Study on the Role and Influence of AI in Personalized Learning for Second Language Acquisition

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Abstract. The combination of AI and second language acquisition can help to provide personalized teaching content and adjust learning more dynamically so that students can improve their learning efficiency and learning effect. Therefore, the use of AI in SLA has received widespread attention, but its accuracy and usability are still insufficient. This paper analyzes the particularity of SLA teaching and the application of AI in SLA, especially its potential to meet the unique needs of learners, optimize learning paths, and improve teaching efficiency. This paper concludes that the combination of teacher and AI is more ideal than the use of AI alone. Based on this, this paper proposes a new pedagogy that fully implements teacher-AI collaborative teaching in SLA. These improvements will promote a more effective language learning environment while strengthening the role of technology in supporting education, and these strategies will drive SLA teaching practices in a more personalized and technology-driven direction.

Keywords: Second Language Acquisition (SLA), Artificial Intelligence (AI), Educational Technology, Personalized Learning, Adaptive Learning.

1. Introduction

In the current globalized educational background, the teaching methods and effects of Second Language Acquisition (SLA) have attracted increasing attention. Especially in today's diversified learning needs and rapid development of technology, personalized learning is particularly important in SLA. Personalized learning emphasizes adapting teaching methods and content to the learner's specific needs, learning style, speed, and ability to maximize learning results. However, while existing artificial intelligence (AI) technologies have made some progress in providing personalized instruction, such as the widespread use of language learning apps such as Duolingo, these technologies still have shortcomings in grammar teaching, pronunciation training, and cultural adaptation. This paper aims to explore the application of AI technology in SLA, analyze its advantages and challenges in promoting personalized learning, and propose improvement schemes. In addition, this paper will discuss specific applications of AI in SLA, such as intelligent tutoring systems and computer-assisted language learning, and analyze how these technologies can help improve the efficiency and quality of language learning. Besides, the paper will explore the potential and limitations of AI technology to improve learning motivation, engagement, and cross-cultural understanding. Through this research, this article hopes to provide valuable insights and recommendations for the SLA teaching field to promote more effective and inclusive language teaching practices.

2. Connotation and Requirements of Personalized Learning for Second Language Acquisition

2.1. Definition and Connotation of SLA Personalized Learning

Personalized learning refers to a teaching concept that adjusts teaching methods and contents according to learners' specific needs, learning styles, learning speeds, and abilities. This mode of teaching emphasizes that each learner is a unique individual with different learning backgrounds, interests, and goals, so teaching should flexibly adapt to these differences to maximize learning results. Personalized learning not only focuses on the teaching of learning content but also focuses on the

optimization of the learning process, by providing targeted support and resources, so that learners can learn in the best state. In the Second Language Acquisition (SLA), the idea of personalized learning is particularly important. Second language learners often have diverse backgrounds and needs, including their mother tongue, cultural background, language level, learning motivation, and interest. Skehan discusses how individual differences affect learning speed, particularly in the language aptitude section. He stated that language learning talent is not a single ability, but is composed of several components that can vary relatively independently, which may lead to different patterns of talent and thus affect the speed of learning [1]. Therefore, personalized teaching for these diverse factors can significantly improve the effectiveness of SLA.

2.2. Characteristics and Challenges of Second Language Acquisition

There are many significant differences between SLA and native language learning, and these differences have an important impact on the development of personalized learning strategies. First, native language learning usually takes place in a natural language environment, where children acquire language unconsciously through daily interactions and communication. On the other hand, second language learning takes place in the classroom environment, and learners need to learn and practice consciously, which makes the process of second language learning more explicit and systematic. In academic circles, the process of acquiring a language other than the mother tongue is called second language acquisition. Defined as the process of learning a second language through environment and formal instruction, it is a theory that describes the complex process of how people learn a second language [2]. Native language learners usually have abundant language input and long practice opportunities, and the learning process is more natural and stress-free. However, second language learners often lack sufficient language input, especially in non-verbal environments, and their learning opportunities and time are limited. To discuss more specifically, research on common challenges of second language acquisition covers cross-cultural comprehension difficulties, differences in language structure, and issues of motivation and self-confidence. First, cultural background differences affect learners' understanding and use of language, especially in the communication of different cultural backgrounds may lead to misunderstanding and communication barriers. Second, significant structural differences between languages, such as grammar and vocabulary systems, pose additional challenges for learners, and these structural differences require cognitive adaptation and recoding by learners. Third, motivation is one of the key factors for success in language learning, and low motivation and self-confidence problems often hinder the learning process, especially in the face of learning difficulties and setbacks.

2.3. Requirements for Personalized Learning

Personalized learning strategies in second language teaching need to meet many conditions to be effectively implemented. First, technical support is crucial. Modern educational technologies, such as learning management systems (LMS), artificial intelligence (AI), and virtual reality (VR), can provide a wealth of resources and tools for personalized learning. Second, teacher training is crucial. Teachers need to master how to use these technological tools and understand the basic ideas and methods of personalized learning. Training can help teachers design and implement effective personalized teaching strategies, ensuring they can provide appropriate support and guidance for each learner [3]. In addition, teachers need to be able to assess the needs of learners and adapt teaching methods. Flexibility in course design is also fundamental to successful personalized learning. Courses should be designed to allow for adjustments to the learner's interests, level, and progress. Flexible course design not only increases learner engagement and motivation but also helps them learn at their own pace to maximize learning outcomes. Intelligent devices and technologies enable intelligent learning environments to effectively promote the development of personalized and adaptive learning, in line with the trend of accelerating the integration of personalized and adaptive learning. This means that the application of some technologies provides strong support for achieving a more personalized and flexible course design.

3. The Role and Influence of AI

3.1. Overview of the Application of AI Technology in Second Language Acquisition

Artificial Intelligence (AI) technology is increasingly used in the second language acquisition field and plays an important role in improving learning efficiency and personalized learning experiences. AI plays a role in data analysis of learner behavior and performance. The use of intelligent tutoring and computer-assisted learning has increased recently due to advances in technology and the shift to distance learning. These systems are capable of customizing interactions with each learner, allowing them to provide a broader range of personalized interventions than one-on-one tutoring [4]. In addition, by analyzing the performance of learners, AI technology can provide real-time, personalized feedback to help learners improve during the learning process. The intelligent tutoring system based on memory and skills mentioned in Zylich and Lan's research uses learners' historical performance to optimize teaching strategies [4]. By accurately simulating learners' memory decay curve and skill mastery, the intelligent system can select review items specifically to ensure learning effects. This approach works well for SLA because language skills need to be practiced and consolidated over and over again. In addition, through the personalized learning suggestions and tips provided by AI, these systems can also generate personalized learning suggestions and tips according to the specific performance of learners, and guide learners on how to correct mistakes and improve skills more effectively [4]. This personalized feedback mechanism based on data not only improves the pertinency and effectiveness of learning but also makes the learning process more in line with individual learning habits and abilities. This highlights the integration of AI in educational practices, particularly in language learning, where personalized learning paths and real-time feedback can significantly improve learning outcomes. Many SLA tools are widely used in the market today. Schroeder's research details Duolingo as a learning aid commonly used in SLA. Duolingo is a language learning app that helps users learn multiple languages efficiently through gamification and personalized lessons. It provides users with certain interactions, such as daily goal-setting and progress tracking. Its teaching content is mainly based on repeated exercises and the course design includes choosing words from the word bank to fill in the blank or typing answers to translate sentences. This approach aims to enhance language learning through constant repetition [5]. For those who want to learn a language systematically, Rosetta Stone helps users master a new language with an immersive approach. It uses a combination of images, text, and sound to allow users to learn in a natural language environment. The platform adaptive algorithm can evaluate the proficiency level and learning style to personalize the user learning experience [6]. The advantage of this software is that it covers four skills when used: reading, listening, speaking, and writing. As learners progress, the difficulty increases and a variety of vocabulary and grammatical functions can be intuitively taught without practice or translation. Some teachers believe that this software can be used as a power to enhance reading motivation, to stimulate students' learning motivation [7]. Other platforms can be used for SLA, such as Hellotalk, Babbel, Memrise, etc. They may have different functions and features, but in general, are based on algorithms to analyze the performance and needs of learners and provide personalized learning content and recommendations to meet the needs of different learners. They are developing diversified learning content, interactivity, real-time feedback, and natural language processing to better help learners improve the effectiveness and efficiency of SLA.

3.2. Advantages of AI Compared with Traditional Classroom

The application of AI in the field of education has brought significant changes to the traditional classroom, especially in improving learning motivation and engagement. Therefore, more AI-based SLA learning platforms have emerged and been used. Through gamification elements and progress visualization, AI could effectively increase the appeal of learning while providing a personalized learning experience tailored to the preferences of different learners. First, gamification refers to the application of game design elements in non-game environments, such as educational platforms. This method stimulates students' learning interest and sense of competition by introducing elements such

as a point system, grade promotion, and virtual reward. Language learning apps like Duolingo, for example, use gamification extensively to increase user engagement and motivation through daily tasks, achievement systems, and interactive exercises. Students receive immediate feedback as they complete challenges and reach goals, which not only increases learning efficiency but also increases enjoyment. According to the research of Murillo-Zamorano et al., there is a significant difference in the outcome presentation between learners who participate in gamified active learning settings and those who participate in non-gamified active learning settings [8]. It can be seen that gamification facilitates the development of skills required in the current workplace in the context of active learning described [8]. Secondly, progress visualization is also an important aspect of improving learning motivation. Through visual tools such as charts and progress bars, students can visually see their learning progress and future learning routes. This transparent display of progress helps students set short and long-term learning goals, effectively strengthening their commitment to learning. For example, the learning path provided by Khan Academy clearly shows the stages from basic to advanced, and students can choose the appropriate courses and exercises according to their level of mastery. In addition, AI educational tools show great flexibility in considering learner preferences. It can automatically recommend the most suitable learning time, learning content, and learning style based on students' learning history and behavior patterns. Different learners have different learning preferences. Khan, Arif, and Yousuf discussed the relationship between learning preference and academic achievement. Taking college students as the research object, their learning preference was divided into visual, auditory, audio-visual combination, and kinesthetic. Among them, high achievers usually prefer visual learning, followed by audio-visual combination [9]. For visual learners, the AI platform can provide rich charts, videos, and images. For auditory learners, the proportion of lectures and audio materials can be increased. Learners who prefer hands-on operations can improve their practical operation ability through virtual experiments and simulated operations. This personalized learning experience allows each student to learn in the way that works best for them, greatly increasing the effectiveness and satisfaction of learning.

4. Questions and Suggestions on Existing SLA AI

4.1. Existing Deficiencies in SLA AI Field

Although AI software for SLA in general is highly developed and used, there are still many shortcomings in existing software. Taking Duolingo learning software as an example, Schroeder's study used questionnaires and interviews to collect users' evaluations of Duolingo. Users generally give Duolingo high marks for its vocabulary teaching, especially when it comes to learning vocabulary for specific situations [5]. However, some users have pointed out that the app has shortcomings in grammar teaching, pronunciation attention, and user experience, which sometimes lead to user frustration [5]. These problems are universal, and not just in Duolingo. In addition, there are some problems with the AI application of SLA that have not been properly addressed. Zhai and Wibowo conducted a study on the effectiveness of AI dialogue system in improving the communicative competence of English as a foreign language student in college, and found the following problems: First, when providing personalized learning feedback, the current study paid little attention to the influence of cultural background [10]. Secondly, the dissatisfaction and stress problems that students may encounter in the learning process are also not given enough attention at present, and more compassionate ways of support are needed. Finally, technical limitations, such as the unnatural sound of dialogue systems and poor understanding of student input [10]. These challenges mean that technical and cultural factors need to be considered more fully when applying AI to education. In addition, AI systems may not yet adequately simulate the intuitive and emotional interactions of human teachers in teaching. When learners experience more positive emotions, they usually have a higher level of intrinsic motivation. Therefore, in traditional classrooms, teachers showing happy emotions can help improve students' positive emotions and motivation [11]. This is

important in language learning, where emotional factors can significantly influence motivation and effectiveness. However, in an AI system for SLA, this is difficult to replicate.

4.2. Suggestions

4.2.1. Develop AI potential according to SLA characteristics

In response to these problems, the integration of some applications may be applied to improve the shortcomings of SLA AI systems. The combined application of these technologies demonstrates the potential of AI in SLA, not limited to a single application, but as a versatile, scalable instructional support system. For example, a Learning Management System (LMS) is a software application used to manage, record, track, report, and deliver educational courses or training programs. They are widely used in online learning environments in educational institutions and businesses to support distance learning and digitize course content, making it easy for students to learn anytime, anywhere. In their research, Nkomo and Danielhe Butson described LMS as dynamic, in which students can show various forms of participation to cultivate emotional participation and cognitive participation, and self-regulate learning by acquiring resources at their own pace [12].

In addition, some models can be integrated into the AI of SLA. Modern pre-trained language models such as BERT and GPT-3 have significantly improved the ability of systems to understand and generate human-like text [13]. This combination can enhance its capabilities in understanding student queries and generating natural responses, thereby improving the quality of interaction between students and AI. Meanwhile, AI chatbots utilizing advanced NLP technology have been increasingly integrated into educational environments. These chatbots can provide real-time feedback, handle regular educational interactions, and support personalized learning paths. They are beneficial in language learning, providing immediate correction and explanation, and simulating a more natural and engaging learning environment [14]. The development of AI in the SLA field needs to be pushed forward.

4.2.2. The combination of manual and AI in SLA classroom design

No matter how independent and perfect the AI system is, it is difficult to completely replace the traditional classroom. This is reflected in the difference between technology and manpower and the self-perception of traditional teachers. Volpe and Gori directly point out that technology cannot replace teachers because teachers play a central role as mediators [15]. Trust in these technologies is not widespread among teachers globally, which to some extent may limit the adoption of AI technologies in actual educational Settings [16]. Therefore, the current ideal state should be to implement the combination of human and AI systems in SLA classrooms. For example, AI-assisted simulated conversation environments can be designed to allow students to practice in an environment close to real language use. Meanwhile, teachers can use the data analysis function provided by AI to carry out real-time monitoring and immediate feedback on students' progress and difficulties, to guide students more effectively. In addition, teachers can make learning more interesting and interactive through gamified AI applications, thereby increasing student engagement and motivation. Moreover, improving teachers' understanding of AI and self-efficacy can help them see the potential benefits of AI in teaching, reduce their concerns, and thus enhance their trust in AI technology [16]. Promoting SLA education under the mutually reinforcing interaction of humans and AI may be a more ideal future development path.

5. Conclusion

By analyzing the application of AI in SLA, this study explores the role and limitations of AI technology in personalized teaching and cross-cultural education. Research shows that while AI can improve learning efficiency by accurately analyzing learner behavior and performance to provide personalized learning feedback, AI applications still face challenges when it comes to teaching grammar, and pronunciation accuracy, and simulating emotional interactions with human teachers.

These challenges highlight the inadequacies of AI in fully simulating the intuitive and emotional interactions of human teachers. In addition, the paper discusses the potential of AI technology to boost learner motivation and engagement, especially engaging learners through gamified learning and progress visualization. However, technical limitations, such as the unnaturalness of the voice of the dialogue system and the lack of understanding of complex student input, as well as insufficient consideration of the cultural context of the learner, remain important obstacles for AI to overcome in the field of education. Based on the findings, this paper suggests that future SLA AI applications need to focus more on improving the humanization and cultural sensitivity of the technology, as well as training to strengthen teachers' understanding and use of AI tools. Educators should consider adopting a hybrid teaching model, using AI technology as an auxiliary tool rather than a substitute for teachers, and using AI to enhance teaching content while retaining the central role of teachers in the teaching process. Overall, AI technology offers significant opportunities in the SLA space, but its successful implementation depends on a deep understanding of educational practices and careful application of the technology's potential. Future research and practice should aim to address the shortcomings of existing technologies and harness the benefits of AI in education while ensuring that education is equitable and inclusive.

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