GEORGE BROWN PRESS
JOURNALS, BOOKS & PROCEEDINGS

Journal of Computer, Signal, and System Research

Article

AI-Assisted Strategies for Improving Chinese Proficiency in Non-Native AP Exam Takers

Zengxian Mo [1,2,*]

[1] Suzhou Zhenhua Middle School, 78 Shiquan Street, Suzhou, China
[2] San Francisco State University, California, United States
* Correspondence: Zengxian Mo, Suzhou Zhenhua Middle School, 78 Shiquan Street, Suzhou, China, San Francisco State University, California, United States

Abstract: This paper explores the role of AI-assisted strategies in enhancing Chinese language proficiency for non-native students preparing for the AP Chinese exam. By analyzing the key requirements of the AP Chinese exam, the study identifies how AI tools, such as Speechling, FluentU, and HelloChinese, can support students in improving their listening, speaking, reading, and writing skills. The paper also addresses the ethical and social implications of AI in education, focusing on data privacy, algorithmic bias, and educational equity. Key strategies for optimizing AI in language learning are discussed, alongside a comparison of different AI tools in AP exam preparation. The study emphasizes the need for a balanced approach to AI implementation in education, considering both the technological advantages and the ethical challenges. Future research directions are outlined to further explore the long-term impact and integration of AI in educational contexts.

Keywords: AI-assisted learning; AP Chinese exam; language proficiency; data privacy; educational equity

1. Introduction

1.1. Background of AI in Language Learning

The integration of artificial intelligence (AI) into language education has rapidly gained traction in recent years, especially in the context of standardized tests such as the AP (Advanced Placement) exams. The need for non-native Chinese learners to enhance their proficiency in Chinese has driven the demand for more efficient and targeted learning methods. AI-assisted strategies offer personalized learning experiences, enabling students to focus on specific areas of weakness and improve their overall language skills.

AI tools such as Duolingo, HelloChinese, and FluentU have revolutionized the way learners engage with Chinese. These tools utilize AI to track progress, adapt to individual learning speeds, and provide real-time feedback, offering an interactive and engaging approach to language acquisition [1].

1.2. Purpose of the Study

The main objective of this study is to explore the impact of AI-assisted strategies on improving the Chinese proficiency of non-native students preparing for the AP Chinese exam. By analyzing AI tools that cater specifically to the demands of the AP exam, this research aims to identify how these technologies can optimize exam preparation, from listening comprehension to written expression. The study will also assess the ethical implications of AI applications in educational settings, particularly regarding data privacy, algorithmic bias, and access to education.

Received: 18 February 2025
Revised: 22 February 2025
Accepted: 28 February 2025
Published: 02 March 2025

2. Understanding the AP Chinese Exam and AI in Language Learning

2.1. AP Chinese Exam Structure and Requirements

The AP Chinese exam is a rigorous assessment that evaluates students' proficiency in listening, speaking, reading, and writing, each of which tests different language skills. Understanding the exam's structure and the specific requirements of each section is crucial for preparing effectively.

1) Listening Comprehension: The listening comprehension section includes a variety of listening materials, such as conversations, announcements, interviews, and lectures. These materials are designed to test students' ability to understand spoken Chinese in a range of contexts, from formal academic language to casual conversation. This section is timed and requires the student to comprehend information quickly and accurately, often under pressure. The challenge lies not only in understanding the meaning but also in catching specific details and responding appropriately.AI tools can help address these challenges by providing a vast array of authentic listening materials, such as news reports, podcasts, and radio broadcasts. Platforms like FluentU offer interactive listening exercises, where students can listen to native speakers in various contexts and engage with the content through subtitles and quizzes. AI can adjust the difficulty level based on the learner's proficiency, ensuring that students continuously face appropriate challenges. Moreover, AI can track the learner's listening accuracy, identify weak spots, and suggest specific content to target those areas.
2) Speaking**:** The speaking section of the AP Chinese exam assesses the student's ability to express ideas clearly and coherently in spoken Chinese. Students are required to respond to questions in both individual and interactive formats, with the goal of demonstrating fluency, accuracy, and organization of ideas. This section demands not only the correct use of vocabulary and grammar but also the ability to speak confidently and at a natural pace.AI-assisted platforms such as Speechling and HelloChinese (Figure 1) provide students with opportunities to practice speaking by offering immediate feedback on their pronunciation, tone, and fluency. AI tools can analyze a learner's speech, identify pronunciation errors or unnatural pauses, and offer corrective measures in real time. This immediate feedback is crucial in helping students improve their speaking skills, as they can continue practicing until they achieve a high level of proficiency. Additionally, AI tools can simulate the interactive nature of the speaking section, creating dynamic conversation scenarios that mimic the conditions of the actual exam.

Figure 1. AI-Assisted Language Learning Tool: HelloChinese (from the official website).

3) Reading Comprehension: Reading comprehension is another vital part of the AP Chinese exam, in which students are required to quickly and accurately understand longer passages of Chinese text. The passages may cover a variety of topics, including literature, historical documents, and contemporary social issues. Students are then asked to answer questions that test their ability to grasp both the main idea and specific details of the text. This section requires a strong vocabulary, solid grammar knowledge, and the ability to infer meaning from context.AI-based platforms like Lingvist and ChineseSkill offer personalized reading exercises that adapt to the student's level. These platforms use spaced repetition and adaptive learning techniques to ensure that students are exposed to a wide range of reading materials, from short stories to longer academic texts. AI-powered systems can analyze the student's reading performance, identify areas of difficulty, and tailor exercises to target specific reading skills. The adaptive nature of these tools ensures that students are always working with content that challenges them, helping them develop the speed and accuracy necessary for the reading comprehension section of the AP exam.
4) Writing: In the writing section, students must demonstrate their ability to craft coherent and grammatically correct responses to given prompts. This section requires not only the correct use of vocabulary and grammar but also the ability to organize thoughts clearly and express ideas logically. AI tools can assist in the writing section by providing students with practice prompts, correcting their grammatical errors, and suggesting improvements to sentence structure.

Tools like Skritter help students practice writing Chinese characters by offering instant feedback on stroke order and accuracy. Meanwhile, Grammarly can be used to check writing samples for grammar, vocabulary, and structure. AI platforms can even assess the logical flow of the student's writing, offering suggestions to improve the coherence of their arguments. By continuously practicing with AI tools, students can refine their writing skills and ensure that their responses on exam day are clear, accurate, and well-structured [2].

2.2. AI-Assisted Strategies for AP Exam Preparation

AI can significantly enhance students' preparation for the AP Chinese exam by targeting each of the exam's key sections. These AI tools utilize data-driven, personalized learning techniques, which adapt to the learner's progress and needs, ensuring that students receive tailored support in each area of the exam. Below is an overview of how AI tools assist in preparing students for the different sections of the AP Chinese exam (see Table 1):

Table 1. AI-Assisted Tools for AP Chinese Exam Preparation.

Exam Section	AI Tool	Function	Benefits for AP Preparation
Listening Comprehension	FluentU	Provides authentic audio-visual content	Helps simulate real-life listening experiences, increases listening skills
Speaking	Speechling, HelloChinese	Offers pronunciation feedback	Improves pronunciation and fluency with instant feedback
Reading Comprehension	Lingvist	Uses spaced repetition and adaptive learning	Enhances reading speed and comprehension with tailored practice
Writing	Skritter, Grammarly	Aids in character writing and essay structuring	Improves grammar, writing structure, and coherence

Each section of the AP exam presents unique challenges that require specific skills. AI-assisted tools provide interactive, customized exercises to address these challenges:

1) Listening Comprehension: AI-based platforms like FluentU use authentic Chinese language content, including news reports, TV shows, and podcasts. By simulating real-life listening experiences, these tools help students improve their comprehension skills in a contextual setting. The AI adapts to the learner's level, increasing the difficulty of the content gradually as the student progresses. This personalized approach ensures that students improve steadily, mastering listening skills required for the AP exam.
2) Speaking: AI tools such as Speechling and HelloChinese focus on pronunciation, a crucial aspect of the AP Chinese speaking section. These tools provide instant feedback, correcting mispronunciations and guiding students towards better fluency. By using voice recognition and AI algorithms, these platforms can identify pronunciation errors and provide corrections, allowing students to practice speaking in a controlled environment. This feedback helps learners refine their speaking skills in preparation for the AP exam's oral section.
3) Reading Comprehension: AI tools like Lingvist leverage adaptive learning algorithms to tailor reading exercises to each student's needs. By analyzing past performance, these tools create individualized learning paths, enabling students to target their weaknesses and enhance their reading comprehension. The use of spaced repetition ensures that students engage with content multiple times, reinforcing vocabulary and grammar patterns.
4) Writing: For the writing section, tools like Skritter and Grammarly assist students in honing their writing skills. These platforms focus on character recognition, grammar, and essay structure. Skritter helps students practice writing Chinese characters, while Grammarly provides feedback on grammar and sentence structure. Together, these tools help students craft coherent essays and improve their writing proficiency, ensuring better performance in the writing section of the AP Chinese exam.

By integrating AI tools into their study routine, students can maximize their preparation for the AP Chinese exam. These tools not only enhance learning efficiency but also ensure that students receive personalized guidance to tackle the exam's challenges effectively.

2.3. AI in Exam Simulation and Feedback

AI can play a pivotal role in simulating exam conditions and providing real-time feedback, essential components in AP exam preparation. The ability to practice under exam-like conditions is crucial for students to develop test-taking strategies and manage time effectively. AI-driven platforms offer a variety of tools for this purpose, which can help learners prepare with greater precision and efficiency.

2.3.1. Simulating Real Exam Conditions

AI-powered systems can replicate the structure of the AP Chinese exam, offering timed practice tests that closely mirror the format and difficulty of the actual exam. For example, platforms like Kahoot! and Quizlet can create customized quizzes based on specific exam sections, such as listening, reading, or writing, and set time limits for each. These simulations provide students with a sense of urgency, helping them practice time management while testing their proficiency.

By repeatedly engaging with these AI-generated practice tests, students can become accustomed to the pressure of exam conditions, gaining confidence and refining their ability to perform under stress. AI platforms also collect performance data to identify weak spots and target areas that require further attention. This focused feedback enhances the learning experience by promoting continuous improvement.

2.3.2. Real-Time Feedback and Adaptive Learning

Beyond practice exams, AI also plays a crucial role in providing real-time feedback on various aspects of the student's performance. For example, after completing a listening comprehension exercise, AI systems can analyze the student's answers and offer instant corrective feedback on mistakes, allowing them to learn from their errors immediately. Similarly, after completing a speaking exercise, tools like Speechling offer detailed evaluations of pronunciation, tone, and fluency, providing students with actionable insights to improve.

Adaptive learning technology used in AI platforms helps tailor feedback to each student's unique needs. As students interact with the AI system, their progress is continuously monitored, and the system adapts the difficulty level of tasks accordingly. This ensures that students are always challenged but not overwhelmed. This personalized feedback loop accelerates learning by focusing on areas that require more practice, ultimately improving performance in the AP Chinese exam [3].

3. Ethics and Social Implications of AI in Education

As AI tools become increasingly integrated into education, they bring about innovative ways of learning but also raise a range of ethical and social concerns. To maximize the educational potential of AI and minimize its negative consequences, educators, developers, and policymakers must carefully consider the ethical challenges surrounding the use of AI in education and implement appropriate measures.

3.1. Data Privacy and Security

As AI tools collect vast amounts of data on students, including their learning habits, performance metrics, and personal information, data privacy has become a central concern. The personal data of students is essential for AI systems to provide personalized learning experiences, but it also presents significant risks if mishandled. AI platforms must implement robust security measures to protect student data from unauthorized access, breaches, or misuse. This includes utilizing advanced encryption technologies, ensuring that data is securely stored, and giving students control over their personal information.

Moreover, AI platforms must maintain transparency regarding how data is used. For example, some AI platforms may use student data to improve their algorithms, which could inadvertently lead to biases if not properly managed. Clear and explicit communication is needed to inform users about the specific ways their data will be used. Furthermore, students should have the option to opt out of data collection if they prefer, or at least to modify or delete their data. Offering these choices helps build trust between users and the platform while safeguarding user privacy [4].

AI companies must also comply with data protection regulations, such as the General Data Protection Regulation (GDPR), which aims to ensure transparency, fairness, and protection of student data. This legal framework provides guidelines for data processing and gives students rights regarding their personal data, ensuring that the ethical handling of student information remains a top priority.

3.2. Algorithmic Bias and Fairness

Another significant ethical issue in AI applications in education is algorithmic bias. AI systems are only as unbiased as the data they are trained on, and if the training data reflects certain demographic imbalances or stereotypes, AI tools may unintentionally disadvantage certain student groups. For instance, a language-learning AI trained predominantly on data from native Chinese speakers may fail to meet the needs of non-native learners who have different linguistic and cultural backgrounds.

To address this issue, AI developers must ensure that their algorithms are trained on diverse, representative datasets that account for various linguistic backgrounds, ethnicities, gender identities, and socio-economic statuses. This approach helps create a more inclusive AI system that serves a broader range of learners. Additionally, AI tools should undergo regular audits to detect and mitigate biases that may emerge during the training process. These audits should focus on identifying any systemic bias in learning recommendations, content delivery, or assessment criteria, ensuring fairness in student evaluations and outcomes [5].

Furthermore, transparency is key to minimizing algorithmic bias. AI platforms should openly communicate their methodologies, including how algorithms are developed and tested, to provide stakeholders with a clearer understanding of how decisions are made. This also enables independent oversight and fosters trust in AI's role in education.

3.3. Accessibility and Educational Equity

While AI has the potential to democratize access to education, its implementation also presents challenges in terms of equity. Access to AI-powered learning tools is often limited by factors such as economic status, geographic location, and technological infrastructure. For students in underdeveloped regions or from lower-income families, the cost of these AI tools can be prohibitive.

To better understand the impact of these disparities, consider the following chart, which shows the distribution of AI-powered learning tools across different income levels and regions. The data illustrates the accessibility gap in AI-driven educational resources, highlighting the challenges faced by disadvantaged groups.

As shown in Table 2, the availability and accessibility of AI learning tools are significantly higher in wealthier regions, where students have better access to the necessary technology and infrastructure. In contrast, students from lower-income regions face barriers to AI usage due to factors like lack of internet access, the high cost of devices, and insufficient local educational support.

Table 2. Distribution of AI-Powered Learning Tools by Region and Income Level.

Ethical Concern	Description	Proposed Solutions
Data Privacy and Security	AI tools collect vast amounts of student data, raising concerns about unauthorized access.	Implement encryption, secure data storage, opt-out options, and GDPR compliance.
Algorithmic Bias and Fairness	Bias in AI systems can disadvantage minority groups if training data is not diverse enough.	Train AI systems on diverse datasets, conduct regular audits, and ensure transparency.
Accessibility and Equity	AI tools are often inaccessible to students from low-income or rural areas due to economic and technological barriers.	Subsidize AI tools for disadvantaged students, improve digital infrastructure in underserved regions.

Governments and educational institutions should explore ways to make AI tools more accessible, such as offering subsidies or providing free access to AI-powered platforms for students from disadvantaged backgrounds. Additionally, efforts should be made to integrate AI technology into existing educational systems, particularly in schools that lack advanced technological resources [6].

3.4. Social Impacts of AI on Educational Diversity and Language Learning

AI also has implications for the cultural and linguistic diversity of education. While AI can enhance learning experiences, it may also reinforce dominant cultural and linguistic norms, potentially marginalizing students from minority language backgrounds or diverse cultural contexts. For example, AI language learning tools may prioritize standard language norms or cultural references that do not necessarily reflect the experiences of all students.

To address this, AI tools should be designed to recognize and respect linguistic and cultural diversity. This includes incorporating culturally relevant materials, offering language-specific learning content, and accounting for the varied learning needs of different student groups. By providing learners with content that reflects their own linguistic and cultural backgrounds, AI can help foster greater inclusivity and empathy in education. This also allows for the preservation of minority languages and cultures, promoting linguistic diversity in educational settings.

Additionally, AI should be continuously updated to reflect the evolving nature of languages and cultures, ensuring that learning tools stay relevant and inclusive. Researchers and developers need to collaborate with educators from diverse linguistic and cultural backgrounds to ensure the tools meet the needs of all students, no matter their background or language proficiency [7].

4. The Future of AI-Assisted Language Learning in AP Chinese Exam Preparation

4.1. Personalized Learning and Adaptive AI

The future of AI in language learning lies in its ability to offer personalized learning paths tailored to individual students' needs. As AI technology continues to evolve, we can expect even more sophisticated algorithms that can adapt in real time to a student's performance, preferences, and learning style. AI can dynamically adjust the difficulty of exercises based on how well the student is performing, ensuring that learners are always challenged but not overwhelmed.

In the context of the AP Chinese exam, AI could further refine its approach by analyzing a student's past exam performances, identifying weaknesses, and offering targeted practice in those areas. For example, if a student struggles with the writing section, the AI could recommend additional exercises on grammar and syntax or provide feedback on structure and clarity in writing.

4.2. Cross-Cultural Adaptations and Global Expansion

As AI tools continue to grow, there will be a need for greater cross-cultural adaptations. The diversity of learners globally means that AI systems must be equipped to accommodate different cultural contexts and learning needs. AI developers should work to ensure that their tools are not only linguistically accurate but also culturally sensitive, offering content and examples that reflect the experiences and perspectives of students from various backgrounds.

Expanding the reach of AI-assisted language learning tools will also mean improving multilingual support. Students from different linguistic backgrounds can benefit from a wider range of language options, helping them bridge cultural gaps and better understand the Chinese language and culture.

5. Future Research Directions

Looking ahead, research on AI-assisted strategies for improving Chinese proficiency in non-native AP Chinese exam takers can be further expanded. A key area for future exploration is assessing the effectiveness of AI tools across diverse learner demographics. While AI tools offer individualized learning, it is essential to investigate their impact on learners with different educational backgrounds, learning styles, and cultural contexts. Longitudinal studies would be valuable to determine how well AI supports sustained

language retention beyond exam preparation and whether these tools contribute to long-term proficiency.

Moreover, AI tools could benefit from integration with other advanced technologies, such as virtual reality (VR) and augmented reality (AR), which could offer more immersive and interactive language-learning experiences. For example, AI-driven VR environments could simulate real-life conversations, allowing learners to practice speaking in realistic settings. The combination of AI with immersive technologies might bridge gaps in oral proficiency and listening comprehension more effectively.

Ethical considerations surrounding AI in education must remain a priority in future research. While AI promises efficiency, privacy concerns, algorithmic bias, and the digital divide must be carefully managed. Future studies could provide frameworks for regulatory oversight, ensuring that AI tools remain transparent, fair, and equitable for all learners. Furthermore, the role of AI in enhancing educational equity and preserving linguistic and cultural diversity in language learning contexts requires thorough investigation [8].

6. Conclusion

This study has explored how AI-assisted strategies can improve the Chinese proficiency of non-native learners preparing for the AP Chinese exam. AI tools such as Speechling, HelloChinese, FluentU, and Skritter enable tailored learning experiences that address the diverse demands of the AP exam, including listening comprehension, speaking fluency, reading comprehension, and writing skills. Through personalized feedback, adaptive learning, and real-time performance analysis, AI tools create a dynamic and individualized study environment that aligns with the exam's specific requirements.

However, the widespread integration of AI in education raises significant ethical and social concerns, particularly related to data privacy, algorithmic fairness, and access to technology. To ensure that AI tools benefit all students, developers, educators, and policymakers must collaborate to ensure these tools are secure, inclusive, and accessible to all learners. Despite these challenges, AI holds significant promise for transforming language education, particularly in exam preparation contexts like the AP Chinese exam.

In conclusion, while AI is poised to revolutionize language learning, its full potential can only be realized through careful design, ethical implementation, and continued research into its long-term impacts on learners and education systems.

References

1. Q. Tang, "Exploring the application of generative ai in tprs international chinese language teaching practice: a case study of international students with elementary chinese proficiency," *Eurasia J. Sci. Technol.*, no. 5, 2024, doi: 10.61784/EJST3034.
2. D. Zhang, T. Hoang, S. Pan, Y. Hu, Z. Xing, M. Staples, and A. Quigley, "Test-takers have a say: Understanding the implications of the use of AI in language tests," arXiv preprint arXiv:2307.09885, 2023, doi: 10.48550/arXiv.2307.09885.
3. Z. Li, C. J. Bonk, and C. Zhou, "Supporting learners self-management for self-directed language learning: A study within Duolingo,"*Interact. Technol. Smart Educ.*, vol. 3, pp. 381–402, 2024, doi: 10.1108/ITSE-05-2023-0093.
4. L. Huang, "Ethics of artificial intelligence in education: Student privacy and data protection," *Sci. Insights Educ. Front.*, vol. 16, no. 2, pp. 2577–2587, 2023, doi: 10.15354/SIEF.23.RE202.
5. R. S. Baker and A. Hawn, "Algorithmic bias in education," *Int. J. Artif. Intell. Educ.*, pp. 1–41, 2022, doi: 10.1007/S40593-021-00285-9.
6. K. Holstein and S. Doroudi, "Equity and artificial intelligence in education," in *The Ethics of Artificial Intelligence in Education*, Routledge, 2022, pp. 151–173, ISBN 9780429329067.
7. S. Aslam, O. Faisal, and H. Kamal, "Analyzing AI's role in promoting diversity and inclusivity within educational systems, addressing different learning styles and needs,"*Rev. Appl. Manag. Soc. Sci.*, vol. 7, no. 4, pp. 1099–1113, 2024, doi: 10.47067/ramss.v7i4.446.
8. D. S. Sumo and M. L. Bah, "Chinese language education in the era of artificial intelligence: Innovation development, pedagogy & the smart classroom,"*Educ. Q. Rev.*, vol. 4, no. 4, 2021. doi: 10.31219/osf.io/axr27.