

The Impacts of Artificial Intelligence on Learners' Second Language Acquisition

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Abstract. With the rapid development of technology, Artificial Intelligence (AI) has started being used in the second language teaching aspect. This paper is mainly based on Input Hypothesis, Output Hypothesis, Interaction Hypothesis, Monitor Hypothesis, Affective Filter Hypothesis and Natural Order Hypothesis, uses the method of combining theoretical analysis and literature review to research the integration and the impacts of AI on learners' Second Language Acquisition (SLA), and points out some drawbacks existing in previous studies. The research finds that AI can provide learners with some useful situations when they start an interaction with it. It can also increase learners' learning motivation, reduce their anxieties and enhance their self-confidence effectively. Furthermore, it can improve learners' language proficiency when they start using AI at a younger age. However, there are also some disadvantages, such as the irregularity of proficiency tests, learners' dependence on AI, users' negative attitudes toward AI, the lack of relevant skills among users, and the unreliability of AI-generated content. This paper aims to provide learners with some useful advice on applying AI tools and improving the efficiency of their SLA.

Keywords: AI, SLA, Language Proficiency

1. Introduction

Artificial Intelligence (AI) is a new technical science which is based on computer science and technology, and it aims to enable machines to imitate some common human behaviors, such as perception, reasoning, learning, decision-making and natural interaction, which can improve human lives to become more convenient [1]. Second Language Acquisition (SLA) is a second language learning process after learners master their mother tongue, which is influenced by many elements, such as input, output, interaction, monitoring and emotion. With the rapid development of technology, AI has become more and more popular in many aspects. The most obvious phenomenon is that AI is integrated into language learning gradually, breaking the limitations of traditional SLA modes. Although there are many studies on AI using in SLA process and the reconstruction of instructional models, the systematic review and analysis of existing research contexts, methods and practical problems in the integration of the two are lacking. This research systematically sorts out the theoretical support of AI integration into SLA and summarizes the existing problems, based on SLA theory and existing research. And the study uses the method of combining theoretical analysis and literature review. The meaning of this research is improving the standardization of AI assisting

SLA learning and teaching process, helping learners and teachers use AI rationally, promoting learners to find the suitable language method for themselves, and further developing relevant tools.

2. The supported theories of integration of SLA and AI

2.1. Overviews of SLA theories

The study of SLA theories originated in the 1960s and 1970s, aiming to explain the SLA learning process. This framework encompasses several key hypotheses. The first is Input and Output Hypothesis. Krashen's Input Hypothesis. It mainly proposes that SLA learners should test their own second language levels, which is recorded as "i", and then study some relevant language materials that are more difficult than their current language levels, so that they can improve their language abilities. Swain's Output Hypothesis emphasizes the importance of learners finding their drawbacks in the process of language use, and then helps learners internalize this language [2]. The second is Long's Interaction Hypothesis. This hypothesis is mainly about learners interacting with each other, and then enhancing their input and output quality and solving the language comprehension barriers [2]. Next is Monitor Hypothesis. This hypothesis means that learners should correct some grammatical mistakes consciously. It is reflected in writing and speaking aspects [2]. Affective Filter Hypothesis shows that anxiety, self-confidence and motivation are three main factors that can affect language learning outcomes [3]. Natural Order Hypothesis states that learners acquire grammatical rules in a fixed sequence regardless of the target language [4]. These hypotheses provide researchers with an effective way to comprehend language learning patterns and design AI-assisted learning tools.

2.2. Theoretical support for AI integration into SLA

AI technology is highly consistent with the core requirements of SLA theory, providing solid theoretical support for its integration. AI can generate learning materials at the $i+1$ difficulty level based on learners' current language proficiency, and can adjust the difficulty dynamically, which is consistent with Krashen's Input Hypothesis($i+1$ theory). This can enhance learners' SLA motivation [4]. An AI system can create a practical interaction platform, allowing learners to take part in some simulation training. Therefore, learners can gain more useful feedback, correct their language using errors and mistakes, and then promote their language competence. This reflects the support of Long's Interaction Hypothesis [5]. AI can build acoustic models to assess learners' pronunciation, intonation and fluency with instant feedback. It helps learners correct their language output consciously. This reflects Monitor Hypothesis' support [4]. Communicating with AI tools can also reduce learners' pressure, anxiety and improve their self-confidence compared to interacting with their teachers and partners, which shows the support of Affective Filter Hypothesis and enhances learners' language competence effectively [3].

3. AI's impact on learners' SLA

3.1. Generative AI(GAI) products and Large Language Models(LLM)

Nowadays, there are many AI tools, including intelligent apps and Large Language Models. Liulishuo English, ChatGPT and LLMs are the typical ones. These tools provide learners with a good way to boost their language proficiency. For example, the app called Liulishuo English applies computer technology to push some useful information that suits learners' language proficiency and

correct users' grammar, pronunciation and intonation by speech recognition technology. It can also apply Virtual Reality(VR) to create different situations, such as campus life, travel, and business, to help learners comprehend the different usages of words in different scenarios [4]. ChatGPT holds a language corpus. So it allows learners to gain a lot of actual second language input. It has intelligent agents which can interact with SLA learners naturally, boosting immersive practice [6]. LLMs can predict the next word, sentence or paragraph and revise learners' papers. It promotes learners to notice the gap between their intended expression and actual expression and then strengthens learners' output abilities [3]. These tools support multi-modal input and output, real-time dialogue and instant feedback, which can provide learners with a more convenient way to practice their second language.

3.2. Meta-analysis method of AI effects on SLA

Meta-analysis method is a research method that systematically integrates existing studies to find common conclusions and some new knowledge. It was first proposed by Glass [7]. It can get reliable conclusions by the process, including searching relevant studies, coding data and analyzing results [8]. A meta-analysis by Guo et al. reviewed 35 empirical studies on AI chatbots in SLA. Research results are represented by effect size, which is a standard indicator for measuring the magnitude of AI chatbots' promotional effect on learners' SLA. The larger the effect size, the better it promotes learners' SLA. The result shows that the overall average effect size was 0.677, illustrating that AI chatbots have a positive impact on SLA. Furthermore, AI has a noticeable increase in terms of learners' emotions, with an effect size of 1.375, including learning motivation, self-confidence improvement, and anxiety reduction. Learning stages, teaching cycles, robot interfaces, interaction modes, and language skills also influence SLA learning. Meanwhile, listening, vocabulary and oral language can be improved greatly because of AI chatbots. However, studying contexts shows no significant moderating effect on the overall outcome [9].

3.3. Exploration of AI-assisted SLA teaching modes

There are many existing studies about the exploration of AI-assisted SLA teaching methods. Meng et al. constructed an oral English teaching mode with three stages by using GAI. Teachers can prepare the relevant information, such as topic materials, task goals and learners' oral language proficiency with the help of GAI. During the learning process, GAI can record learners' speaking mistakes, give instant feedback and generate review reports. After the class, teachers can collect learners' report data to find some common problems and address these mistakes or errors in the future teaching. Moreover, GAI can give some targeted improvement suggestions to different learners. It can also produce some targeted training tasks to help learners strengthen their weaknesses. Finally, GAI can expand the topic to give more relevant tasks to enable learners to use those language materials flexibly [10]. Another research mainly focuses on vocational college teaching. Ma et al. proposed a teaching method: guiding before class, interacting during the class and producing a report after class by using AI technology for vocational colleges. This method shows a circular chain: input, output, interaction and monitoring. The intervention of AI can make this circular chain more accurate and personalized [2]. Vista-LLaMA and video-SALMONN are two multimodal LLM. Teachers can use these LLM to analyze learners' learning behaviors and learning states and then adjust their teaching materials to satisfy learners' current language proficiency, which suits Krashen's Input Hypothesis [3].

3.4. Impacts of AI on learners at different stages

Guo et al.'s research reflects that primary school students can improve their language competence dramatically (effect size 1.314) due to AI, followed by kindergarten children, about 0.720. College students' application effect is 0.447, but secondary school students enhance their second language proficiency slightly, only 0.088, much lower than significance level ($p=0.614$). This phenomenon shows that chatbots can improve learners' language proficiency greatly from 2 years old to 12 years old. After this life stage, learning language becomes more and more difficult. Meanwhile, because of academic pressure, secondary school students pay more attention to their grades and they may have higher learning motivation, so they prefer to use AI tools to generate content in line with specific knowledge test points. However, AI tools such as chatbots lack this specific functionality. This reflects that people in different life stages have different learning motivations and recognition. AI functions also affect learners' language learning effects [9].

4. Existing problems in AI-assisted SLA

4.1. Non-standard identification of learners' second language assessment

Many AI systems do not have a standard to test learners' current language proficiency. That is because many AI technologies mainly test learners' vocabulary, grammar and other basic language competence. They can not test learners' logic expression ability, practical use and other practical abilities. That means learners may not know their real language proficiency and different AI tools may give different results, so that learners may face different levels of difficulty in different AI tools. Learning materials do not suit learners' capabilities. This may lead to an unpleasant result, that is, learners can not improve their language abilities exactly because of lack of input.

4.2. Learners' dependence on AI applications

Using AI applications can provide learners with a lot of convenience and can generate some materials with a few mistakes. So learners prefer to use AI to help them finish their homework rather than doing it by themselves. For example, younger learners may follow the AI's feedback to assess their language proficiency rather than correcting these mistakes by themselves. This may lead learners to reduce their independent thinking and learning ability gradually. Learners also reduce their active detection of some mistakes and they may not know their mistakes in what aspect in further study. This breaks the Monitor Hypothesis totally and affects learners' language proficiency improvement [4].

4.3. Learners and teachers' incompetence and negative attitudes toward AI applications

Learners' and teachers' AI-using skills and attitudes may affect AI that assists language learning and teaching effects. Some teachers may resist the use of AI technology [5]. They suppose that AI may replace their positions in the future. And many teachers do not know how to use AI to assist them during the teaching process [10]. Also, some learners are unable to use AI to help them solve practical problems in their language learning process and they may be unwilling to use AI tools to help them study. Some of them may also gain uneven ability test results because of a lack of relevant abilities, which may affect their further study [4]. The insufficient literacy of teachers and learners leads to the improper use of AI, which can only play a superficial role and cannot realize the deep integration of AI and language learning.

4.4. Lack of reliability in AI-generated content

The content that AI generates includes some problems such as inaccuracy and contextual deviation. For instance, ChatGPT can not distinguish false information to some extent. Meanwhile, in order to satisfy users' needs, it may generate some unreliable information. Furthermore, because of the imbalance between creativity and restraint, AI may lead to over generation or under generation. The official of ChatGPT also acknowledges this point [6]. This may lead learners to misunderstand some language knowledge, because they can not distinguish true information from false content, which may bring some potential problems in their learning process and influence the accuracy of their input and output [6].

5. Conclusion

This study systematically analyzes the impact of AI on learners' SLA through theoretical analysis and literature review. It shows that AI has a positive impact on SLA, which can improve learners' input and output ability, promote interaction, reduce anxiety and so on. It also reveals some existing problems in AI-assisted SLA. It mainly includes the inconsistency of language ability tests, learners' reliance on AI, users' negative attitudes and lack of technical proficiency and the unreliability of AI-generated content. This paper also has some room for improvement. It mainly adopts the method of combining theoretical analysis and literature review, without any field research. In the future, researchers can mainly focus on how to establish a standard to test learners' current language proficiency, and adjust AI-generated content to ensure their accuracy and reliability. Moreover, researchers can also find some practical ways to help users use AI applications correctly and efficiently, which aim to further improve the integration of AI and SLA.

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