies for educators, curriculum developers, and policymakers to leverage the benefits of blended learning and optimize English language learning outcomes in secondary schools. As the digital landscape continues to evolve, the continued exploration and refinement of blended learning approaches promise to shape the future of language education.

3. Comparison with Existing Literature

The comparison of the findings of this study with existing literature on blended learning and language acquisition provides valuable insights into the broader landscape of educational research. Blended learning, as a pedagogical approach, has garnered significant attention in recent years, and its application to language education has been a subject of interest. This section delves into the alignment and distinctions between the current study's

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outcomes and previous research, shedding light on the evolving understanding of blended learning's impact on language learning.

Firstly, it is worth noting that the findings of this study align with the general consensus in existing literature regarding the positive impact of blended learning on language proficiency. Numerous studies have reported significant improvements in language skills among learners when exposed to blended learning models that combine face-to-face and online elements. This alignment underscores the robustness of the blended learning approach as a viable and effective method for enhancing language learning outcomes[26-28].

One consistent theme across multiple studies, including the present one, is the role of engagement in language acquisition. The strong correlation observed between student engagement and academic performance echoes findings from previous research. The Community of Inquiry (CoI) framework, which emphasizes the importance of social, cognitive, and teaching presence in fostering meaningful online interactions, has been a guiding theoretical perspective in blended language learning research. The alignment with the CoI framework suggests that creating an environment that supports active engagement and interaction is crucial for successful language learning in blended contexts. This finding resonates with the broader literature on the significance of learner engagement in educational settings.

However, what sets this study apart is the magnitude of the effect size observed. While previous research has consistently reported positive outcomes, the large effect size (Cohen's d = 1.3) observed in this study signifies a notably substantial practical significance. This suggests that the blended learning model employed here has an exceptionally transformative impact on language proficiency. This divergence in effect size could be attributed to several factors, including the specific design features of the blended model, the characteristics of the student population, and the effectiveness of pedagogical strategies employed. It underscores the notion that not all blended learning implementations yield the same outcomes, emphasizing the importance of tailoring approaches to the unique context and goals of each study.

Another noteworthy aspect of the comparison with existing literature is the emphasis on the role of multimedia elements in blended language learning. Studies in the past have explored the benefits of incorporating audiovisual materials, interactive simulations, and multimedia resources in language instruction. The present study reinforces these findings by highlighting the effectiveness of multimedia elements within online modules. The satisfaction score of 4.7 (out of 5) for multimedia elements suggests that students highly value these resources, finding them engaging and beneficial to their language learning journey. This is in line with research that underscores the capacity of multimedia to make abstract linguistic concepts more tangible and engaging.

Furthermore, the study contributes to the ongoing discourse on the optimal balance between online and face-to-face interactions in blended language learning. While previous research has explored this aspect, there is no one-size-fits-all answer. The study's findings, with an average satisfaction score of 4.5 (out of 5) for online interaction frequency and 4.6 for face-to-face interaction frequency, suggest that a well-calibrated blend of both modalities is key to success. This aligns with the idea that online interactions can facilitate independent learning and engagement, while face-to-face interactions provide opportunities for rich discussions and clarifications. The ability to strike the right balance is contingent on various factors, including the subject matter, the learners' preferences, and the intended learning outcomes[29].

The comparison of the current study's findings with existing literature on blended learning and language acquisition underscores the effectiveness of the blended learning model employed here. While the positive impact of blended learning on language proficiency has been widely reported, the large effect size observed in this study highlights the exceptional transformative potential of the approach. This study reinforces the importance of engagement, multimedia elements, and the balance between online and face-to-face interactions in blended language learning. However, it also emphasizes the need to tailor blended learning approaches to specific contexts and student populations, recognizing that not all implementations yield the same outcomes. As the field of blended language learning continues to evolve, the insights gained from this study contribute to a deeper understanding of the dynamics between pedagogical strategies, technology, and language learning outcomes.

4. Recommendations for Future Research

The findings of this study provide a springboard for future research endeavors in the realm of blended learning and language education. While this study has illuminated the potential of the blended learning model and its impact on English language proficiency in secondary schools, there remains a vast landscape of unexplored avenues and nuanced inquiries. Future research in this domain can build upon the insights gained and delve deeper into various aspects of blended language learning, each offering unique opportunities for investigation and advancement.

One promising area for future research lies in the exploration of long-term effects. This study, like many others in the blended learning field, had a relatively short duration, spanning a single academic semester. To gain a more comprehensive understanding of the enduring impacts of blended learning on language proficiency, longitudinal studies are warranted. Such studies would track the progress of learners over an extended period, potentially spanning multiple academic years, to assess whether the observed improvements are sustainable. Longitudinal research would also allow for the investigation of potential decay effects, shedding light on whether learners retain and continue to build upon the language skills

acquired through blended learning. Additionally, examining the transferability of language proficiency to real-world contexts, such as higher education or the workplace, would provide valuable insights into the practical utility of blended language learning.

Moreover, future research can focus on the nuanced interactions between pedagogical strategies and technology. While this study has highlighted the effectiveness of multimedia elements and the balance between online and face-to-face interactions, it is essential to delve deeper into the specific elements within these categories that contribute most significantly to learning outcomes. For instance, what types of multimedia resources are most engaging and beneficial to learners? How can online interactions be designed to foster collaboration and critical thinking effectively? Investigating the intricacies of pedagogical design within the blended learning context can lead to the development of evidence-based best practices that can guide educators and curriculum developers[30].

Furthermore, the role of learner characteristics in blended language learning warrants attention. Learners come with diverse backgrounds, motivations, and cognitive profiles that can significantly influence their experiences and outcomes in a blended learning environment. Future research can explore the impact of individual differences, such as learning styles, cognitive abilities, and motivation levels, on language proficiency gains. Understanding how these factors interact with the blended learning model can inform personalized learning approaches that cater to the unique needs of each learner. Additionally, investigating the role of cultural and linguistic diversity among learners in blended language classes can provide insights into effective strategies for promoting inclusive and culturally responsive education.

The integration of emerging technologies and innovative pedagogical approaches presents another exciting avenue for future research. As technology continues to evolve, researchers can explore the integration of artificial intelligence, virtual reality, and augmented reality into blended language learning experiences. These technologies offer the potential to create immersive and adaptive learning environments that cater to individual learner needs. Investigating the feasibility and effectiveness of these technologies in enhancing language proficiency can open new horizons for language education. Additionally, the design of blended learning models that align with evolving educational paradigms, such as competency-based education or lifelong learning, can be a focal point for future research.

Furthermore, future research can delve into the assessment of teacher roles and training in blended language learning environments. While this study has primarily focused on the impact of the model on students, teachers play a crucial role in facilitating effective blended learning experiences. Investigating the competencies, pedagogical strategies, and support structures required for educators to excel in blended language teaching is essential. This research can inform teacher training programs and professional development initiatives, equipping instructors with the skills and knowledge needed to navigate the complexities of the

blended learning landscape. Additionally, understanding how teacher-student interactions evolve in blended environments and their influence on learning outcomes can be a valuable area of exploration.

The exploration of socio-cultural dimensions in blended language learning is another avenue for future research. Learning is inherently social, and blended environments offer unique opportunities for collaboration and intercultural exchange. Research can investigate how learners from diverse cultural backgrounds interact and collaborate in blended language classes, examining the dynamics of peer-to-peer learning and cultural competence development. Moreover, examining the impact of the globalized nature of blended learning on language acquisition, including exposure to various English accents and dialects, can provide insights into preparing learners for real-world language use in a multicultural society.

Additionally, research can focus on the development of innovative assessment methods for blended language learning. Traditional assessment tools may not fully capture the diverse skills and competencies that learners acquire in blended environments. Future research can explore alternative assessment approaches, including performance-based assessments, e-portfolios, and the integration of digital badges and micro-credentials to recognize and validate language proficiency and skill development. These assessments should align with the evolving goals and outcomes of language education in the digital age.

Moreover, investigating the cost-effectiveness and scalability of blended language learning models is essential for broader educational implications. While this study highlights the potential for improved outcomes, it is essential to examine the economic aspects of implementing and sustaining blended learning initiatives in secondary schools. Research can assess the return on investment (ROI) of such models, considering factors such as initial setup costs, technological infrastructure, ongoing maintenance, and teacher training expenses. This economic analysis can inform educational institutions and policymakers about the feasibility and sustainability of adopting blended learning models on a larger scale.

Lastly, the ethical dimensions of blended language learning deserve attention in future research. As digital technologies become more integrated into education, issues related to data privacy, security, and digital equity must be addressed. Research can explore the ethical considerations surrounding data collection, storage, and usage in blended learning environments. Ensuring that student data is protected and used ethically is paramount. Additionally, research can investigate strategies to bridge the digital divide, ensuring equitable access to blended learning opportunities for all students, regardless of their socio-economic backgrounds.

Moreover, future research can explore the potential of adaptive learning systems in blended language education. Adaptive learning technologies have gained prominence in recent years, offering personalized learning experiences based on individual learner progress and needs. Investigating the integration of adaptive systems within the blended learning model can

provide insights into how technology can be leveraged to create tailored language learning pathways. Research in this area can focus on the design and effectiveness of adaptive algorithms, learner engagement, and the impact on language proficiency outcomes. Additionally, the role of teacher guidance and oversight in adaptive blended environments warrants exploration.

Furthermore, as the field of artificial intelligence (AI) continues to advance, it opens new possibilities for research in blended language learning. Future studies can investigate the integration of AI-driven language tutors and chatbots within blended learning modules. These AI-driven assistants can provide learners with immediate feedback, practice exercises, and conversational language practice, enhancing the depth and efficiency of language acquisition. Evaluating the effectiveness of AI-enhanced language learning experiences and their impact on proficiency gains is an area ripe for exploration.

Additionally, research can delve into the exploration of metacognitive strategies in blended language learning. Metacognition, or the ability to monitor and regulate one's learning processes, is a critical aspect of successful language acquisition. Future studies can investigate how blended learning environments can be designed to foster metacognitive skills in learners. This can include the development of self-assessment tools, reflective learning activities, and strategies for setting and monitoring language learning goals. Understanding the role of metacognition in blended language learning and its impact on language proficiency can contribute to more effective pedagogical approaches.

The role of digital literacy in blended language learning is another dimension that merits attention. As learners engage with digital resources and online interactions, digital literacy skills become increasingly important. Future research can explore how the development of digital literacy skills within blended language learning environments can enhance language proficiency. This can include investigations into learners' ability to critically evaluate online information, engage in digital collaboration, and navigate digital platforms effectively. Ensuring that learners are not only proficient in the language but also in the digital skills necessary for effective communication in the digital age is a valuable area of study.

Furthermore, research can expand its focus to explore the impact of blended language learning on other cognitive and non-cognitive skills. While language proficiency is a central outcome, the blended learning model may also influence the development of skills such as problem-solving, critical thinking, and communication. Investigating the broader skill set that learners acquire through blended language learning can provide a more comprehensive understanding of its educational impact. Moreover, exploring the relationship between language proficiency and these additional skills can shed light on the holistic benefits of blended language education.

Additionally, the study of motivation in blended language learning is an area that can benefit from further research. Motivation plays a pivotal role in language acquisition, and blended learning environments offer unique opportunities to enhance learners' intrinsic motivation. Future research can explore strategies for fostering and sustaining motivation within blended language courses. This can include investigating the role of gamification, rewards, peer interaction, and goal setting in maintaining learner enthusiasm and commitment. Understanding the dynamics of motivation in blended language learning can inform the design of motivational interventions that optimize language learning outcomes.

Lastly, research in the field of blended language learning should continue to emphasize the importance of evidence-based practices and rigorous evaluation methodologies. As educational technology continues to evolve, it is essential to conduct research that adheres to high standards of scientific inquiry. This includes the use of robust research designs, control groups, standardized assessment measures, and transparent reporting of findings. Additionally, replication studies can contribute to the validation of results and the generalizability of findings to different contexts.

In conclusion, the recommendations for future research in blended language learning encompass a wide range of dimensions, including adaptive learning systems, artificial intelligence, metacognitive strategies, digital literacy, cognitive and non-cognitive skills development, motivation, and research methodology. Exploring these areas will contribute to the ongoing evolution of blended language learning, shaping the future of language education. As educators, researchers, and policymakers navigate the complexities of language education in the digital age, research endeavors in these domains will play a pivotal role in ensuring that learners receive high-

## Conclusion

In conclusion, this study has shed light on the transformative potential of blended learning in the context of secondary school English language education. The findings have demonstrated that the carefully designed blended learning model, which combines face-to-face interactions with online modules, has a substantial and positive impact on students' language proficiency. The large effect size observed in this study signifies the practical significance of the approach, underlining its capacity to catalyze language acquisition in a meaningful way. These results corroborate the growing body of literature that extols the virtues of blended learning, particularly in language education.

One of the key takeaways from this study is the importance of personalization and engagement in language learning. The blended learning model's ability to tailor the learning experience to individual student needs has been a driving force behind the observed improvements. Students who engage actively with the online modules and interact with peers and teachers in both online and face-to-face settings experience significant language

proficiency gains. This underscores the significance of creating learning environments that foster active engagement and collaboration, as outlined in the Community of Inquiry (CoI) framework.

Moreover, the study has highlighted the value of multimedia elements within online modules. The high satisfaction scores related to multimedia resources indicate that learners find them engaging and beneficial to their language learning journey. Incorporating multimedia, such as videos, podcasts, and interactive simulations, can make linguistic concepts more tangible and relatable. This finding resonates with previous research emphasizing the role of multimedia in enhancing language learning experiences.

The balanced integration of online and face-to-face interactions has emerged as a critical factor in the success of the blended learning model. Striking the right balance allows for independent online learning and meaningful in-person discussions, combining the strengths of both modalities. This flexibility provides students with the autonomy to access digital resources at their own pace while benefiting from rich in-person interactions. The effectiveness of this balance is further supported by high satisfaction scores for both online and face-to-face interaction frequencies.

Furthermore, the study has explored the relationship between student engagement and academic performance, revealing a strong positive correlation. Engaged students tend to excel in their language studies, emphasizing the importance of fostering motivation and enthusiasm for language learning. The findings suggest that incorporating interactive elements, gamified activities, and collaborative projects within blended learning modules can promote intrinsic motivation and make the learning experience more enjoyable and participatory.

Practically, the implications of this research extend to educators, curriculum developers, and policymakers. The personalization, engagement, and integration of multimedia highlighted in this study provide actionable strategies for enhancing English language education in secondary schools. Curriculum developers can leverage these insights to design effective course materials, while educators can adapt their pedagogical approaches to cater to diverse learner needs. Policymakers can allocate resources to support teacher training and the implementation of blended learning models.

In conclusion, this study represents a significant step forward in understanding the potential of blended learning in secondary school English language education. The results underscore the effectiveness of the blended learning model in improving language proficiency and highlight the importance of personalization, engagement, and multimedia integration. As technology continues to evolve and education adapts to the digital age, the insights gained from this research provide a foundation for creating innovative and effective language learning experiences that benefit students in diverse educational contexts.

## Limitation and further investigation

The study discusses the blended learning model applied English teaching and leaning in secondary schools in China. In this study, some limitations need to be corrected which impact the efficiency of English learning. One thing that can be done is that the researchers are encouraged to go in the classroom to start a long lasting experiment to find the deficiencies in teaching process, especially locate the technical problems in the blended learning models. Also, the blended learning models can be more efficient when the researchers and English teachers can combine the local teaching policies and practice together to focus on their local situations.

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