



Pathways, Strengths and Limitations of ChatGPT for Second Language Teaching and Learning

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Abstract. With the advancement of globalisation, second language learning has become more and more important. Traditional second language teaching methods face many limitations and challenges. The rapid development of artificial intelligence technology has brought new opportunities for second language learning. ChatGPT, as an artificial intelligence-based chatbot, can simulate real conversations and provide a personalized language learning experience. As an interactive tool with natural language processing capabilities, it provides new learning methods and learning resources for second language learners. In this paper, we will discuss the implementation paths, advantages and challenges of ChatGPT in assisting second language teaching, and make application suggestions to further improve the effectiveness of ChatGPT in teaching.

Keywords: ChatGPT; Second Language; Teaching; Artificial Intelligence

1 Introduction

The impact of ChatGPT on second language teaching and learning is an emerging area of research that has attracted several academic and educational researchers. Many educational technologists are dedicated to exploring the use of AI technology in education, focusing on how ChatGPT can improve students' language skills and support teachers and students by developing ChatGPT-based instructional tools. Language education scholars focus on the role of ChatGPT in second language acquisition and teaching from a linguistic and pedagogical perspective, investigating the impact of ChatGPT on learners' language proficiency, mastery of grammar rules, and vocabulary accumulation.^[7] Teachers and educational practitioners introduce ChatGPT into the classroom and assess the effectiveness of ChatGPT in providing immediate feedback and personalised learning experiences by observing students' interactions with ChatGPT. Experts in the fields of artificial intelligence and natural language processing, on the other hand, investigate how to improve ChatGPT's language generation capabilities and interaction experience to better support second language teaching and learning. Due to the relative newness of ChatGPT in second language teaching, research is still limited. There is a need to explore the broader implications of ChatGPT for second language teaching and learning.

2 Connotation of ChatGPT and Related Resources

ChatGPT(Chat Generative Pre-trained Transformer) is a dialogue model based on AI technology for generating natural language responses with coherence and contextual understanding. In the field of second language teaching, ChatGPT acts as a virtual assistant or online tutor for students. It is capable of answering students' questions, explaining concepts, providing learning resources, and interacting with and guiding students. Currently, the resource development of ChatGPT as a popular chatbot technology has attracted a lot of attention and research in the past few years. One is to use it in applications or websites. Many companies and developers have integrated ChatGPT into their apps or websites to provide chat,customer service, or other interactive features.The second is the use of virtual assistants or chatbots, such as Siri, Google Assistant,and Microsoft Ice on smartphones, which have adopted ChatGPT technology.The third is the development of your own apps, using ChatGPT to build and customise apps to suit your needs.

3 The Path of Realisation of ChatGPT in Second Language Teaching and Learning

Second language learning has always been a challenging process.Traditional teaching methods have many limitations in providing a personalised learning experience and immediate feedback.^[6] With the advent of AI technologies such as ChatGPT, the field of second language teaching has opened up new opportunities that bring significant value to second language learners.^[3]

3.1 Improvement of Oral Expression

3.1.1 Real Dialogue Simulation.

ChatGPT simulates conversations through the use of large-scale pre-trained language models combined with the technology of generative text modelling.ChatGPT simulates real teacher-student conversations with natural, fluent interactions with learners. This allows learners to practice oral expression in a low-stress environment and improve their fluency and self-confidence.

The general steps of ChatGPT simulated dialogue include process modules such as data preparation,model training, context processing,dialogue generation and evaluation and improvement.Data preparation is that ChatGPT needs a certain amount of teacher-student dialogue data as training material. Model training is to use the prepared dialogue data and input it into the ChatGPT model for training.Dialogue generation is when dialogue generation is performed, given an initial dialogue context, the model will generate the next reply based on that context. Context processing is where in each round of dialogue, the model uses the contextual information of the historical dialogue to better understand and generate coherent replies. Contextual processing can be done by using previous rounds of dialogue as input or by using a technique called "attention mechanism" to weight different parts of the dialogue.Evaluation and refinement is the

process by which the results of the generated dialogues need to be evaluated and refined in order to improve the quality and accuracy of the model.

ChatGPT simulates teacher-student dialogues by materialising the simulated dialogue flow module into four parts: question answering, academic guidance, feedback and assessment, and assisted teaching. Question answering means that students can ask ChatGPT questions, and it will reason based on its training data and pre-trained models to give answers related to the questions. Academic Guidance means that during teaching, teachers usually provide academic guidance, answer students' questions, and provide learning suggestions. Feedback assessment means that ChatGPT can also play the role of a teacher to assess and provide feedback on students' assignments or answers. Teaching aid means that ChatGPT can be used as an aid to support teachers. Teachers can use ChatGPT to access lesson planning materials, teaching resources or teaching suggestions, and refer to ChatGPT responses in class to enrich and improve their teaching.

3.1.2 Virtual Language Partners.

ChatGPT can act as a virtual language partner for learners, providing opportunities for speaking practice at any time. Learners can communicate with ChatGPT to increase language input and output opportunities, thus accelerating the language learning process.

There are four ways to make ChatGPT a virtual language partner. First, use human-computer interactive dialogue. ChatGPT can play the role of a virtual language partner by engaging in real-time interactive dialogue with users. Users can ask questions, share opinions or express their feelings, and ChatGPT will respond according to its training data and models, simulating real human dialogue as much as possible. Second, language learning support: ChatGPT can provide help and support in the language learning process. Learners can use ChatGPT as a practice partner for dialogue practice, grammar correction or vocabulary expansion. Third, cultural communication: ChatGPT can promote cross-cultural communication and understanding by simulating dialogues in different cultural backgrounds. Through dialogue with ChatGPT, users can learn about the customs, views and values of other cultures and expand their own horizons and perceptions. Fourth, emotional support. ChatGPT can become a role of an understanding and a listener, providing emotional support. When using ChatGPT as a virtual language partner, we should understand its limitations and combine it with human judgement and communication skills to get a better interaction experience and language learning effect.

3.2 Personalised Learning Experience Counselling

3.2.1 Customisation of Learning Content.

Based on the needs and level of the learner, ChatGPT can provide personalised learning content and guidance to each learner. This helps to meet the specific learning needs of learners and improve learning outcomes. Firstly, ChatGPT can provide personalised learning content for second language learners. ChatGPT can adaptive learning

paths that are customised according to a student's level, goals and interests. This allows learners to follow their own progress, increasing efficiency and motivation. Second, ChatGPT can provide learners with intelligent assisted practice. It helps learners consolidate their knowledge of grammar, vocabulary and phonics. Thirdly, through dialogue with ChatGPT, learners can practice language communication and hone their speaking and listening skills. ChatGPT can simulate conversations in real-life scenarios, providing opportunities for learners to communicate and interact using the language they have learned. Fourth, ChatGPT can provide learners with support and feedback on their writing. Learners can ask ChatGPT for writing questions, seek writing advice, and get immediate guidance. Fifth, cultural background and interest matching: ChatGPT can understand learners' cultural background and interests and provide relevant learning content based on this information. It is important to note that guidance and feedback from human teachers remain critical to learner development.

3.2.2 Self-directed Learning Flexibility.

ChatGPT can provide flexible learning paths and schedules based on learner progress and learning styles. Learners can learn at their own pace and preferences, increasing motivation and engagement. During the learning process, learners identify the topics or skills they want to learn and set clear learning objectives. This helps ChatGPT to develop a learning path and timetable that is tailored to the needs of the learner. ChatGPT can give you personalised learning advice based on your preferences and personalised recommendations for learning resources. At the same time, learners can use ChatGPT to adjust their learning plan based on progress. ChatGPT can adjust the learning plan based on feedback and assessment results to ensure that learners are making progress in the right direction. When you encounter difficulties or have questions, seek help from ChatGPT, which can provide answers to questions, relevant learning resources and suggestions to help you overcome difficulties and continue learning.

3.2.3 Feasibility of Distance Education.

ChatGPT-based online learning platform can provide students with distance learning opportunities. Students can obtain learning materials and guidance anytime and anywhere by interacting with ChatGPT. ChatGPT can provide students with learning resources sharing and recommendation. It can recommend suitable textbooks, reference books, online courses, etc. to help students expand their knowledge areas and deepen their learning content. Students can ask

ChatGPT questions at any time and get instant answers. By interacting with students, ChatGPT can act like an intelligent teaching assistant to provide tutoring and guidance to students. It can explain concepts, provide examples, solutions, etc. to help students understand and master the learning content. It can provide challenging questions and exercises to prompt students to think and explore deeper areas of knowledge, and provide guidance and feedback accordingly.

3.3 Providing Immediate Feedback and Correction

3.3.1 Instant Error Correction.

ChatGPT can detect language errors in learners in a timely manner. When a language learner uses incorrect grammar or vocabulary, ChatGPT recognises it and suggests corrections. In a dialogue, ChatGPT understands the learner's question or sentence in context and tries to give the correct expression. Targeted corrections and feedback are provided. This helps language learners to improve their speaking and writing skills and helps learners to quickly identify and correct their language problems and improve language accuracy. In addition, ChatGPT tries to understand the learner's question or sentence and provides targeted correction suggestions based on the context to help learners express themselves better.

3.3.2 Assessment of Learning Progress.

By interacting with ChatGPT, learners can get instant assessment of their progress, which enables them to understand their strengths and needs for improvement and develop strategies accordingly. This enables learners to understand their strengths and areas for improvement and develop learning strategies accordingly. ChatGPT's learning progress can be assessed in three ways: through automated assessment metrics, manual assessment, and user feedback. Automated assessment metrics are used to quantitatively assess the learning progress of ChatGPT. Manual assessment is an important type of assessment that can be performed by professional assessors or domain experts on the responses generated by ChatGPT. User feedback is the collection of feedback and comments from users is also an important way to assess learning progress. Users can provide ratings of satisfaction and accuracy of ChatGPT responses, as well as suggestions for improvement and optimisation. For a machine learning model like ChatGPT, learning progress is a gradual process. With continuous iterations and updates, the model's performance will gradually improve.

3.4 Development of Supplementary Teaching Materials

ChatGPT can be used to develop teaching materials, especially in aiding the writing, editing or provision of learning resources. Its powerful natural language processing and generation capabilities make it a promising tool. Textbook writers can use ChatGPT to quickly generate articles, paragraphs or answer questions. By interacting with ChatGPT, ideas and inspiration can be gained and the time and effort required to write teaching materials can be reduced. At the same time, ChatGPT can be used as a supplement to teaching resources, answering students' questions, explaining concepts or providing examples. It can provide detailed explanations and personalised feedback for different levels and levels of understanding.

The following steps can be followed to develop instructional materials using ChatGPT. First, identify the topic and objectives. That is, determine the topic of the textbook that you want to develop, and then define the objectives of the textbook, including the required content coverage and the level of the learners. Second, collect information and knowledge. Collect information and knowledge points related to the

theme. Third, construct the structure of the teaching materials. Based on the objectives and content, develop the overall structure of the teaching material and the division of chapters. Determine the topic and sequence of each chapter to guide learners in a logical and progressive way. Fourth, add examples and exercises. The textbook should contain some examples and exercises to help learners better understand and apply what they have learnt. Fifth, revise and edit. After completing the initial writing, revise and edit the textbook.

The advantages of ChatGPT in preparing teaching materials are mainly in three aspects, such as fast content generation, diverse expressions and automatic proof-reading function. ChatGPT also has a built-in grammar and spell checker that automatically flags possible grammar and spelling errors or gives them to the author when writing textbooks. It automatically flags possible grammatical errors and spelling mistakes or gives hints when writing textbooks. However, since the text generated by ChatGPT may contain inaccuracies or ambiguities, the generated content needs to be modified and adjusted manually.^[1]

3.5 Assisting Teachers in Lesson Planning

ChatGPT can help teachers prepare for lessons in a number of ways by providing support and resources. It can provide teachers with background knowledge, answer questions about specific topics, and provide relevant background knowledge and explanations of concepts. At the same time, ChatGPT can help teachers prepare lesson plans. Detailed plans and instructions designed for a specific course or teaching activity. ChatGPT can provide suggestions and guidance, such as the title of the lesson plan, the objectives, the teaching steps, and the assessment methods. In terms of designing teaching activities, ChatGPT can help generate ideas and content for teaching activities and provide creativity and inspiration for designing interesting, interactive and effective teaching activities. On the other hand, teachers can interact with ChatGPT and request it to generate content and answer questions for lesson planning. Teachers can provide requests or examples, and ChatGPT will generate corresponding paragraphs, explanations or examples based on the input. This can speed up the teacher's preparation of course materials and provide ideas and inspiration for lesson planning. During lesson planning, teachers may encounter difficult or complex concepts. By communicating with ChatGPT, questions can be asked and answered, eliminating confusion.^[2] Compared with the traditional way of lesson planning, ChatGPT can on the one hand provide teachers with novel ideas and creativity. By interacting with ChatGPT, teachers can obtain ideas and suggestions related to the content, thus expanding the design of lesson plans and teaching methods. On the other hand, ChatGPT can quickly generate appropriate answers and text frames based on teachers' questions or instructions. This can help teachers to quickly access relevant knowledge and information, and provide reference and guidance during lesson planning. In summary, ChatGPT can provide creative inspiration, quick access to information and diverse resources in teacher preparation. However, teachers still need to review and modify the texts generated by ChatGPT in conjunction with their own professional knowledge and experience to ensure the quality and adaptability of the content of their lesson planning. ChatGPT can

be used as a supplementary tool for teachers, but teachers are still an indispensable core resource in the process of lesson planning.

4 Advantages of ChatGPT in Second Language Teaching and Learning

4.1 Storage and Processing Capacity

ChatGPT can quickly store and retrieve large amounts of information with superior memory capacity, providing accurate,detailed knowledge and information when needed. In terms of storage capacity,ChatGPT can store and retrieve large amounts of information without memory limitations. In contrast, human teachers have limited memory capacity. In terms of logical reasoning and analysis capabilities,ChatGPT has strong logical reasoning and analysis capabilities based on deep learning models. It can provide accurate answers based on previous patterns and rules, and handle complex computational and inferential tasks. In contrast, humans may encounter cognitive biases,emotional disturbances, or attention problems that lead to uncertainty and errors in thinking.

4.2 Processing Speed and Efficiency

ChatGPT can complete complex computational and analyticaltasks in an instant and maintain high efficiency.ChatGPT runs on powerful computer hardware with high-speed processing capabilities.In terms of information retrieval speed, ChatGPT can quickly find relevant answers by searching large-scale data sets and literature, and process and output at a very high speed. Whereas humans need more time and energy to acquire and organise information. In terms of rest frequency, ChatGPT is an AI assistant based on a computer system that does not require rest or sleep. Compared to humans, ChatGPT can handle multiple tasks and requests simultaneously without fatigue or distraction. Despite ChatGPT's advantages in processing speed and efficiency, human intelligence and intuition are still valuable and irreplaceable in certain complex situations. Therefore, in many tasks, machines and humans can achieve better results by collaborating with each other and taking full advantage oftheir respective strengths.

4.3 Communication Across Languages and Cultures

ChatGPT effortlessly translates and communicates between multiple languages in real-time, providing a hassle-free communication experience for users worldwide. It understands user questions in an instant and quickly generates answers for instant communication and service. ^[4]ChatGPT provides multilingual support and can process and understand a wide range of languages, including those with different language families and grammaticalstructures.ChatGPTis culture-neutral; it is a model built based on machine learning and training data, and is unaffected by personal experience,cultural backgrounds, or biases.ChatGPT can provide teachers and students with

cross-cultural knowledge by accessing a variety of cultural backgrounds and domain-specific knowledge through large-scale datasets and web resources. Although ChatGPT has advantages in cross-cultural communication, it still has some limitations, such as possible limited understanding of specific cultures, customs and contexts.

4.4 Anonymity and Privacy Protection

Unlike human communication, ChatGPT does not collect or store personally identifiable information. This provides users with an anonymous and privacy-protected communication environment, making cross-cultural communication freer and safer. On the one hand, ChatGPT does not collect personally identifiable information. It focuses on answering questions and providing information without involving the verification or acquisition of personal identities. On the other hand, ChatGPT does not keep a long-term history of users' conversations, which are ad hoc. After each dialogue, the data of the dialogue with the user will be erased without leaving any permanent record. In addition, in terms of data encryption and secure transmission, ChatGPT uses secure communication protocols and encryption technology to ensure that the process of data transmission between the user and ChatGPT is encrypted and secure, thus preventing third parties from stealing or tampering with the data.

4.5 Scalability

ChatGPT can be easily deployed and used across multiple platforms and applications, whether on mobile devices, computers or other smart devices for a wide range of applications. For mobile devices, ChatGPT can be integrated by developing appropriate mobile applications, and for computers and other smart devices, ChatGPT can be embedded into existing applications such as chatbots, customer service systems or virtual assistants. Since ChatGPT has multi-language support, it can be used in applications in different countries and regions as needed. This makes it possible to provide cross-language services and support to global users. ChatGPT has these advantages, but there are still some limitations, such as lack of real-world experience, understanding complex contexts, and relative weakness in perceptual and emotional inferences. Therefore, human intelligence and judgement remain irreplaceable.

5 Limitations of ChatGPT in Second Language Teaching and Learning

ChatGPT has great potential in education, offering advantages in terms of personalised learning experiences and instant feedback, but it also faces a number of challenges and limitations. These challenges include aspects such as linguistic accuracy, lack of authentic interaction experiences, and thresholds for using the technology. Therefore, when introducing ChatGPT into education, its advantages and limitations need to be considered in a comprehensive manner and combined with traditional teaching methods to achieve better educational outcomes and student development.^[3]

5.1 Knowledge base with Deadlines

The main versions of ChatGPT that are widely used for testing are ChatGPT-3.5 and ChatGPT-4. Both versions have a knowledge base cut-off date of 1 September 2021. From the results of theory and testing, ChatGPT is currently unable to provide relevant and accurate information for any event that occurs after this date, and is unable to use the updated training dataset. In May 2023, a new plug-in was added to ChatGPT to allow it to access the Internet. This means that ChatGPT is no longer affected by the disruption of training data after 2021. It not only searches for current information, but also provides the source and verifies it itself, preventing malicious generation of random information. However, it is not yet widely open for use and its security is questioned by many experts.

5.2 Challenges of Linguistic Accuracy

ChatGPT is a model-based generative robot that may have limitations and deficiencies in its linguistic and cultural expression. It may not be able to fully understand and accurately answer learners' questions, especially when it comes to linguistic and cultural details. Since the way ChatGPT generates answers is based on training with a large amount of data, it may generate some inaccurate or misleading information. This may confuse learners and lead to incorrect language acquisition. ChatGPT is relatively accurate when dealing with common linguistic contexts, but may misunderstand or provide answers that are not entirely accurate for complex contexts, ambiguous questions, or puns, etc. ChatGPT itself does not have the capability to perform direct grammar and spell checking. It is an AI assistant based on natural language processing, which is more adept at understanding and generating the contextual meaning of text. The main function is to generate and understand text, not to perform direct text structure and logic checking.^[5] Human review mechanisms can be introduced to ensure that the answers provided are accurate and reliable.

5.3 Lack of Real Interaction Experience

Conversations with ChatGPT lack authenticity and emotional connection compared to real people. ChatGPT may have difficulty understanding the learner's emotional state and needs and providing support and encouragement accordingly. Its responses are based on pre-existing knowledge and language patterns. ChatGPT cannot really understand or feel the meaning of things, nor can it provide an intuitive and subjective human-like experience. Although it can simulate real conversations, its dialogue patterns are still limited by technology. This can lead to an unnatural or mechanical interaction experience for the learner when conversing with ChatGPT. We can consider combining virtual reality technology, Create a more immersive and authentic interactive experience.

5.4 Cultural Differences and Linguistic Practices

ChatGPT uses a large amount of English text for training, so there may be limitations when dealing with Chinese or other non-English languages. ChatGPT is generated based on large-scale training data, which may contain potentially biased or inappropriate content. Despite efforts to filter and optimise, these issues cannot be completely eliminated. ChatGPT's answers are based on pre-trained models, which do not actually understand and learn in-depth knowledge of a particular domain. Adding training data for non-English languages to improve ChatGPT's performance in these languages.

6 Conclusion

ChatGPT has various paths of application in the field of second language teaching. It can be used as a learning tool to assist students in understanding and memorizing new vocabulary and grammatical structures. By simulating real dialogue environments, ChatGPT can improve learners' language practice ability, especially for those complex sentence patterns and pragmatic rules that are difficult to master through traditional teaching methods. However, its advantages are also accompanied by certain limitations, such as it may lead to learners' dependence on AI-generated content, which reduces their opportunities for independent thinking and problem solving. In addition, over-reliance on ChatGPT may weaken the interaction between students and teachers, reducing the development of their creativity and critical thinking skills. These problems can be overcome through targeted solution strategies. Therefore, when using ChatGPT for teaching and learning, educators need to carefully design their lessons to fully utilise its potential while avoiding potential negative impacts. In the future, the training data of ChatGPT models can be improved to increase their linguistic accuracy; emotional intelligence and contextual understanding can be further investigated to provide more realistic and personalised interactants. Understanding these limitations and shortcomings is important to help teachers and students to be cautious when using ChatGPT and to be aware of the limited nature of its responses. The use of AI as a tool in practical teaching scenarios will enable the three-dimensional structure of teacher, student and machine to work in parallel to build on their strengths and avoid their weaknesses to achieve AI-enabled second language teaching and learning curriculum development.

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