



REVIEW PAPER

Learning and teaching with ChatGPT: Potentials and applications in foreign language education

Ferdiye Çobanoğulları
Gazi University, Turkey

ferdiyec@gazi.edu.tr

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Abstract

This literature review delves into the applications and implications of ChatGPT, an artificial intelligence-driven chatbot, in educational settings. As technology continues to permeate the field of education, ongoing debates persist regarding the potential impact on learners' critical thinking skills and the evolving role of educators. Instead of resisting such technologies, this review contends that discussions should focus on strategies to optimise their use within education. By conducting a comprehensive content analysis, this study homes in on the utilisation of ChatGPT, harnessing its natural language processing technology, within the realm of foreign language acquisition. The findings of this review indicate that ChatGPT can significantly enhance foreign language writing skills and conversational capabilities, offering tailored language support. Through personalised feedback and guidance, ChatGPT has the potential to facilitate more effective knowledge acquisition and create practical and interactive learning experiences, particularly in applied sciences. It is important to note, however, that ongoing debates surrounding accuracy, currency, and reliability should be considered. Thus, the study emphasises the cautious and responsible use of ChatGPT within educational contexts. To summarise, when used responsibly, AI chatbots such as ChatGPT can enrich language learning processes and provide practical and active learning experiences, ultimately fostering more

effective knowledge acquisition. Therefore, this review underscores the significance of bolstering the tech-literacy of both educators and students, integrating novel technological skills into educational curricula, and investing in comprehensive training on technology usage for students. By embracing these approaches, educational institutions can harness the full potential of AI chatbots to enhance the learning journey.

Keywords

Artificial Intelligence, ChatGPT, Foreign Language Education, Technology in Education

1. Introduction

Today, technology and education have become two inseparable and essential concepts. Rapid technological advancements have led to significant changes in various aspects of life, including education. Traditional learning methods are progressively being replaced by innovative teaching and learning approaches. Educators frequently utilise technology across all educational fields to enrich students' learning experiences and enable them to play a more active role in the learning process. Technology provides students with personalised learning opportunities, interactive and dynamic learning content, motivation **for courses, and alternative learning possibilities (Elvan & Mutlubaş, 2020). The Covid-19** pandemic in 2020 can be said to have created a turning point in the use of technology in education, with previously underutilised educational technologies gaining popularity and acceptance in society.

Although debates have emerged regarding remote education technology, over time, this type of education has begun to be normalised. Students can now access assignments, lecture notes, learning materials, and even exams online. New developments created by technology keep debates on the role of technology in education alive. The recent popularisation and adoption of the AI-powered chatbot ChatGPT in the field of education has led to disagreements among educators. Educators are concerned that students might copy and paste texts without critically analysing and referencing original sources (García-Peñalvo, 2023, Halaweh, 2023). There is a considerable likelihood that some students will have ChatGPT complete their assignments and tasks without putting in any effort. Raising a generation dependent on artificial intelligence and with atrophied thinking skills is indeed worrisome.

Rasul et al. (2023) suggest that for students to effectively develop skills such as critical thinking, problem-solving, collaboration, and teamwork, real-world experiences and social interactions are crucial. However, artificial intelligence models like ChatGPT lack the ability to fully offer these experiences. Additionally, ChatGPT may find it challenging to evaluate student learning outcomes, and its limitations become clear in promoting active participation and social interaction, which are fundamental principles of the constructivist theory in education. Therefore, relying solely on ChatGPT will not enable students to enhance those skills which should be grounded in real-world experiences and interactions.

However, instead of worrying about ChatGPT and similar technologies, it is more appropriate to discuss how to better utilise such technologies and integrate them into education when necessary. Stopping technological progress is nearly impossible. Despite concerns, artificial intelligence technologies can make tasks more efficient and faster, and new opportunities can be leveraged in various fields. According to McMurtrie (2022), just as calculators and computers revolutionised science, ChatGPT will become a significant part of writing processes, especially in the future. However, although artificial intelligence technologies provide significant support in the field of education, it is not possible to fully replace the abilities and knowledge of educators (Yiğit et al., 2023).

Thanks to ChatGPT's high natural language processing capabilities, it can establish natural communication with humans. Natural language processing is a branch of science that emerged with advancements in computing technologies. This field focuses on processing languages with the help of computers, based on the principle of communicating with

computers. With this technology, computers can understand what humans have written, answer questions, and perform translations between languages. To achieve this, languages are analysed **in-depth in terms of sound, form, syntax, and meaning** (Adali, 2012). ChatGPT's natural language processing abilities enhance its applicability in applied sciences, such as foreign language education. It is worth noting that research on the role of ChatGPT in education has been limited to date. Therefore, conducting research in this area is essential to better understand its potential benefits and drawbacks. The following research questions will be discussed in the study:

- How can ChatGPT be used in foreign language education?
- What are the advantages and disadvantages of using ChatGPT in education?
- How can students and educators benefit from ChatGPT?

The findings will contribute to the ongoing dialogue about the intersection of artificial intelligence and education, paving the way for future research and implementation.

2. A brief overview of the history of artificial intelligence in education

Artificial intelligence has recently gained traction in education, yet it has a short history, with the term first defined in 1955. The development of AI-supported learning models began in the 1960s (Ilkka, 2018). The 1960s and 1970s can be considered the golden age of Computer-Assisted Learning (CAL) applications. PLATO, developed by the University of Illinois, was a system that allowed thousands of students to interactively access standard course materials. This system included new educational technology that is still in use today, such as emails, instant messaging, and remote desktop connections (Arslan, 2020). In 1970, the first educational software containing an artificial intelligence component called Intelligent Tutoring Systems (ITS) was developed. This software was programmed to monitor students' work, provide feedback, and offer hints (Shute & Zapata-Rivera, 2010). In the 1970s, SCHOLAR, an early example of an intelligent tutoring system capable of communicating with students, responding to their questions, and posing questions, was developed (Carbonell, 1970). In the 1980s, computers entered a period in which they could establish relationships between pieces of information in addition to their storage and processing capabilities. During this time, the deep learning technique proposed by John Hopfield and David Rumelhart was developed. This technique allowed computers to use previously stored or used information in new experiences. At the same time, Edward Feigenbaum developed the expert systems program, which could mimic a decision-making process like that of expert humans. Expert systems are artificial intelligence (AI) systems that attempt to generate and find data to solve problems, and these systems aim to assist students based on expertise (Arslan, 2020; Supriyanto et al., 2018). In the 1990s, technologies called artificial neural networks took a significant step in information processing by imitating the human brain. In the field of language learning, in particular, an approach called intelligent computer-assisted learning began to emerge with the use of these technologies (Arslan, 2020; Bailin, 1995).

Between 2000 and 2009, with the widespread use of distance education, research on the design and implementation of online education increased. Virtual reality emerged in this field to bring live experiences to classrooms. Between 2010 and 2019, student profile models and learning analytics gained importance. Education is seen as an area with great potential for the application of AI technology. AI innovation in education has evolved from idealised laboratory scenarios to more complex real-life learning contexts. Companies in the EdTech industry have developed systems such as individual adaptive learning systems that allow for personalised learning, systems that assist in classroom environment management, and systems for student enrolment and counselling. However, with the rapid advancement of AI-based innovations, some issues have arisen, such as how AI-based education systems can be integrated with macro educational institutions and micro educational contexts, the roles stakeholders play in the AI-based education ecosystem, and the development of AI-based technology platforms for consumers (Guan et al., 2020). Popular culture's perceptions of artificial intelligence, both good and bad, may suggest that AI is rapidly becoming super-intelligent, but this is not quite accurate. Current AI systems have serious limitations like command mismatch, a lack of human interaction, and high cost, and there are boundaries to what they can do technically, socially,

scientifically, and conceptually. Research on human learning provides important tools and concepts that help us better understand the capabilities of current artificial intelligence systems. Many existing AI systems use simplified versions of learning and biological intelligence models, learning theories thus help us to better understand the capacities of current AI systems (Iikka, 2018; Khanzode & Sarode, (2020).

Today, artificial intelligence studies in education include knowledge-based, data-based, and logic-based AI applications. These applications include personalised education, data mining, student article analysis, chatbots, education for children with special needs, AI-based assessment systems, and automatic test generation systems. Additionally, other applications such as exploratory learning and child-robot interaction are present (Arslan, 2020).

3. ChatGPT technology

ChatGPT (Chat Generative Pre-training Transformer) is a language model developed by OpenAI, a leading company in artificial intelligence and machine learning research. ChatGPT can be used as a chatbot or virtual assistant that can communicate with people using natural language. The model is trained using reinforcement learning methods and is built upon a model from the GPT-3.5 series. ChatGPT's goals include communicating with people in a more interactive and natural manner, learning based on human-provided feedback, and facilitating people's daily lives. However, the model has some shortcomings. For example, it can sometimes give incorrect or meaningless answers and can sometimes write excessively long responses. The model may respond differently to variations of the same question and can make unrealistic predictions when a clear question is not asked. The model was developed by OpenAI in 2022, yet its knowledge base has not significantly expanded since 2021. Additionally, the model can sometimes respond to unwanted or harmful instructions. Alongside the release of ChatGPT, OpenAI continues to work on releasing safer and more useful AI systems, using the experiences gained from previous models (OpenAI, 2023a).

With ongoing efforts, OpenAI has introduced ChatGPT-4, the latest version of GPT. According to the technical report published by OpenAI, GPT-4 can process image and text inputs and generate text outputs. This new model has been evaluated in various exams designed for humans and generally exhibited better performance than most human test participants. Furthermore, it has outperformed previous large language models and most state-of-the-art systems in traditional NLP tests. However, like previous GPT models, GPT-4 has limitations and cannot be considered fully reliable. Caution should be exercised when using its outputs, especially in contexts where reliability is crucial. The report also addresses the challenges of developing deep learning infrastructure and optimisation methods that exhibit predictable behaviour across a wide range of scales. The report highlights the security challenges created by GPT-4's capabilities and limitations and explains the interventions made to prevent potential harm. Considering the potential societal impact of models like GPT-4, it is believed that carefully investigating these challenges is an important research area (OpenAI, 2023b).

4. Education and ChatGPT

It would not be wrong to say that ChatGPT can be used in every area of education. ChatGPT can primarily serve as an individual education guide or partner for every student. Teachers can also use ChatGPT as a research assistant when developing educational materials and evaluating students. Other advantages of ChatGPT in education can be grouped as follows:

ChatGPT Usage for Educators (The Centre for Learning, Teaching, and Development, 2023):

- Creating lesson plans based on specific pedagogical goals.
- Enhancing learning experiences by providing students with more engaging and interactive materials.
- Creating storyboards for interactive or gamified learning activities.

- Developing interactive quizzes and exercises.
- Generating test questions.

To prevent students from easily completing their assignments without effort by consulting ChatGPT, teachers should ask open-ended questions. Open-ended questions that require written responses cannot be easily answered by ChatGPT and can help students develop their critical thinking and analytical skills. Also, questions that offer different options and require students to interpret the information can be used. For example, instead of asking, "What is the main theme of the story?", questions like "How does the author convey the main theme of the story using symbolism?", can enhance students' analytical skills. Peer assessment, where students evaluate and provide feedback on each other's work, can also be employed. This method not only evaluates students' understanding of the material, it can also promote collaboration and critical thinking (The Centre for Learning, Teaching, and Development, 2023).

In addition to these, more emphasis can be placed on in-class activities instead of homework. For example, more time can be allocated to in-class group work. The teacher can assign workgroups to focus on specific topics and encourage students to interact with each other, exchange ideas, and complete in-class assignments more authentically. Furthermore, workgroups can engage in discussions about the topics they are working on. Finally, instead of homework, students can be encouraged to give more in-class presentations on specific topics. Even if the student benefits from ChatGPT during the presentation preparation phase, the teacher can assess their understanding of the topic by asking questions and listening to the explanations given after the presentation.

Although some educators may have concerns about ChatGPT, it can save a significant amount of time for educators, especially when preparing exams and materials. When ChatGPT is given detailed information about students' levels, interests, and needs, it can quickly create suitable materials. Likewise, if the subject and difficulty level of the exam are specified, ChatGPT can automatically generate the desired exam quickly.

ChatGPT Usage for Students (Adipat et al., 2022; Gimpel et al., 2023):

- Students can work with ChatGPT anytime and anywhere, regardless of time and place.
- Each student can test their knowledge at their own pace, even without a teacher.
- Students can use ChatGPT for homework and exam preparations.
- ChatGPT can be useful for quickly reviewing materials such as long notes or difficult-to-read texts, identifying important aspects, and summarising. However, it should be remembered that summaries may skip essential details. Therefore, ChatGPT should be used cautiously for summarising.

When used conscientiously, ChatGPT can be a valuable learning partner for students. Its benefits are not limited to those mentioned above. Students can reinforce their understanding of classroom topics by asking ChatGPT questions. For example, a student can query ChatGPT for help with a math problem to learn the solution and get study tips for courses.

Although ChatGPT is an excellent tool for explaining short texts, it is not yet sufficient for developing long arguments or analysing a topic in detail. Therefore, it can be used in conjunction with structured thinking to develop a framework. As ChatGPT facilitates the eloquent expression of open thoughts, students can focus more on ideas and structure. Properly guiding and effectively using tools like ChatGPT helps ensure they become useful assistants (Gimpel et al., 2023).

5. ChatGPT and foreign language education

Large language models like ChatGPT are designed for use in various fields, including natural language processing tasks. These fields encompass translation, summarisation, question answering, and content creation such as stories or news articles. In short, large language models have become versatile tools capable of being utilised in many different

application areas due to advancements in natural language processing technologies. With the potential to radically transform how languages are learnt and taught, large language models can create a revolution in this field by providing access to high-quality, customised, and personalised language learning materials (Topsakal & Topsakal, 2022).

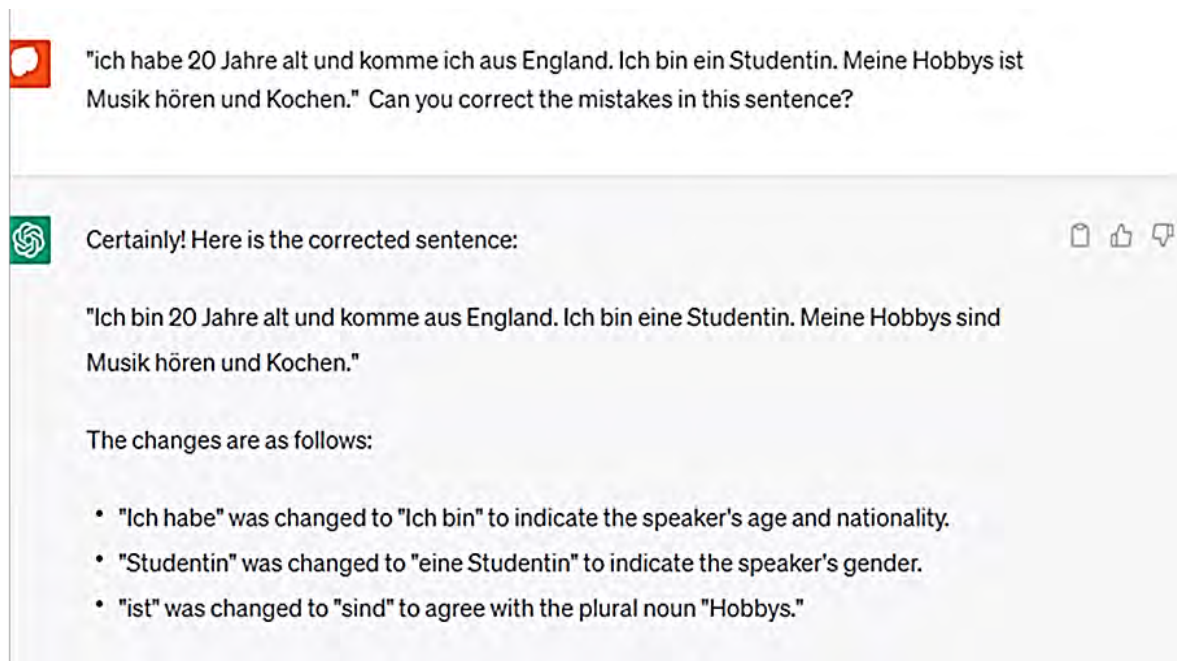
ChatGPT can be used in foreign language education in the following ways (The Centre for Learning, Teaching, and Development, 2023):

- It can be used to save time in preparing time-consuming activities such as composition writing and translation in a foreign language.
- Students can create texts with the help of ChatGPT to improve their foreign language writing skills and revise their texts. Moreover, ChatGPT can be used to help students generate ideas and suggestions for their writing tasks.
- Teachers can consult the model to create texts at different levels to help students learn at their own pace.
- Students can create texts suitable for their own level or simplify higher-level texts with ChatGPT.
- It can be used to provide personalised language support for students.
- It can be used to provide examples for given assignments.
- Students can use ChatGPT to create dialogues in a foreign language.
- Students can use ChatGPT to create sentences and expressions in a foreign language.

It can be said that the use of ChatGPT in foreign language education can be particularly important as a tool for improving foreign language writing skills. Figure 1 depicts ChatGPT correcting spelling mistakes in German sentences, providing the right forms and explaining the errors (OpenAI, 2023c).

Figure 1

Screenshot of ChatGPT correcting spelling errors.



In addition to creating texts in a foreign language or correcting spelling errors, ChatGPT can also be a good teacher. In the figure 2, ChatGPT has been asked to explain the topics of "Akkusativ and Dativ" in German (OpenAI, 2023c):

Figure 2

Screenshot of ChatGPT's explanation on the topic.

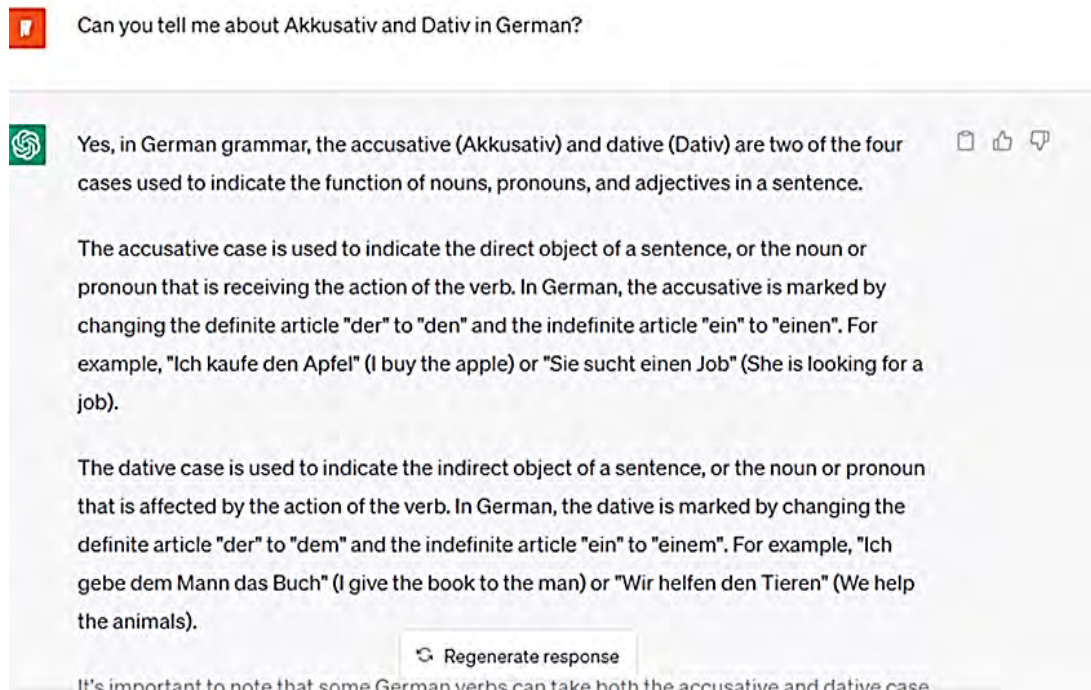
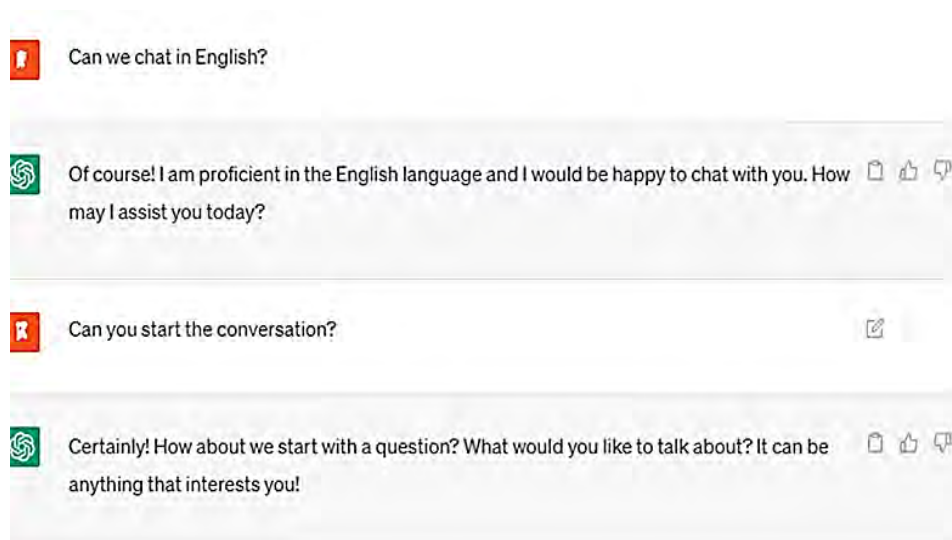


Figure 2 shows ChatGPT offering detailed explanations with examples in natural language, allowing students to review and understand topics on their own, and generating related exercises for additional practice.

ChatGPT's natural language processing (NLP) capability provides students with the opportunity to engage in dialogue and chat using natural language in foreign language learning. In daily life, it is often impossible for students to have conversations with native speakers of the target language. Figure 3 shows an English conversation conducted with ChatGPT (OpenAI, 2023c).

Figure 3

English conversation with ChatGPT.



As seen, AI-powered chatbots like ChatGPT have the potential to provide students with a natural language learning experience during the foreign language learning process, making the learning journey more enjoyable and effective.

Table 1 summarises how ChatGPT may be used in foreign language teaching:

Table 1

Benefits of ChatGPT in Foreign Language Learning.

Benefits	Descriptions
1. Supplemental Learning Tool	Provides additional practice and reinforcement of topics covered in class.
2. Interactive Learning	Students can engage in text-based conversations with ChatGPT to make learning more interactive.
3. Feedback and Revision	Offers feedback on written assignments, helping students revise and improve their work.
4. Improvement of Writing Skills	Helps enhance foreign language writing skills by detecting and correcting errors in sentences.
5. Teacher-like Assistance	Acts as a virtual teacher, providing detailed explanations and examples on various topics.
6. Natural Language Interaction	Enables students to engage in dialogue and conversations using natural language.
7. Enhanced Learning Experience	Provides a more enjoyable and effective learning experience in foreign language education.

6. Methodology

In this study, a qualitative content analysis of educational documents was conducted. This analysis entailed a systematic and in-depth examination of a diverse range of educational materials. Additionally, a thematic literature review was carried out to assess relevant academic sources. Qualitative content analysis was chosen as the primary method because of its effectiveness in systematically evaluating and interpreting textual information. The study might be limited by its dependence on existing documents, and by potential researcher bias in interpreting the data.

6.1. Data collection

The literature review entailed an analysis of previously conducted studies. Relevant academic journals, conference papers, theses, and books were searched, and previous research on similar topics was examined. This literature search process served as the basis for establishing the theoretical framework of the research, and for identifying existing knowledge gaps.

The document analysis involved using reports, guidelines, and scholarly articles, with attention to source credibility and currency, guided by specific inclusion and exclusion criteria. A document was included if it was peer-reviewed and met the following criteria:

- It scrutinises the specific pedagogical applications of artificial intelligence in foreign language education, with a focus on ChatGPT.
- It investigates the practical impact of ChatGPT in enhancing language learning outcomes in education settings.
- It delves into the potential for ChatGPT to provide personalised language support.

- It evaluates the challenges and opportunities in integrating ChatGPT as a supplementary tool in the foreign language classroom, considering factors such as learner engagement and teacher support requirements.

In addition to academic literature, screenshots from direct interactions with ChatGPT were also included as primary source data.

6.2. Data analysis

In the data analysis phase, documents were closely reviewed, and content analysis was used to categorise and code the information. This helped to pinpoint key concepts tied to the research goals, and to interpret the findings in line with those objectives.

The coding and classification structure of study:

- a) ChatGPT in Foreign Language Learning:
 - Code A: Usage and potential in language education
- b) ChatGPT in Education:
 - Code B: General impact and applications
 - Code C: Benefits and opportunities
 - Code D: Challenges

7. Results and discussion

7.1. The use of ChatGPT in education

The advent of artificial intelligence in education, marked by the introduction of AI-supported chatbots such as ChatGPT, has ignited substantial interest and exploration from educators and students alike. Based on a review of current literature, AI-powered chatbots like ChatGPT are found to offer multiple benefits to both educators and students.

As an individual education guide, ChatGPT has the potential to bridge gaps in learning by providing personalised support to students. This can be particularly effective for students who may need additional help outside of classroom hours, enabling learning at their own pace and convenience. Moreover, ChatGPT can facilitate the creation of texts suitable for different learning levels, thereby providing a more tailored learning experience (The Centre for Learning, Teaching, and Development, 2023). According to Ausat et al. (2023), when considering ChatGPT's role in education, it is important to recognise that such technology serves merely as a tool and cannot fully substitute the comprehensive role of a teacher.

ChatGPT stands out from other AI chatbots due to its superior performance in creative tasks (Aktay et al, 2023). For teachers, ChatGPT can serve as a robust research assistant, facilitating the preparation of lesson plans based on specific pedagogical goals, generating test questions, and developing interactive quizzes. It can also enhance the learning experience by helping in the creation of engaging and interactive materials, such as storyboards for gamified learning activities (The Centre for Learning, Teaching, and Development, 2023).

7.2. The role of ChatGPT in foreign language education

In the realm of foreign language education, ChatGPT emerges as a potential game-changer. It can serve as a writing assistant, translation aid, and dialogue creator, transforming the learning experience into a more interactive and engaging process. ChatGPT can be particularly useful in the creation of texts, dialogues, and sentences in a foreign language, thereby helping students improve their language skills (The Centre for Learning, Teaching, and Development, 2023).

Moreover, it can provide personalised language support, enabling students to learn and practice a foreign language at their own pace. By creating texts suitable for different levels, ChatGPT can provide content that is tailored to each student's proficiency level. AI-powered chatbots like ChatGPT have the potential to play a significant role in foreign language education by improving writing skills, acting as virtual teachers, generating exercises, enabling natural language interactions, and enhancing the overall learning experience. Baskara and Mukarto (2023) argue that ChatGPT can enhance learners' language abilities, efficacy, and bolster their learning motivation.

7.3. Challenges relating to the use of ChatGPT

The introduction of ChatGPT in education has brought about significant discussions regarding its application. Understanding its capabilities, limitations, and implications is crucial for leveraging its advantages. While ChatGPT can be a powerful educational tool, educators should be aware of its limitations. For instance, it may generate incorrect or misleading information, however, Kohnke et al. (2023) remind us that the quality of answers is linked to asking the right questions. Proper use of ChatGPT will reduce the likelihood of incorrect responses.

On the other hand, there is a risk that students may over rely on it for completing assignments, thereby stifling the development of critical thinking skills. Students who experience limited human interaction may miss out on the opportunity to establish emotional connections and develop social skills.

Ethical violations that may arise in the academic field due to ChatGPT are another concern. Turnitin can now distinguish texts written by artificial intelligence; this could lead to a cycle of detection and avoidance without addressing the problem of ChatGPT's ethical use or the issue of its unoriginal responses that lack citations and may verge on plagiarism (Kohnke et al., 2023).

8. Conclusion

AI-supported chatbots like ChatGPT, are becoming an integral part of education and are reshaping it. Their integration into educational practices, as noted by Rahman and Watanobe (2023), enhances accessibility and provides innovative ways to engage with complex material. ChatGPT, in particular, benefits educators in lesson planning, and students in language acquisition, with studies indicating improved engagement and academic achievement (Aktay et al., 2023). Yet, its implementation must be approached with caution, addressing concerns about information accuracy and reliability.

Further research is needed to explore the long-term impact of ChatGPT in education, its broader potential, and its effective integration into teaching. The advancement of such technologies necessitates bolstered digital literacy among educators and students, alongside a curriculum that supports technological adeptness. Lastly, ethical use and data privacy are paramount in the deployment of AI in educational settings, requiring awareness and education on handling AI tools responsibly.

Ethical statement

The study does not require ethical permission.

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