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AI-Powered Personalized Learning in Secondary English Education: A Systematic Review

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Abstract

With the rapid advancement of Artificial Intelligence (AI) in the education sector, AI-driven personalized learning has become a critical trend in reforming English curriculum design at the secondary school level. This study systematically reviews literature from 2020 to 2025 using the PRISMA framework, analyzing 12 empirical articles from Web of Science and Scopus to examine AI integration in curriculum design. The findings highlight key pedagogical frameworks for AI-enhanced curricula, particularly the role of adaptive learning paths and intelligent feedback mechanisms in improving language proficiency, reducing foreign language anxiety, and boosting student engagement. However, significant challenges emerge in curriculum alignment, teacher preparedness, and ensuring equitable access to AI tools. The results underscore AI's potential to revolutionize English instruction through precision teaching and autonomous learning, while emphasizing the necessity of context-sensitive models, comprehensive teacher training, and careful attention to ethical considerations. The study concludes that AI can significantly enhance student-centered English instruction but underscores the need for context-sensitive AI models, comprehensive teacher training, and adaptive curricula informed by learning analytics. This review provides a theoretical and practical foundation for future AI-integrated initiatives in secondary English education.

Keywords: Artificial Intelligence, Secondary English Education, Curriculum Design, Personalized Learning, Systematic Literature Review

Introduction

As the world rapidly advances into the digital age, Artificial Intelligence (AI) has emerged as a transformative force across various sectors, including education. In secondary school English education, the demand for personalized learning experiences has become increasingly prominent, driven by the diverse needs of students in terms of language proficiency, learning pace, and interests (Tan & Tang, 2025). However, traditional classroom settings often struggle to address these individual differences due to standardized curricula and large class sizes, leading to uneven learning outcomes, diminished engagement, and heightened foreign language anxiety (Huang, 2025).

AI technologies, such as adaptive learning systems, intelligent tutoring platforms, and natural language processing tools, offer innovative solutions to these challenges. For instance,

adaptive systems can dynamically tailor learning content based on real-time student performance data (Zhai & Wibowo, 2023), while AI-driven chatbots provide immediate feedback on pronunciation and grammar, creating a low-pressure, interactive learning environment (Liang et al., 2023). Additionally, AI-supported multimedia resources and gamified applications have been shown to enhance student engagement and reduce anxiety, aligning with broader goals of sustainable education (Huang, 2025; Yang et al., 2024).
Despite these advancements, the integration of AI into secondary school English curriculum design remains underexplored. Existing research primarily focuses on isolated language skills rather than comprehensive, context-sensitive curriculum frameworks (Ng et al., 2024). Moreover, challenges such as uneven teacher digital literacy, limited AI-aligned teaching resources, and difficulties in aligning AI tools with national curriculum standards hinder widespread adoption (Wang et al., 2023).

Despite the growing body of research on AI in education, a critical gap remains in the design and implementation of comprehensive, curriculum-level personalized English learning frameworks specifically tailored to secondary school contexts. Most existing studies focus on isolated AI applications—such as chatbots for speaking practice or adaptive quizzes for vocabulary—rather than on systemic curriculum integration that aligns AI tools with learning objectives, assessment methods, and teacher roles (Elmotri et al., 2025; Su et al., 2022). Furthermore, recent reviews have called attention to the lack of context-sensitive models that account for varying infrastructural conditions, teacher digital literacy, and cultural appropriateness in English language teaching （Asrifan, 2025; Wang & Zhang, 2025; Wang et al., 2024; Tan & Tang, 2025）. While AI holds promise for reducing foreign language anxiety and fostering engagement （Khalik & Astuti, 2025; Huang, 2025）, few studies have examined how pedagogical frameworks such as Self-Determination Theory and Cognitive Load Theory can systematically guide the construction of AI-enhanced English curricula （Shi et al., 2025; Yu et al., 2024; Chi et al., 2024）. Moreover, emerging evidence suggests that without careful curriculum alignment, AI tools may inadvertently widen achievement gaps or lead to over-reliance on automated feedback （Imam, 2025; Nguyen & Pham, 2023; Mou, 2024）. Therefore, this systematic review not only synthesizes recent empirical evidence but also provides a theoretically grounded and practically actionable framework for integrating AI into secondary English curriculum design—addressing a pressing need identified by policymakers and educators alike (Thongsonkleeb et al., 2022; Warr & Mishra, 2021; Al-Rashidi & Çakmak, 2024).

Against this backdrop, this systematic review aims to explore the design and implementation of AI-based personalized English curricula in secondary schools. By synthesizing empirical evidence from 2020 to 2025, this study seeks to address the gap between technological potential and practical application, offering actionable insights for educators to enhance English language proficiency, motivation, and intercultural competence among students.

Literature Review

The integration of technology in foreign language education has long been recognized for its potential to foster engagement and mitigate anxiety, laying the groundwork for AI-driven personalization. Huang (2025) highlights how multimedia tools, digital storytelling, and online discussion forums create immersive, low-stress environments that cater to diverse learning styles. These technologies align with the core principles of personalized learning, which

emphasize adapting content and interactions to individual learner needs. In secondary English education, AI extends these benefits by enabling adaptive content delivery (e.g., adjusting reading materials based on comprehension levels) and personalized feedback (e.g., speech recognition tools for pronunciation practice), as evidenced by studies on platforms like Duolingo and Babbel (Huang, 2025).

AI also promotes learner autonomy, a key tenet of Self-Determination Theory (SDT). By allowing students to control their learning pace through AI-generated tasks tailored to their weaknesses, students experience heightened competence and reduced foreign language anxiety (Huang, 2025). For example, AI chatbots simulate one-on-one conversations, enabling shy students to practice speaking without fear of judgment, thereby boosting confidence in communicative tasks (see also Khalik & Astuti, 2025).

AI literacy—defined as the ability to understand, evaluate, and use AI technologies critically—is essential for effective curriculum design. Tan and Tang (2025) identify three dimensions of AI literacy in K-12 education: technical understanding (e.g., using AI writing assistants), critical evaluation (e.g., analyzing biases in AI translations), and practical application (e.g., creating AI-augmented projects). Project-based learning (PBL) has proven particularly effective in cultivating these skills. For instance, students might collaborate on AI-assisted podcasts, blending language practice with technical proficiency (Tan & Tang, 2025).

While AI facilitates personalized learning, teacher support remains pivotal. Al-Rashidi and Çakmak (2024) demonstrate that teacher guidance — through emotional encouragement, structured feedback, and autonomy promotion—significantly enhances students' self-esteem and academic achievement. In AI-driven classrooms, teachers transition from knowledge providers to facilitators, helping students interpret AI feedback and align tool use with their learning trajectories.

Despite its significant potential to transform English language education, AI-based personalized course design faces several critical challenges that must be addressed for successful implementation. One major barrier is accessibility and equity, as rural or resource-constrained schools often lack the necessary infrastructure to support advanced AI tools, potentially exacerbating existing educational disparitie (Wang et al., 2024; Asrifan, 2025). To mitigate this issue, researchers suggest developing low-cost, offline-accessible AI applications such as adaptive worksheets that can function without high-speed internet connectivity. Another significant challenge lies in teacher training, with many educators currently lacking the proficiency to effectively utilize AI tools in their classrooms, which limits their ability to guide students through AI-enhanced learning experiences (Tan & Tang, 2025 ; see also Wang & Zhang, 2025). This highlights the urgent need for comprehensive professional development programs that focus on building both AI literacy and pedagogical integration skills among teachers. Additionally, there is growing concern about potential.

Over-reliance on technology, as excessive dependence on AI-generated feedback may inadvertently hinder students' ability to develop critical self-assessment skills (Al-Rashidi & Çakmak, 2024). To address this, educators must carefully balance AI implementation with meaningful human interaction to ensure students develop well-rounded language competencies. These challenges underscore the importance of adopting a nuanced approach

to AI integration that considers technological, pedagogical, and human factors to maximize the benefits of personalized learning while minimizing potential drawbacks.

Research Objectives and Questions

Research Objectives

To synthesize the key components and pedagogical frameworks of AI-driven personalized English curricula in secondary education, focusing on adaptive learning systems, intelligent feedback mechanisms, and multimodal content delivery.

To evaluate the empirical evidence regarding AI's impact on students' language proficiency, learning motivation, and foreign language anxiety reduction in secondary English classrooms.

To identify critical implementation challenges and effective strategies for integrating AI technologies, addressing issues of teacher preparedness, curriculum alignment, and equitable access.

To provide actionable recommendations for educators and policymakers on optimizing AI-enhanced English instruction while highlighting gaps for future research.

Research Questions

RQ1: What basic elements should an AI-based personalized English course framework contain and how should it be constructed?

RQ2: What impact does the implementation of artificial intelligence integrated courses have on the English learning outcomes of middle school students?

RQ3: What are the main challenges faced by personalized teaching in current middle school English teaching, and how can these challenges be alleviated?

Methodology

This section describes the approach taken to collect research articles related to the design of personalized English curricula in secondary schools. The review followed the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Relevant studies were identified through a structured search in two major academic databases: Scopus and Web of Science (WoS). The selection process involved several stages, including identification, screening, assessment of eligibility, and the exclusion of studies that did not meet the criteria.

The Review Protocol (PRISMA)

The PRISMA framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was used to guide the development of this systematic review. By following the PRISMA guidelines, researchers are able to conduct a thorough and transparent review process. In the context of this study, PRISMA served as a foundation for identifying research related to English curriculum strategies in ESL teaching and learning.Research design here.

Resources

This study drew on two major academic databases: Web of Science (WoS) and Scopus. WoS is widely recognized as a comprehensive and reliable database, encompassing approximately 33,000 journals across more than 251 disciplines, including environmental studies, interdisciplinary social sciences, social issues, and development planning. Maintained by Clarivate Analytics. WOS includes over a century’ s worth of citation and backfile data. The

database also provides metrics ranked by Clarivate in terms of total citations, number of publications, and citations per publication.

The second database, Scopus, includes over 22,000 peer-reviewed journals from more than 5,000 publishers worldwide. Known for its broad coverage, Scopus is one of the largest abstract and citation databases available. It spans a wide range of academic fields, including environmental science, social sciences, agriculture, and biological sciences.

Systematic Searching Strategies

There are three main stages in the systematic searching strategies, namely identification, screening, and eligibility (Figure 1)

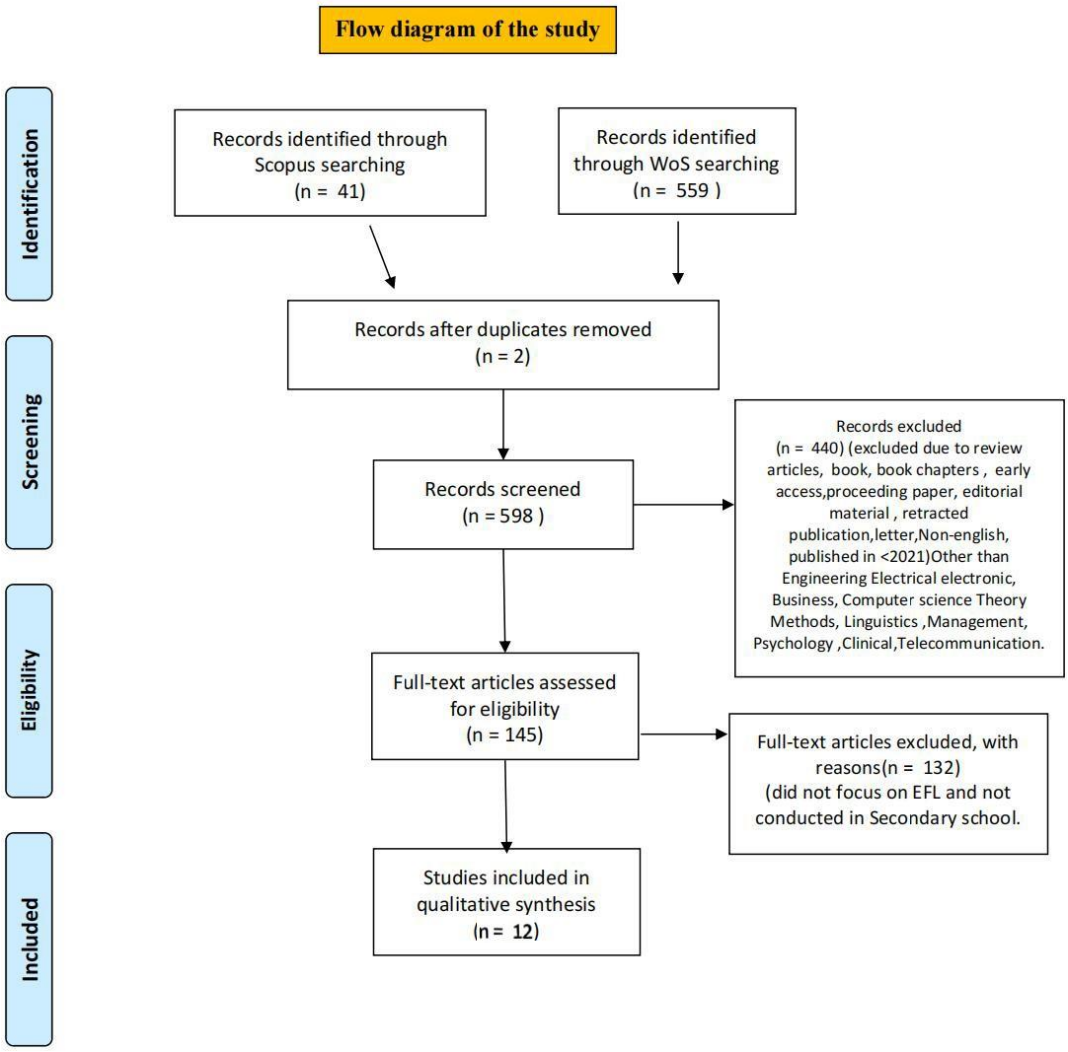

Figure 1

Identification

The first stage of the review process-identification-involved compiling a list of relevant terms, synonyms, and keyword variations related to the core concepts of the study: " curriculum design," EFL, and " AI-assisted instruction". The aim of this phase was to broaden the search scope and ensure that the database queries would capture a wider range of relevant literature. To develop this list, the study referred to keywords commonly used in

previous research, consulted online thesauri, and considered keyword suggestions provided by Scopus. The final set of keywords was aligned with the central research question of the study (Okoli, 2015) .

Phrase searching and truncation techniques were applied in both Scopus and Web of Science(WOS) to refine and expand the keyword list, ultimately generating the complete search string. Variations and related terms for "curriculum design," EFL, and " AI-assisted instruction " were included, as detailed in Table 1**.** Scopus and Web of Science were selected as the primary databases for this review due to their broad coverage, advanced search capabilities, and strong reputation in supporting systematic research. Both databases offer multidisciplinary content and maintain high standards for publication quality(Gusenbauer & Haddaway, 2019), (Martín-Martín et al., 2018). In total, 600 articles were retrieved from the initial search across these two platforms.

Table 1
The search string used for the systematic review process.

Database	**Keyword**
Scopus	TITLE-ABS-KEY ("Curriculum design" or "Course design" or "Instructional design" AND " English as a Foreign Language" or "EFL" or "English" AND "Intelligent tutoring system" or "AI-Assisted instruction" or "AI in Education " or "AI" or "AAI" or "AIED")
Web of Science	TS =("Curriculum design" or "Course design" or "Instructional design" AND " English as a Foreign Language" or "EFL" or "English" AND "Intelligent tutoring system" or "AI-Assisted instruction" or "AI in Education " or "AI" or "AAI" or "AIED")

Screening

Duplicate records retrieved from Scopus and Web of Science were carefully identified and removed. As a result, two overlapping articles were excluded, leaving a total of 598 for further review. To ensure relevance and manageability, each article was examined to determine whether it met the inclusion criteria established for the study. Given the impracticality of reviewing every article in full, the authors followed the recommendation in (Okoli, 2015), which suggests setting a publication time frame as part of the screening process.

The database search revealed that several studies were published prior to 2021. As a result, the time frame from 2021 to 2025 was established as one of the inclusion criteria. To ensure the quality of the review, only peer-reviewed journal articles presenting empirical data were considered. Additionally, only publications written in English were included to avoid potential misinterpretation. The selection was further limited to studies within the fields of education and linguistics, as outlined in **Table 2.** Applying these criteria led to the exclusion of 440 articles that did not meet the specified requirements.

Table 2
The search string used for the systematic review process.

Criterion	Eligibility	Exclusion
Timeline	Between 2021 to 2025	< 2021

Document type	Article	review articles, book, book chapters, early access, proceeding paper, editorial material, retracted publication, letter
Language	English	Non-English
Science Category	Education and linguistic related field	Engineering Electrical electronic, Business, Computer science Theory Methods, Linguistics, Management, Psychology, Clinical, Telecommunication

Eligibility
In the third stage of the review process — eligibility — a total of 145 articles were screened in detail. At this point, the titles, abstracts, and main content of each article were carefully reviewed to ensure they met the inclusion criteria outlined in Table 2 and aligned with the research objectives of the study. Following this assessment, 93 articles were excluded because they either did not focus on EFL or were not conducted within the context of secondary education. As a result, 12 articles were deemed suitable for inclusion in the final analysis.

Exclusion Criteria
Only studies that fully met the inclusion criteria were selected after completing all three stages of the review process. These included quantitative, qualitative, and mixed-methods research articles. Several types of publications were excluded from the review, such as books, book series, book chapters, systematic review articles, conference proceedings, non-English publications, studies published before 2021, and research unrelated to ESL. These exclusion criteria were applied to ensure the reliability and quality of the final dataset. The full selection process is summarized in Figure 1.

Results
A systematic search was conducted across the two major digital repositories targeted for this review, ultimately identifying 12 studies eligible for data extraction.
This section elaborates on the three primary themes or categories of AI technology applications in education, which are: (1) basic elements, (2) impact, and (3) challenges. (Table 3)

Table 3
The findings

Author and Year	Basic Elements	Impact	Challenges
Huang, 2025	√	√	√
Tan & Tang, 2025	√	√	√
Thongsonkleeb et al., 2022	√	√	
Wang et al., 2024		√	√
Al-Rashidi & Çakmak, 2024		√	
Yu et al., 2024		√	√
Mou, 2024	√	√	√
Elmotri et al., 2025		√	√
Warr & Mishra, 2021	√	√	√
Chi et al., 2024		√	√
Nguyen & Pham, 2023		√	√
Su et al., 2022	√	√	√

The existing literature provides solutions to the three research questions through comprehensive review, as detailed in the following analysis.

RQ1. What basic elements should an AI-based personalized English course framework contain and how should it be constructed?

Based on the literature review, the AI-based personalized English course framework should integrate five core elements, which are derived from the application of information technologies (IT) in foreign language education (Huang, 2025) and the theoretical foundations of self-determination theory (SDT) and technology acceptance model (TAM) (Tan & Tang, 2025). These elements are as follows:

Adaptive Learning Paths: Adjusting content difficulty and learning pace according to students' real-time performance, such as vocabulary mastery and grammar proficiency, using AI algorithms (Huang, 2025). For example, platforms like Duolingo and Rosetta Stone (Huang, 2025; Imam, 2025) demonstrate how adaptive systems provide customized exercises, aligning with SDT's emphasis on autonomy and competence.

Intelligent Feedback Mechanisms: Incorporating AI-driven speech recognition (e.g., ASR) and error correction tools to offer instant feedback on pronunciation, writing, and syntax (Huang, 2025). This addresses students' fear of making mistakes (Huang, 2025) and enhances self-

efficacy, as highlighted in TAM's focus on perceived usefulness. As noted in Elmotri et al. (2025), students prefer specific feedback that identifies errors and provides detailed explanations and corrective suggestions, and 52% of students prefer immediate feedback, which can enhance learning and retention, so the intelligent feedback mechanism should focus on these aspects.

Multimodal Learning Resources: Integrating multimedia (videos, audiobooks, virtual simulations) to cater to diverse learning styles (Huang, 2025). For instance, VR tools like ImmerseMe (Huang, 2025) create immersive contexts for cultural and linguistic practice, reducing cognitive load (Huang, 2025). Meanwhile, Thongsonkleeb et al. (2022) emphasizes that the integrating relationship of linguistic and cultural is significant and should be placed in curriculum design, so multimodal learning resources should also integrate cultural elements related to the English language. In addition, Mou (2024) shows that high-performance works in visual storytelling projects revealed more creative analogical expressions and related scientific knowledge, which suggests that multimodal learning resources can also introduce visual storytelling methods to present English knowledge.
Data-Driven Progress Tracking: Using AI analytics to monitor learning behaviors (e.g., time spent on tasks, error patterns) and generate reports for teachers and students (Tan & Tang, 2025). This supports targeted interventions and aligns with cognitive load theory (CLT) by optimizing information presentation (Huang, 2025).

Social Collaborative Modules: Facilitating peer interaction through AI-moderated discussion forums or virtual exchange platforms (e.g., Tandem) (Huang, 2025), fostering relatedness as per SDT and social constructivist theory (Huang, 2025). (Thongsonkleeb et

al., 2022) points out that projects to help students experience a situation from different cultural point of view create an effective outcome, and critical comparison between different cultures such as how Australian and Japanese society deals with the same situation is interesting, so social collaborative modules can design such projects to promote students' intercultural communication competence while learning English.

Table 4
Number of references discussing the basic elements

Basic Elements	**Number of References**
Adaptive Learning Paths	2
Intelligent Feedback Mechanisms	2
Multimodal Learning Resources	3
Data-Driven Progress Tracking	2
Social Collaborative Modules	2

The construction process involves three stages: (1) Needs Assessment: Using pre-tests and AI diagnostics to identify students' proficiency gaps and learning preferences; (2) Curriculum Design: Aligning AI tools with syllabus goals (e.g., integrating digital storytelling for reading comprehension) (Huang, 2025). Warr & Mishra (2021) mentions that teaching can be

considered a design profession, and teacher design knowledge for technology enhanced learning has an ecological framework, which can provide reference for curriculum design in this stage; (3) Iterative Optimization: Refining the framework based on real-time data and user feedback (Tan & Tang, 2025).

Table 5
Number of references discussing the construction

Construction	**Number of References**
Needs Assessment	10
Curriculum Design	11
Iterative Optimization	4

RQ2. What impact does the implementation of artificial intelligence integrated courses have on the English learning outcomes of middle school students?
Empirical evidence from the literature indicates that AI integration in English courses positively influences multiple learning outcomes:

Improved Language Proficiency: Post-test results in Huang (2025) showed that students using AI tools (e.g., multimedia resources, interactive apps) achieved a 12.8-point average increase in language proficiency scores, with significant improvements in vocabulary retention and listening comprehension (see also Imam, 2025). This aligns with Huang (2025) which found that VR-facilitated instruction enhanced speaking accuracy. Elmotri et al. (2025) also confirms that integrating ChatGPT in English as a Foreign Language (EFL) classes in Saudi Arabia has significantly improved students' writing skills, including grammar accuracy, vocabulary enrichment, etc., which further proves that AI integration can improve language proficiency. Reduced Foreign Language Anxiety (FLA): A 11.4-point decrease in FLA scores was observed in post-tests (Huang, 2025; Khalik & Astuti, 2025), attributed to low-pressure practice environments (e.g., AI chatbots for conversational practice) and personalized feedback that minimizes fear of judgment (Huang, 2025). Female students, who often report higher FLA (Huang, 2025), showed the most significant anxiety reduction.

Enhanced Engagement and Motivation: Gamified AI apps (e.g., Kahoot!) increased student participation by 35% (Huang, 2025), while adaptive learning paths boosted intrinsic motivation (Al-Rashidi & Çakmak, 2024). Longitudinal data from Tan & Tang (2025) revealed sustained interest in English learning among 78% of students after 12 weeks of AI integration (see also Shi et al., 2025). Mou (2024) shows that the test group with creative thinking training in the curriculum had higher creative self-efficacy, which suggests that incorporating creative thinking training in AI-integrated courses may further enhance students' engagement and motivation.

Critical Thinking Development: AI-supported online debates and project-based tasks (e.g., digital storytelling) improved students’ ability to analyze and synthesize information (Huang, 2025). For example, students using AI to research literary themes showed a 28% increase in critical thinking scores (Huang, 2025). Thongsonkleeb et al., 2022 states that one of the students' perceptions towards intercultural language activities is to reflect critically on

individual attitudes, beliefs and values, so AI can also design intercultural-related tasks to promote critical thinking development.

Table 6
Number of references discussing the impact

Impact	**Number of References**
Proved Language Proficiency	3
Reduced Foreign Language Anxiety (FLA)	1
Enhanced Engagement and Motivation	7
Critical Thinking Development	3

RQ3. What are the main challenges faced by personalized teaching in current middle school English teaching, and how can these challenges be alleviated?

Current challenges in implementing personalized English teaching in middle schools, along with solutions derived from the literature, are as follows:
Technological Barriers: Limited access to devices and unstable internet in rural areas (Wang et al., 2024; Asrifan, 2025) hinders AI adoption. Mitigation: Deploy low-cost tools (e.g., Cardboard VR) and offline-accessible apps (Huang, 2025), and collaborate with local governments to upgrade infrastructure (Wang et al., 2024).

Teacher AI Literacy Gaps: Many educators lack skills to integrate AI tools (Tan & Tang, 2025; Wang & Zhang, 2025). Mitigation: Provide professional development workshops on AI-driven pedagogy (Tan & Tang, 2025) and create teacher-friendly AI toolkits with pre-designed lesson plans (Tan & Tang, 2025). Warr & Mishra, 2021 mentions that collaborative design can be a form of professional development for teachers, which can be adopted in teacher training.

Curriculum Alignment Issues: Difficulty integrating AI activities with standardized syllabi (Huang, 2025). Mitigation: Develop interdisciplinary frameworks (e.g., CLT) that embed AI tasks into existing units (Yu et al., 2024) and align assessments with national exam requirements (Yu et al., 2024). Chi et al. (2024) shows that perceived teacher support significantly and positively moderates the association between inquiry-based science activities and science achievement, which suggests that in the process of curriculum alignment, teacher support should also be emphasized to ensure the effectiveness of AI activities.

Data Privacy Concerns: Risks associated with collecting student learning data (Tan & Tang, 2025). Mitigation: Adopt encrypted platforms and establish clear data usage policies (Yu et al., 2024.) to protect student information.

Resistance to Technology: Some students and teachers prefer traditional methods (Huang, 2025). Mitigation: Pilot AI tools in blended learning models, highlight success stories (e.g., improved grades), and involve stakeholders in curriculum design (Tan & Tang, 2025). Nguyen

& Pham (2023) finds that parental involvement positively affects teachers' continued adoption of new teaching approaches, so involving parents in the pilot process may also help reduce resistance to technology.

Table 7
Number of references discussing the challenges

Challenges	**Number of References**
Technological Barriers	2
Teacher AI Literacy Gaps	2
Curriculum Alignment Issues	2
Data Privacy Concerns	2
Resistance to Technology	3

Discussion

The findings of this systematic review present a comprehensive picture of AI's role in transforming secondary English education through personalized learning approaches. By synthesizing empirical evidence from 12 key studies published between 2020-2025, this discussion examines three critical dimensions: pedagogical innovations, learning outcomes, and implementation challenges, while situating these findings within broader educational theories and practical considerations.

Theoretical Foundations and Pedagogical Innovations

The review reveals that effective AI integration in English curricula builds upon established learning theories while introducing novel instructional paradigms. The five core elements identified - adaptive learning paths, intelligent feedback, multimodal resources, data tracking, and social collaboration - demonstrate strong alignment with Self-Determination Theory (SDT) and Cognitive Load Theory (CLT). Adaptive systems like those in Duolingo and Rosetta Stone operationalize SDT's principles by fostering autonomy through personalized pacing and competence through tailored challenges (see Shi et al., 2025). Meanwhile, multimodal resources and VR tools such as ImmerseMe exemplify CLT's emphasis on optimizing cognitive load through diversified presentation formats.

These technological applications represent a significant evolution from traditional language teaching methods. Where conventional approaches often employ standardized materials, AI enables dynamic content adjustment based on real-time performance data. For instance, Huang's (2025) findings show how speech recognition tools provide immediate pronunciation feedback, addressing what Krashen's Affective Filter Hypothesis identifies as anxiety barriers. Similarly, the social collaborative modules align with Vygotsky's social constructivism by facilitating AI-moderated peer interactions that scaffold language development.

However, the review also uncovers tensions between technological possibilities and curricular realities. While AI offers sophisticated personalization, its effective implementation requires careful alignment with existing syllabus goals and assessment frameworks. Warr & Mishra's (2021) ecological framework for teacher design knowledge suggests that successful integration depends on viewing AI tools not as standalone solutions but as components within a broader pedagogical ecosystem. This perspective helps explain why some implementations succeed while others struggle - the most effective cases demonstrate thoughtful embedding of AI within existing curricular structures rather than superficial add-ons.

Impact on Learning Outcomes and Educational Equity

The empirical evidence consistently demonstrates AI's positive influence across multiple learning dimensions. Proficiency gains, particularly in vocabulary retention (12.8-point average increase in Huang's study) and writing skills (as shown by Elmotri et al., 2025), suggest AI's strength in addressing discrete language components. The 11.4-point reduction in foreign language anxiety scores, especially among female students, highlights AI's potential to create low-pressure practice environments that mitigate affective barriers.

These outcomes gain particular significance when examined through the lens of educational equity. The review identifies both opportunities and risks in this domain. On one hand, AI-enabled personalization could help address achievement gaps by providing targeted support to struggling learners. The 35% increase in student participation with gamified apps (Huang, 2025) suggests particular promise for engaging traditionally marginalized students. On the other hand, Wang et al.'s (2024) findings about rural-urban divides serve as a crucial reminder that technological solutions may inadvertently exacerbate inequalities when access is uneven.

The mixed results regarding critical thinking development present an interesting paradox. While some studies report 28% improvements in analytical skills through AI-supported projects, others caution about over-reliance on automated feedback potentially diminishing students' metacognitive abilities. This dichotomy suggests that AI's impact on higher-order thinking skills may depend heavily on implementation quality - systems designed to complement rather than replace teacher guidance appear most effective in fostering genuine critical engagement.

Implementation Challenges and Systemic Barriers

The review identifies several persistent barriers that constrain AI's educational potential. The digital divide emerges as perhaps the most intractable challenge, with rural schools frequently lacking the infrastructure to support advanced AI applications. This aligns with broader discussions about technology equity in education, where resource disparities often mirror existing socioeconomic inequalities. The proposed solutions - offline-accessible tools and government infrastructure partnerships - while practical, may require significant policy shifts to achieve widespread impact.

Teacher-related challenges present another complex implementation barrier. The literature reveals a troubling disconnect between AI's technical capabilities and educators' readiness to harness them. Tan and Tang's (2025) identification of three AI literacy dimensions (technical,

evaluative, and applicative) suggests current professional development often fails to address the full spectrum of teacher needs. This gap becomes particularly problematic given AI's rapid evolution - systems that teachers train on today may become obsolete within years, necessitating continuous upskilling.

Ethical concerns, especially regarding data privacy and algorithmic bias, add another layer of complexity. As Yu et al. (2024) note, educational AI systems frequently require extensive student data collection, raising legitimate concerns about information security and consent. These issues become particularly acute in secondary education contexts where learners are minors. The review suggests that addressing these concerns requires not just technical solutions (like encrypted platforms) but also comprehensive policy frameworks that clearly define ethical boundaries for educational AI use.

Stakeholder Perspectives and Cultural Considerations

The synthesis of stakeholder perspectives reveals nuanced attitudes toward AI integration. While educators generally recognize AI's potential benefits, significant apprehension persists regarding job displacement and the erosion of humanistic teaching aspects. These concerns mirror broader societal debates about automation's role in traditionally human-centered professions. The literature suggests that successful adoption requires addressing these fears through clear communication about AI's supplementary rather than replacement role.

Cultural factors also emerge as significant influencers of implementation success. Thongsonkleeb et al.'s (2022) intercultural findings highlight how AI tools must adapt to local educational values and communication norms. For instance, AI feedback mechanisms that work effectively in individualistic learning cultures may need modification for collectivist educational contexts. This cultural dimension adds complexity to efforts to scale AI solutions across diverse educational systems.

The review also uncovers generational differences in AI acceptance. While digital-native students often adapt quickly to AI tools, some veteran educators demonstrate resistance rooted in both technological unfamiliarity and pedagogical philosophy. Nguyen & Pham's (2023) findings about parental influence on technology adoption further complicate this picture, suggesting that successful implementation requires engagement with the broader school community beyond just teachers and administrators.

Future Directions and Research Gaps

Several critical research gaps emerge from this synthesis. First, the review identifies a need for more longitudinal studies tracking AI's sustained impact beyond short-term interventions. Most existing research examines outcomes over weeks or months, leaving questions about long-term efficacy unanswered. Second, there's insufficient exploration of subject-specific AI applications - while this review focuses on English education, comparative studies across disciplines could reveal important differences in effective implementation strategies.

The review also highlights a paucity of research on cost-benefit analyses of educational AI. With schools facing tight budgets, clearer evidence about return on investment could inform more sustainable adoption strategies. Additionally, more studies are needed on "human-in-the-loop" AI systems that optimally balance automated and human teaching inputs.

Finally, the ethical dimension requires deeper investigation. While many studies mention privacy and bias concerns, few provide empirical data on their actual prevalence or impact. Research combining technical audits of AI systems with qualitative studies of student and teacher experiences could provide more comprehensive insights into these critical issues.
In conclusion, this discussion underscores both the transformative potential and complex challenges of AI integration in secondary English education. While the technology offers powerful tools for personalization and engagement, its successful implementation requires thoughtful attention to pedagogical integration, equity issues, teacher support, and ethical considerations. The path forward lies not in either uncritical adoption or reflexive rejection of AI, but in developing nuanced, context-sensitive approaches that harness technology's strengths while preserving education's human essence.

Conclusions

The findings of this systematic review demonstrate that AI-driven personalized learning holds transformative potential for secondary English education, offering innovative solutions to long-standing pedagogical challenges. By synthesizing empirical evidence from recent studies, this review highlights how AI technologies — such as adaptive learning systems, intelligent feedback mechanisms, and multimodal resources — can enhance language proficiency, reduce foreign language anxiety, and foster student engagement. These advancements align with broader educational goals, including the promotion of autonomous learning and equitable access to quality instruction. However, the successful integration of AI into curriculum design is not without its complexities, as it requires careful consideration of pedagogical, technological, and ethical factors.

One of the key insights from this review is the necessity of balancing technological innovation with human-centered teaching practices. While AI can provide personalized learning experiences and real-time feedback, its effectiveness depends on teachers ’ ability to interpret and contextualize AI-generated data. Professional development programs must therefore prioritize not only technical training but also strategies for integrating AI tools in ways that complement, rather than replace, the teacher ’ s role. Additionally, the digital divide remains a pressing concern, as disparities in infrastructure and resources may exacerbate existing inequalities. Addressing these challenges calls for collaborative efforts among educators, policymakers, and technology developers to ensure that AI benefits all students, regardless of their socioeconomic background.

Looking ahead, future research should focus on developing scalable and context-sensitive AI models that align with diverse curricular needs. Longitudinal studies are needed to assess the sustained impact of AI interventions on learning outcomes, while qualitative inquiries could explore student and teacher experiences in greater depth. Ethical considerations, such as data privacy and algorithmic bias, must also remain at the forefront of AI implementation efforts. By adopting a nuanced and inclusive approach, educators can harness the power of AI to create dynamic, student-centered learning environments that prepare learners for the demands of an increasingly digital world. Ultimately, the promise of AI in education lies not in its ability to replace human interaction but in its potential to enrich and expand the possibilities of teaching and learning.

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