



Incorporating AI Tools into Comprehensive Language Learning Platforms: Strategies and Implications

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Abstract

AI technology is advancing rapidly, becoming an important tool in education, especially in language learning. Traditional language teaching methods often use a one-size-fits-all approach, which may lack engagement and fail to meet individual learning needs.

This study focused on how AI tools, particularly large language models (LLMs), improve language learning by offering personalized lessons, real-time feedback, and interactive practice. It aimed to explore the effectiveness, benefits, and challenges of AI in language education, as well as ethical concerns and potential future developments.

The research involved reviewing over 30 academic sources, with a focus on AI technologies such as natural language processing, image recognition, and audio recognition. Key AI tools, including GPT-4, Duolingo, and virtual reality (VR) applications, were analyzed to understand their role in enhancing traditional teaching methods.

The use of AI tools has been shown to increase learner engagement and offer flexible, personalized learning paths. This customization has been particularly beneficial in boosting learner motivation, pronunciation, and conversation skills. Combining AI technologies with traditional education methods results in a more practical and personalized approach to language learning, helping learners strengthen foundational skills while promoting active language use.

Ethical issues, such as data privacy and fairness, play a significant role in the responsible implementation of AI in education. These considerations must be addressed to ensure AI tools are used effectively and ethically in language learning environments.

Keywords/tags (subjects)

Keywords: Language learning application, Artificial Intelligence (AI), Educational technology, EdTech, Chatbots for language practice, Advanced Personalization, Contextual Understanding, Real-time Translation and Communication, Adaptive Learning Systems, Emotional and Social Intelligence.

Miscellaneous (Confidential information)

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1 Introduction

People have different abilities to understand and learn new information, even if they are given the same content. Those who can relate the material to things they already know, or past experiences usually learn better than those who cannot make such connections. Lacot et al. (2017) conducted a study and discovered that "neither familiarity nor recollection appeared fully preserved" when individuals were asked to recognize single items (p. 87). This suggests that certain brain structures play a key role in these memory processes. Their findings emphasize the need to better understand how the brain processes information and how it learns. Recognizing how different parts of the brain contribute to learning and memory is important for improving our knowledge of how the brain works, especially in relation to education and cognitive development.

As AI systems become more advanced, human learning still depends greatly on the brain's ability to process and understand information. Even though AI can provide help, it is important to remember that learning depends on how the brain naturally works. Macpherson et al. (2021) explain that "recent advancements in computing power, along with the development of large-scale neural imaging techniques, have enabled researchers to collect vast amounts of data on brain activity and behavior" (p. 606). However, despite these advancements, AI systems are still limited when compared to the complexity of brain networks. Although AI has made great progress, it is still far from fully copying how the brain works on different levels, from small connections between neurons to the large networks in the brain (Macpherson et al., 2021, p. 608). It shows that, although AI can assist with analyzing data and running simulations, it still struggles to fully replicate the brain's complex functions. Even with recent advancements in technology, the brain's ability to combine and make sense of complex information remains essential and cannot be completely replaced by AI.

As AI technology continues to improve, it becomes increasingly effective at managing simple, everyday tasks. This allows humans to dedicate more time to complex problems that require deeper thought and creativity. By taking care of routine activities, AI enables people to focus on tasks that demand critical thinking and decision making. This shift not only enhances efficiency but also encourages individuals to use their skills in more meaningful ways. As Karapantelakis et al. (2024) explain, "the shift will necessitate the application of techniques

that incorporate critical thinking abilities, including reasoning and planning" (p. 1). In other words, while AI assists with processing information and providing quick feedback, it is still essential for learners to actively engage their critical thinking skills. This involves analyzing information, reasoning through ideas, and making informed decisions. By developing these skills, students can interact more meaningfully with AI tools, using them not just for instant answers but to deepen their understanding and solve problems effectively. Critical thinking allows learners to make better use of AI, enhancing their overall learning experience and applying knowledge in more impactful ways.

While learning a language still requires human effort, AI can provide instant support by simplifying information processing and making the learning journey smoother. The real value of AI is in complementing human thinking, not replacing it. AI manages simpler tasks, allowing the brain to focus on more complex reasoning, decision making, and analysis. As AI continues to evolve in educational settings, critical thinking remains crucial for maximizing its benefits.

A key method used in AI is called the Chain-of-Thought (CoT) approach. It involves making a set of steps to help the AI think through problems. These steps are like a "chain of thought" that guides the AI when it faces complex tasks (Karapantelakis et al., 2024, p. 5). By breaking down difficult tasks into smaller parts, the CoT method allows AI models to solve problems more like humans do. This means that students can use AI tools not just to get quick answers, but also to gain a deeper understanding of the topics they are studying and to develop their problem-solving skills.

In physics, inertia refers to the tendency of an object to resist changes in its motion. This means that more force is needed to get a stationary object moving than to keep it moving once it has started. Similarly, when the human brain encounters new information, it takes more time and effort to understand something unfamiliar, just like overcoming inertia. Just as it takes energy to move an object, the brain needs extra effort to process new ideas before they become easier to understand. Liao et al. (2008) suggest that human thinking tends to rely on past experiences and knowledge when facing new challenges. People often apply what they already know to solve new problems, assuming that things will stay the same until an external factor forces a change (p. 184). In other words, the brain relies on what it already knows to approach new challenges, which can make learning something new more difficult until change is forced by new circumstances. Because of this inertia in how the brain works,

AI can help by providing tools and support to make learning new information easier and faster for people.

In education, teachers often struggle to understand why some students learn quickly while others face difficulties. These differences can be due to several factors, such as a lack of interest, trouble focusing, or the way the material is taught. According to Al-Okaily et al. (2024), some professors do not fully recognize the differences among students and may not feel motivated to offer each one a valuable learning experience (p. 7). When teaching does not consider each student's motivation and attention levels, it can negatively affect their success. Another issue is that students may struggle when they do not have enough background knowledge or context to understand new ideas. Sweller (2024) explains that experts can perform much better than beginners because they do not have to deal with complex information that demands high mental effort. For beginners, the same information feels very complex and creates a high cognitive load. This means that learners unfamiliar with new concepts face a heavier cognitive load, which makes it harder for them to understand and apply new information.

AI can help solve these challenges by offering personalized learning experiences that adapt to each student's needs. While teachers may find it difficult to pinpoint what specific areas students struggle with, AI tools have the ability to track and analyze these learning patterns more effectively. By identifying gaps in understanding and adjusting lessons accordingly, AI can provide targeted support where traditional methods might not succeed. This is especially important in subjects like language learning, where frequent and efficient practice is necessary for improvement. As Nowrozy and Jam (2024) note, "AI-driven educational tools were found to possess the potential to support students in developing critical skills such as problem solving, creativity, and adaptability" (p. 3). These tools can adjust lessons to match each student's skills. This makes sure that students get the right balance of challenges and assistance to achieve their learning goals. AI can resolve these issues because it offers personalized and adaptive learning experiences for each student.

Finally, motivation is a key factor in how well students learn. Feng and Xiao (2024) highlighted that "motivated students learn better and help teachers teach more effectively" (p. 1). Changing teaching strategies to boost student enthusiasm can lead to better learning outcomes. When motivation is low, students often perform poorly. Understanding what

students enjoy and adjusting lesson plans to match their preferences can improve performance and make them more open to learning new things.

As seen in Figure 1, modern classrooms have changed significantly from the traditional, teacher-focused setup. AI tools now have a big part in learning by giving instant feedback and customized exercises.



Figure 1 A student using virtual reality (VR) glasses to study.

AI has great potential to address these challenges. It can offer accurate feedback and help identify the reasons behind a student's performance. Using AI, teachers can see why students are having troubles and change their teaching methods to help. AI can also make learning more engaging by presenting content in ways that match student preferences, making it easier for them to understand. Chen (2025) explains that "entertainment social media based on deep learning and interactive experience can effectively improve students' learning interest and motivation in the English e-learning teaching system" (Chen, 2025). In addition,

Wu et al. (2024) noted that “these large language models (LLMs) have demonstrated a strong ability in quickly adapting to new tasks (like automatic grading) with little or no training data” (Wu et al., 2024). This ability allows AI to handle tasks like grading and giving feedback efficiently, which supports student learning.

AI’s potential goes beyond just assessments. It is currently being used for personalized learning, interactive simulations, natural language explanations, and techniques to improve memory. These advancements have already improved learning outcomes and will continue to do so. This thesis addresses the following three questions:

Question 1: How does AI affect traditional teaching and learning? This question explores how AI is changing language education and highlights its essential, supportive role alongside traditional methods.

Question 2: Which AI technologies are used in language teaching and learning? This question explores how AI is applied in language education, helping us understand its development and impact over time. It highlights how AI tools are evolving to improve language learning methods.

Question 3: What is the future of AI in language learning? This thesis explores how AI could change language education by providing customized lessons, improved feedback, and new ways to practice, making learning more effective and accessible.

This work provides an overview how AI is used in language learning. After the introduction, Section 2 explains the methods applied to select the right studies. Section 3 looks at the literature on traditional language teaching and explores how AI contributes to personalized learning, interactive simulations, and understanding language, with a focus on memory improvement. Section 4 presents the findings and discusses how AI is changing language learning, pointing out both the benefits and challenges. Finally, Section 5 summarizes the conclusions and offers recommendations for further exploration, helping readers understand how AI is shaping language education.

2 Methodology

This thesis explores how artificial intelligence (AI) is used in learning languages. The research looks at how AI technology is applied in education, especially in tools and applications for

language learning. The study follows a scoping review method, which helps gather and analyze information from different sources. This approach is based on the guidelines suggested by Levac, Colquhoun, and O'Brien (2010) and Arksey and O'Malley (2005), which provide a structured way to explore a wide range of studies and data on this topic.

The research started by searching for the term "AI in language learning" in databases such as ScienceDirect, arXiv, and Google Scholar. This search gathered 40 research papers published between 2023 and 2024. These papers were reviewed to explore how AI is being used in education, especially for language learning, and its practical uses.

Next, a thorough review was conducted to identify important topics. The topics covered included traditional methods of teaching languages, the impact of AI in education, and how learning can be personalized for each student. It also looked at interactive activities that make learning more engaging, adaptive learning methods that change based on student needs, and the basics of natural language processing. Additionally, the use of AI to help improve memory and various strategies to keep students motivated were discussed. This process focused the study on 28 papers that specifically looked at how AI is used in language learning.

The selected papers were further analyzed to explore personalized learning and AI-based tools that adapt to individual learners' needs. This work provided insights into AI-driven developments in language education and highlighted the differences between AI-based and traditional teaching methods.

This work gives a look at the latest trends in using AI for teaching languages, along with insights into practical applications and potential future advancements. A PRISMA Flow Diagram (see Figure 2) visually summarizes the review process, illustrating the progression from an initial set of 40 papers to the final selection of 28 relevant papers, detailing the screening, eligibility, and inclusion stages (Page & Moher, 2017).

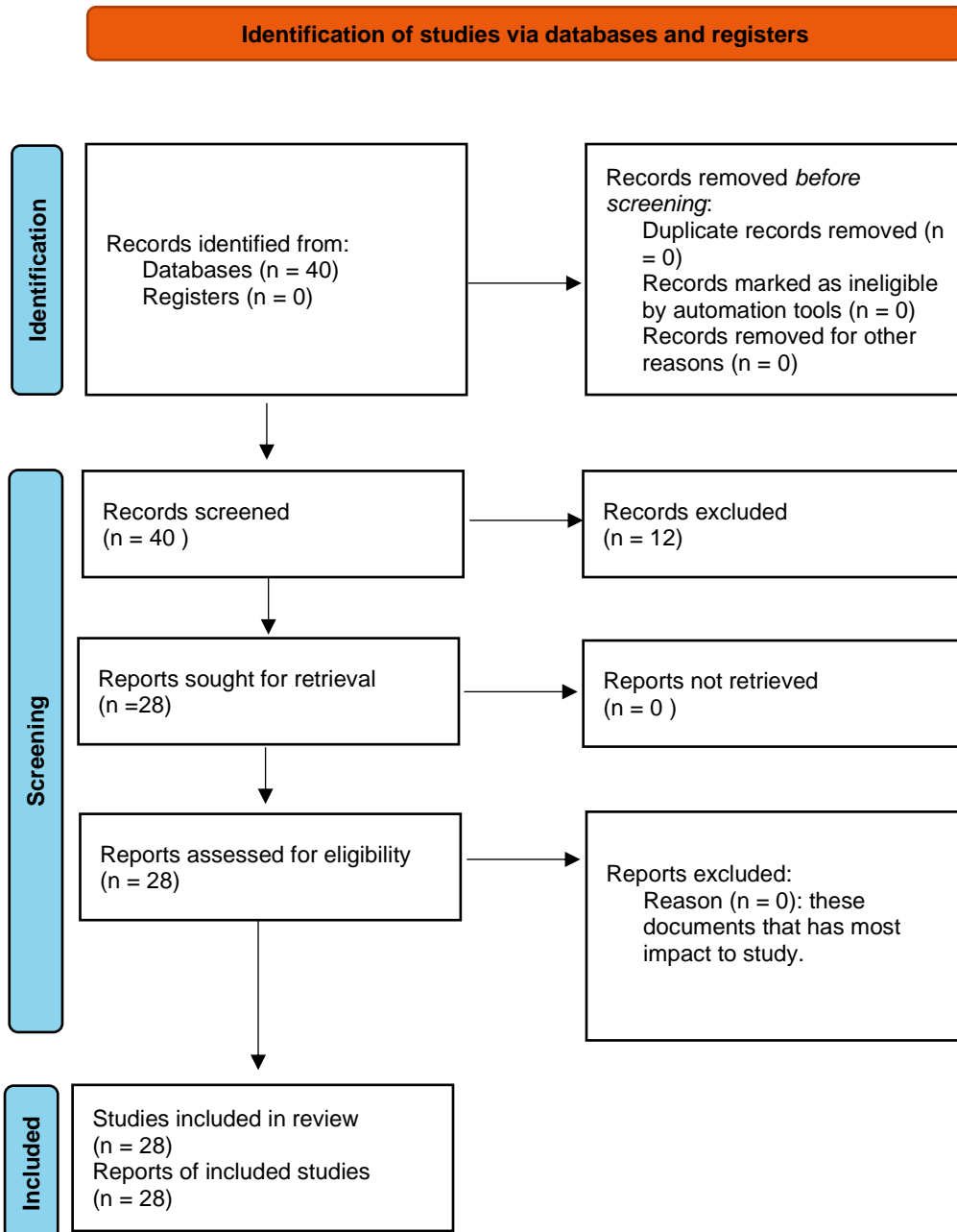


Figure 2 PRISMA Flow Diagram outlining the systematic selection process of literature from an initial dataset of 40 studies to 28 key papers on AI in language learning.

3 Literature Review

3.1 Language Education: From Traditional Methods to AI-Driven Solutions

Traditional ways of teaching languages have mainly focused on grammar rules and translation exercises. Larsen-Freeman and Anderson (2011) explain that the Grammar-Translation Method has been used by language teachers for a long time, originally known as the Classical Method because it was first applied to teaching Latin and Greek (p. 32). This method supports

students to write sentences correctly but provides limited opportunities to practice speaking in everyday situations. Its important goal is to help them read literature in the target language (Larsen-Freeman & Anderson, 2011, p. 37). However, because of its focus on grammar, students often struggle to apply the language in conversations.

In contrast, the Direct Method focuses on listening and speaking by using the learning language, without any translations. According to Larsen-Freeman and Anderson (2011), this method has a basic rule: no translation is allowed. The Direct Method is named because it focuses on helping learners understand the language, they are studying without using their native language. It uses demonstrations and visual aids instead of relying on the students' first language (p. 46). This approach gives learners more practical experience, but it can be hard for beginners. It also requires skilled teachers to explain new ideas clearly.

Another method, the Audio-Lingual Method, focuses on repeating sentence patterns to reinforce grammar and improve speaking. Larsen-Freeman and Anderson (2011) note that "The Audio-Lingual Method drills students in the use of grammatical sentence patterns" (p. 59). While this approach helps improve pronunciation and fluency, it relies heavily on memorization, which can limit natural language use and make lessons feel repetitive.

The Silent Way lets students take control of their learning with only a small amount of input from the teacher. Larsen-Freeman and Anderson (2011) suggest that in the Silent Way approach, teachers collaborate with students, while students actively engage with learning the language (p. 100). This method fosters independence, but it may not be suitable for students who need more guidance.

Lastly, Desuggestopedia focuses on lowering psychological barriers to learning through relaxation and positive suggestion. According to Larsen-Freeman and Anderson (2011), "In Desuggestopedia, more of the students' mental powers must be tapped. This is accomplished by desuggesting the psychological barriers learners bring with them to the learning situation" (p. 110). While this approach can create a low-stress learning environment, its psychological techniques can be difficult to apply consistently across different classrooms. The following table provides an overview of various language teaching methods, highlighting their strengths and weaknesses. It aims to give readers a clearer understanding of each method's effectiveness in different educational contexts.

Table 1 Strengths and Weaknesses of Traditional Language Teaching Methods

| Teaching Method | Strengths | Weaknesses |
|----------------------------|---|---|
| Grammar-Translation Method | Focuses on grammar accuracy and reading skills | Lacks focus on real-life communication, can be disengaging |
| Direct Method | Improves speaking and listening by using the target language directly | Challenging for beginners, limited grammar focus, hard to use in large classes |
| Audio-Lingual Method | Helps develop fluency and pronunciation through repetition | Overemphasizes memorization, lacks real-life language use, feels mechanical |
| Silent Way | Promotes independent learning and student autonomy | Requires skilled teachers, may not suit all learners |
| Desuggestopedia | Reduces mental barriers through relaxation and positive thinking | Challenging to implement effectively in all contexts, depends on psychological techniques |

Transition to AI

As shown in Table 1, each traditional method has its strengths, but they also share weaknesses, especially in promoting real-world communication, keeping students engaged, and meeting individual learner needs. These limitations offer a chance for artificial intelligence (AI) to significantly improve language learning. AI can make learning more personal and interesting by adapting to each student's skill level. It offers instant feedback and makes the learning process more interactive. The next section will explore how AI helps overcome these challenges, making language learning more flexible, engaging, and effective.

3.2 Role of AI in education

Traditional teaching methods such as the Grammar-Translation Method, Direct Method, and Audio-Lingual Method have their advantages, but they often struggle to help students

practice the language in everyday situations (Larsen-Freeman & Anderson, 2011). These methods tend to focus more on grammar and memorization rather than meaningful communication or practical language use (Larsen-Freeman & Anderson, 2011). Additionally, they have difficulty adapting to the individual needs of students. This is where artificial intelligence (AI) becomes useful in improving education, especially in language learning.

AI-powered tools, such as chatbots, offer personalized learning experiences that can address the weaknesses of traditional methods. Cao et al. (2023) propose using four distinct chatbots with specialized roles: the Instructor Bot for teaching, the Social Companion Bot for interaction, the Career Advising Bot for career guidance, and the Emotional Supporter Bot for providing emotional support. This shows how AI can enhance both the learning and emotional sides of education, which traditional methods often miss.

AI chatbots do more than just support students. They can also create new ways of teaching. As Cao et al. (2023) state, "Notably, chatbots are not only supportive tools; when powered by advanced language models such as GPT-3, they can drive pedagogical innovation" (p. 2). With GPT-3, AI chatbots can engage in interactive conversations, giving learners the chance to practice speaking and writing in more dynamic and interesting ways compared to traditional methods.

In addition to academic support, AI also offers emotional and motivational assistance, helping to keep students engaged and reduce their stress. For example, the Emotional Supporter Bot is made to recognize and help with students' feelings by giving personalized support and encouraging messages (Cao et al., 2023, p. 2). This kind of support is especially helpful for language learners who may feel anxious or lack confidence.

AI also provides real time, personalized feedback. Cao et al. (2023) highlight that "LLM [Large Language Models] is capable of providing accurate and human such as responses to student questions" (p. 4). This allows learners to receive specific feedback as they progress, helping them stay motivated and improve their language skills more effectively.

AI driven tools such as AI tutors and chatbots give personalized learning experiences that can address many of the problems with traditional teaching methods. According to Frankford et al. (2024), "The potential of AI-driven tools in enhancing the learning experience, especially in programming, is immense" (p. 1). While their study focuses on programming, these ideas also

work well in language learning. AI can provide specific feedback and guidance that traditional methods may not offer.

For example, large language models (LLMs) such as GPT-3.5-Turbo or GPT-4 (Frankford et al., 2024) can recognize various types of student errors and provide more personalized feedback. Frankford et al. (2024) note that these models can identify a wide range of student mistakes and offer specific guidance beyond simple unit test feedback (p. 1). This kind of detailed feedback is particularly beneficial in language learning, where students often face challenges with grammar, pronunciation, or comprehension, and need clear, context-based support to improve.

Traditional teaching methods often focus too much on memorization, leading to repetitive lessons that do not help students develop real-world communication skills. In contrast, AI gives quickly feedback, helping students know their mistakes immediately and learn better. As Frankford et al. (2024) explain, "A key lesson learned is that the AI-Tutor exhibits the capacity for real-time, personalized feedback provision" (p. 6). This instant feedback keeps students engaged and helps them apply what they learn in practical situations, something that is more difficult to achieve with traditional approaches such as the Grammar-Translation Method.

Additionally, students tend to favor AI systems that provide detailed, specific feedback. Frankford et al. (2024) found that "students preferred more context-specific feedback pointing directly to improvement areas in the code" (p. 5). In the context of language learning, this means AI can offer guidance on specific areas such as verb tenses, sentence structure, or vocabulary. This type of focused feedback helps students learn more quickly and effectively compared to traditional classroom methods, which often offer more general feedback that may not address individual learning needs.

AI also allows for a more flexible and adaptive environment. Frankford et al. (2024) describe two types of learners using AI-driven feedback: "We identified two user personas: (1) Continuous Feedback - Iterative Ivy, who relied mainly on AI feedback before final submissions to APAS, and (2) Alternating Feedback - Hybrid Harry, who alternately used the AI-Tutor and APAS submissions throughout the process" (p. 5). These personas show how

different students can use AI in ways that fit their personal learning styles, something that traditional methods struggle to achieve.

Recently, AI has learned to identify and understand things such as objects, sounds, and images without needing many detailed instructions. This opens up new possibilities for AI in language learning. For instance, models such as AudioMAE and PaSST classify and recognize sounds using spectrograms (visual representations of sound) and learn patterns from large datasets such as AudioSet to identify sound events (e.g., dog barking, cat meowing). Another model, PANN, processes sound directly in its original form. These models show how AI can convert sensory data into something understandable, which could be applied to language learning (Ngo & Kim, 2024, p. 4).

Building on the role of AI in education, the following table presents a summary of student feedback on AI tutoring. This feedback was collected from students who used the AI system in their software engineering courses. While some students recognized the potential of the AI tutor, others felt it lacked personalized and detailed responses, viewing it as still in the early stages of development. Many students expressed a desire for more specific and context-aware feedback in future versions, as well as improvements in interactivity and the inclusion of concrete examples. The feedback highlights the need for further development and refinement of AI tutoring systems. Responses were measured using a Likert scale, where -3 indicated "strongly disagree," +3 indicated "strongly agree," and 0 represented a neutral position. This scale was used to evaluate student perceptions of the AI tutor's usability and effectiveness. The table below summarizes key findings, adapted from Frankford et al. (2024).

Table 2 Summary of student feedback on AI tutoring

Note: Responses were measured using a Likert scale, where -3 indicated "strongly disagree," +3 indicated "strongly agree," and 0 represented a neutral position

| Feedback Aspect | Average Sentiment (Likert Scale) | Key Observations |
|---|-------------------------------------|------------------|
| The AI Tutor is easy to use. | 1.29 | Somewhat Agree |
| The AI Tutor helps me complete tasks more quickly. | -0.29 | Neutral |
| The AI Tutor enhances my ability to complete tasks effectively. | -0.43 | Neutral |
| The AI Tutor boosts my efficiency. | -0.43 | Neutral |
| The AI Tutor simplifies my tasks. | 0.14 | Neutral |
| Overall, the AI Tutor is valuable. | 0.14 | Neutral |

The results show that students generally found the AI Tutor easy to use, as shown by their mild agreement with this statement. However, when asked about its impact on productivity, performance, and task completion, most responses were neutral or slightly negative. This suggests that students were unsure about how useful the AI Tutor was in these areas. Many students didn't know if it helped them complete tasks faster or improve their performance (Frankford et al., 2024).

In their feedback, students mentioned a few main problems with the AI Tutor. One issue was that the responses were too general and did not provide specific help for coding problems. Students also felt frustrated because the system had limited interactivity, especially since they couldn't ask follow-up questions or review previous feedback after closing the window. Many students also wanted the AI to provide clear examples, such as code snippets, to make its suggestions easier to understand. Some students were concerned that using the AI Tutor too much might stop them from developing their own problem-solving skills (Frankford et al., 2024).

While students saw the AI Tutor's potential, they felt it was still in an early stage and needed a lot of improvement. They were hopeful for future updates, asking for more personalized feedback, better interactivity, and useful examples to help them learn better. This feedback shows that the AI Tutor needs more work to better meet students' needs (Frankford et al., 2024).

Ngo and Kim (2024) note, "language models (LMs) have been shown to learn representations of perceptual concepts that plausibly mirror the grounded, physical representations of those same concepts" (p. 1). Though their study doesn't focus on education, this AI capability could improve language learning. Common methods such as Grammar-Translation and Audio-Lingual focus on learning rules and memorizing, which makes it hard to apply the language in practical situations. In contrast, AI can link perceptual concepts, such as sounds or images, with text, offering a more hands-on learning experience. By using AI models in teaching, teachers can help students link what they learn in theory to use in practice.

Ngo and Kim (2024) explored six language models and three audio models, including GPT-2 and LLaMA, to understand how these models align with audio data. Although not directly focused on language learning, their study showed that AI models can generalize and understand sounds in ways that suggest potential for language learning. This ability to process complex sensory data could help create more interactive learning environments, mimicking real-world communication. Traditional teaching methods often rely on repetition and lack flexibility, but AI can provide more flexible and active learning experiences.

In the study by Ngo and Kim (2024), the researchers used Procrustes analysis to compare language and sound representations in different categories, like human voices, domestic

sounds, animals, and music. They represented language with triangles (using BERT, Devlin et al., 2019) and sound with circles (using PaSST, Koutini et al., 2021). This analysis showed clear similarities between the two types of data, especially in the music category. The alignment of language and sound suggests that these models can handle and connect both text and sound data well.

Notably, Ngo and Kim (2024) also found that language models could generalize to new sound classes that were not part of the training data, showing better than random results with both acoustic and auditory data (p. 1). These findings highlight AI's ability to manage complex data. These capabilities can be useful in language learning, where combining sound and text can create a more engaging and interactive learning experience for students.

Additionally, AI technology is also showing promise in generating multi-sensory content, such as representing sounds based on text input. As language models evolve to encode sounds related to objects, even when trained only on text, this opens more immersive content that blends text and sound. Ngo and Kim (2024) discuss how methods such as contrastive probes align audio and text representations, suggesting that language models can represent sounds and other sensory concepts such as color and size. These advancements could help AI create more dynamic learning environments that connect abstract concepts to real-world sensory experiences, benefiting language learners.

In recent years, AI technologies, particularly multimodal AI, have demonstrated promising solutions for enhancing traditional educational methods by creating more engaging and adaptive learning experiences. Lee et al. (2023) explains that 'the idea of multimodality in AI for education heralds a synergistic confluence of various sensory channels and cognitive strategies to enhance teaching-learning and assessment' (p. 1). By integrating auditory (hearing), visual (seeing), and kinesthetic (physical movement) methods, AI can engage multiple senses at once, making learning more interactive and effective. This use of different types of AI can support traditional teaching methods by offering helpful visuals, interactive activities, and immediate feedback. This makes learning more engaging for students.

Moreover, Lee et al. (2023) highlights that multimodal AI applications could help pave the way for advanced AI systems, known as Artificial General Intelligence (AGI), in education (p. 3). By combining multimodal AI with traditional teaching methods, it could provide more

variety in learning strategies, catering to different learning styles and preferences. While traditional methods, such as the Direct Method, focus on improving speaking and listening, AI's ability to use both visual and auditory tools can enhance these methods by giving students personalized support to understand new concepts more easily.

Recent developments, such as Google's Gemini, are made to easily handle various forms of media, such as text, pictures, videos, sounds, and programming code (Lee et al., 2023). This enables AI to provide real-time feedback and create interactive activities, helping students engage more actively in their learning. These developments are particularly helpful for teaching methods that aim to reduce mental barriers to learning, such as Desuggestopedia. By using multiple forms of media, AI creates a more personalized and supportive learning environment, which helps lower student stress and improves their overall learning experience.

Artificial intelligence (AI) is providing major solutions to problems in education. Holmes et al. (2019) show that while AI is expected to improve things significantly, many people still do not fully understand how much it will affect education. AI can give personalized, real-time feedback, which traditional teaching methods often cannot do. This is important because the skills and knowledge that students need to do well in today's world are changing. AI can help education adapt to these new needs (Holmes et al., 2019).

AI is also creating new ways of teaching and learning. As it becomes more common, it is necessary for teachers and policymakers to understand how to use AI effectively. Holmes et al. (2019) emphasize that AI in education is one of the first efforts to guide teachers and policymakers through this new era. As AI keeps shaping education, it is likely to greatly affect both the content we teach and the ways we help students get ready for their future jobs (Holmes et al., 2019).

3.3 Large Language Models

In the early days of artificial intelligence (AI), many systems used a rule-based approach for language learning. These systems followed fixed, prewritten rules to perform tasks such as correcting grammar mistakes and building vocabulary lists. For example, according to Ma et al. (2020), tools such as Chinese Grammatical Error Correction (CGEC) were developed to automatically correct grammatical errors based on strict language rules. By using specific

linguistic rules, developers were able to build large datasets to train these systems. While rule-based systems were effective for basic tasks, they had limitations. They were not flexible enough to handle new situations or more complex language structures without additional programming. As Ma et al. (2020) point out, a "long-term lack of high-quality annotated training corpora hinders many data-driven models from exercising their capabilities on the CGEC task," meaning that rule-based systems struggled to address more complicated errors found in real-life language use.

A significant challenge for rule-based systems is that language is always changing. New words, meanings, and sentence structures emerge constantly, making it difficult for these systems to keep up. Every time language changes, new rules need to be added, which increases the system's complexity and makes it harder to maintain. These systems also lack the ability to give personalized, adaptable feedback that is important for effective language learning, as they cannot easily adjust to individual learners' needs or handle nuanced language contexts.

Large language models (LLMs), such as GPT-4, are major improvements in AI technology, and they have fundamentally changed the way we learn languages. Earlier AI systems relied on strict rules to process language, which made them limited and inflexible. In contrast, GPT-4 and similar models learn from a large range of different information. This training helps them give answers that are not just more accurate but also better suited to real-life situations. According to the GPT-4 Technical Report, "GPT-4 outperforms both previous large language models and most state-of-the-art systems... demonstrating strong performance in other languages" (OpenAI, 2023, p. 2). This capability allows GPT-4 to handle complex language features that are common in everyday conversation, like idioms, cultural nuances, and complicated sentence structures—things those older systems often found challenging. By understanding these elements, GPT-4 provides learners with a more natural and realistic language experience.

How LLMs work

The mechanism behind large language models (LLMs) such as GPT-4 is based on predicting the next word in a sentence by using probability. In other words, these models analyze the words that came before to make the best guess about what comes next. The more data these models are exposed to, the better they get at making accurate predictions. This ability is

especially useful in language learning because it helps the model create more natural and smooth text over time. As OpenAI (2023) explains, "GPT-4 is a Transformer-style model pre-trained to predict the next token in a document, using both publicly available data and data licensed from third-party providers" (p. 2). This means that the model relies on a wide variety of sources to learn about language.

For LLMs, performance generally improves with larger datasets and more complex models, as they can recognize and produce more natural language. However, simply increasing the model size is not enough; the quality of the data is also important. If a model becomes too large but is trained on lower-quality data, it might make more errors or produce less accurate responses.

New models like GPT and Gemini also use this probability-based method to predict the next word. They learn patterns by analyzing vast amounts of text, which helps them understand how words are usually structured in sentences. Research indicates that well-trained models like these often perform as well as or better than traditional methods, particularly in managing large datasets efficiently and producing coherent language.

In today's AI-driven world, large language models like GPT-4 are becoming essential tools for learning, particularly in language education. Traditional approaches, such as the Grammar-Translation Method and the Audio-Lingual Method, have been in use for many years. While these methods provide a foundation in vocabulary and grammar, they often struggle to meet each learner's unique needs or to offer immediate feedback. As a result, students may find it challenging to stay engaged or apply what they learn in real-life conversations.

In contrast, GPT-4 brings a new level of adaptability and responsiveness to language learning. According to OpenAI (2023), GPT-4 "exhibits human-level performance on various professional and academic benchmarks" (p. 1), which means it can handle complex language tasks and understand context much better than traditional methods. GPT-4 provides real-time support, adjusting to the learner's input and helping them understand and use language more naturally. This flexibility allows learners to receive instant feedback, ask questions, and practice in a way that feels more interactive and personalized. By making learning more interesting and customized to fit each person's needs, GPT-4 improves the language learning journey, helping students advance and boosting their confidence in their skills.

Moreover, GPT-4 has shown a stronger ability to understand difficult or confusing prompts, which is very useful in language learning where learners often use complex or unclear language. This is an improvement over GPT-3.5, as GPT-4 has “increased accuracy by 19 percentage points across all topics” (OpenAI, 2023, p. 10). This means GPT-4 can answer learners' questions more accurately and adapt to different levels of language complexity, providing answers that are clearer and more relevant to their needs. This improvement makes it easier for learners to receive helpful responses, whether they are beginners or more advanced in their language skills.

GPT-4's ability to reduce hallucinations—meaning incorrect or made-up facts—makes it a more dependable tool for education. OpenAI explains that “our mitigations on hallucinations improve performance on factuality as measured by evaluations such as TruthfulQA, increasing accuracy to around 60% compared to 30% for an earlier version” (OpenAI, 2023, p. 15). This big drop in errors is crucial for language learners, who rely on correct information to build their skills. When learners receive more accurate responses, they can trust that the AI is helping them learn correctly, which boosts their confidence and understanding over time. This reliability also supports teachers and educators who use AI tools like GPT-4 to provide clear and factual guidance in language learning and other subjects.

Safety is a crucial consideration when using AI in education. With each new version, AI tools are getting better at minimizing risks related to harmful or inappropriate content. GPT-4 has made significant progress in this area. For instance, on the RealToxicityPrompts dataset, GPT-4 produces harmful or inappropriate content only 0.73% of the time, a major improvement compared to GPT-3.5, which generated such content 6.48% of the time (OpenAI, 2023, p. 16). This improvement makes GPT-4 a safer and more reliable option for students and teachers, helping ensure that the content it creates is appropriate and safe for use in any educational environment. By reducing these risks, GPT-4 supports a positive and secure learning experience, making it a valuable tool in educational settings.

With these advancements, GPT-4's interactive platforms are changing how we learn languages. Students now have access to learning environments that use various types of media, which makes the process more dynamic and enjoyable. For example, GPT-4 can take prompts that include both images and text. This means that learners can give tasks that involve both visual and language elements (OpenAI, 2023, p. 9).

This capability makes learning more engaging and interactive. Instead of just reading or writing text, students can work with pictures, videos, and real-life examples. For instance, a student might learn a new word by seeing a picture that represents that word or by watching a short video where the word is used in context. This variety in learning methods helps students connect the language they are learning with real-world situations, making it easier for them to remember and use the language later (Wang, 2024).

Additionally, using different media helps cater to different learning styles. Some learners might study better through visuals, while others may prefer text or audio. By integrating multiple types of content, GPT-4 creates a richer learning experience that can keep students motivated and excited about their language studies. Overall, these interactive features are helping to create better and more enjoyable ways to learn languages.

In summary, GPT-4 has made significant improvements that enhance its ability to know and use to language, making it a powerful tool for education, especially in learning languages. This model is more adaptable than earlier versions, allowing it to adjust to the needs of individual learners more effectively. GPT-4 provides better results by delivering responses that are not only accurate but also consider the context, ensuring that the answers are relevant and helpful.

OpenAI states, “GPT-4 significantly reduces hallucinations relative to previous GPT-3.5 models” (OpenAI, 2023, p. 9). This means that GPT-4 is less likely to give incorrect or misleading information. As a result, learners can trust that they are receiving reliable and timely support as they work on their language skills. Overall, GPT-4’s enhancements make it a valuable resource for students, helping them to learn more efficiently and effectively (Jia & Tu, 2024).

Large language models (LLMs), such as GPT-4, offer a new and interesting method for learning languages (Fan, Gong, & Gong, 2023). Unlike traditional textbooks, which provide fixed information, LLMs are flexible and can adapt based on what the learner inputs. They give instant responses and useful feedback, which helps create the learning process more interactive and enjoyable.

With LLMs, learners can engage in real conversations with AI models rather than just repeating the same exercises. These AI models adjust to the learner’s language level, correct

mistakes in real time, and offer examples that fit the context of the conversation. This approach helps make learning feel more practical and similar to how people communicate in the real world (Wang, 2024).

As Minaee et al. (2024) explain, "LLMs exhibit stronger language understanding and generation abilities, and more importantly, emergent abilities... including in-context learning." This means that LLMs can modify their answers based on the ongoing interaction and examples provided during the conversation. Because of this, LLMs are very effective at creating personalized learning experiences that mirror real-life communication. Overall, LLMs enhance language learning by offering a dynamic and supportive environment where learners can practice and improve their skills effectively.

Large language models (LLMs) learn from extensive collections of text that cover not just grammar and vocabulary but also various situations, dialects, and cultural aspects. As Millière (2024) explains, "LLMs are capable of processing bounded hierarchical phrase structures and recursion in a naturalistic context" (p. 26). This means they can simulate a wide variety of real-world situations. This ability helps learners practice language in settings similar to everyday communication, making it easier for them to use what they learn in real life. For example, a learner can ask an AI model to simulate conversations in a restaurant, at work, or while traveling. This gives them a more practical and deeper understanding of the language than traditional grammar exercises alone. The capability to understand and apply language in context is a major advantage that AI offers over traditional teaching methods.

In traditional classrooms, feedback is often slow and aimed at the whole class rather than meeting each student's individual needs. For example, Desuggestopedia focuses on lowering psychological barriers, but it does not provide immediate, personal feedback. LLMs, on the other hand, give fast, personalized feedback. They can quickly find and fix mistakes in grammar, sentence structure, or word use. This helps learners improve more quickly and avoid repeating errors. LLMs adjust to the learner's skill level, giving more difficult material as they improve. This is different from the same approach for everyone used in traditional methods. Although LLMs have made great progress, they still have limits when it comes to fully modeling how humans learn languages (Vázquez Martínez et al., 2024).

3.4 Personalized learning

Personalized learning adapts content to fit each learner's needs. In language learning, AI programs such as Duolingo provide personalized exercises that adapt to what the user needs. Xu et al. (2024) explain that Duolingo uses information from learners to create exercises that fit their skill level and learning speed (p. 4). Unlike traditional methods, this personalized approach makes sure learners get content that matches their skill level. To improve the experience for each person, personalized AI models consider user details (e.g., individual information and past behavior) and adjust to meet their specific needs (Yu-Min Tseng et al., 2024, p. 3). In the same way, Wu et al. (2024) introduce a system called Personalized Prompt-based Recommendation (PPR) that helps provide better suggestions by using information from existing models, without needing to fully re-train them (p. 3).

Duolingo also provides instant feedback, which is a major advantage over traditional classrooms where feedback is often delayed. Xu et al. (2024) highlight that AI systems can "retrieve exercises relevant to that input" in real time, allowing learners to improve immediately (p. 2). This makes learning more flexible compared the fixed, one-size-fits-all methods used in traditional courses. Additionally, LLMs can offer "step-by-step explanations in the Socratic teaching style, answer questions on technical subjects, and automatically summarize lectures to enhance learning experiences" (Yu-Min Tseng et al., 2024, p. 3).

Duolingo and other AI-powered tools use large language models (LLMs) to improve learning. According to Xu et al. (2024), Duolingo uses systems such as multilingual Hypothetical Exercise Retrieval (mHyER) to better match learner input with the exercises provided. Similarly, Wu et al. (2024) explain that PPR helps pull out more useful and personalized information from pre-trained models using prompt-tuning. To create effective personalized prompts, Wu et al. (2024) add that they "rely on important and informative details about the user. "Despite its benefits, AI-based learning has some limitations. Xu et al. (2024) mention that while Duolingo can offer customized content, it lacks the emotional intelligence and motivation that human teachers provide. LLMs also show potential in therapy, giving "personalized responses and emotional support based on what users say" (Yu-Min Tseng et al., 2024). However, relying too much on AI could result in missing out on important conversational skills that come from human interaction.

Looking forward, Duolingo and similar apps will continue to improve personalized learning. Xu et al. (2024) predict that future AI will enhance features like retrieval methods, gamification, and possibly virtual reality to create more engaging and interactive learning experiences (p. 9). In recommendation systems, PPR shows promise, especially in cases where there is limited data, as Wu et al. (2024) point out that PPR (light) is efficient with parameters, requiring only a few to be adjusted and saved compared to full fine-tuning (p. 6). Additionally, "in prompt-oriented contrastive learning, we hope PPR can distinguish whether two user representations learned from augmented prompt-enhanced sequences derive from the same user" (Wu et al., 2024, p. 6). These advancements may offer a more immersive experience than traditional classrooms.

3.5 Interactive simulation

Interactive simulations are digital tools created to mimic real-life situations, allowing learners to actively participate in experiences where they need to use the target language. These simulations make learning more practical by enabling students to role-play tasks like ordering food at a restaurant, asking for directions, or navigating a train station. By practicing these scenarios, learners engage in a more hands-on way, building confidence as they try out phrases and responses they would use in real conversations. For example, Qiu and Lan (2024) explain how role-playing can be used in fields like counseling to simulate conversations, which could be adapted for language learning to create similar situations like asking for directions or making purchases in a store (p. 1).

Additionally, recent advances in AI and generative models have expanded what these simulations can achieve. Sherry Yang (2023) notes that 'Generative models trained on internet data have revolutionized how text, image, and video content can be created' (p. 1), which opens new possibilities for language learning simulations that are more immersive and detailed. This means learners can practice language in settings that feel closer to real life, enhancing both their understanding and their comfort with using the language in daily situations.

AI improves interactive simulations in many ways. AI chatbots and virtual characters let learners practice speaking and listening in a safe environment. According to Qiu and Lan (2024), tools like virtual counselors "generate professional responses using integrative techniques," making them easy to adapt for language practice (p. 1). Additionally, AI can

examine how learners respond and give immediate feedback on their pronunciation, grammar, and vocabulary. Sherry Yang (2023) notes that AI systems can use large language models to evaluate conversation quality, providing real-time analysis of what learners say (p. 4). This quick feedback helps learners fix mistakes and develop their language skills more effectively.

Interactive simulations offer numerous benefits for language learners. A key advantage is the safe environment they provide, where learners can practice without fear of making mistakes in front of others, which helps build confidence. Qiu & Lan (2024) note that simulations can "imitate real-life user profiles," creating a more authentic and personalized experience (p. 2). These simulations also incorporate cultural elements, helping students not only know the language but also the culture behind it. Taking part in these simulations helps learners remember vocabulary and phrases better. Learners can go through the simulations at their own speed, creating a more personalized learning experience.

Many platforms now use AI tools to make language learning more enjoyable and effective. For instance, Rosetta Stone uses speech recognition technology to help learners practice pronunciation in realistic conversations, giving them instant feedback to improve their speaking skills (Rosetta Stone, n.d. [no date], accessed November 10, 2024). Duolingo offers short, interactive lessons where learners practice vocabulary and grammar with AI characters that respond immediately, making learning more fun with a game-like approach (Duolingo, n.d., accessed November 10, 2024). Busuu combines AI lessons with a social learning experience, where users can practice language skills through structured lessons and practical exercises. They can also get feedback from native speakers, creating a more interactive and community-based way to learn (Busuu, n.d., accessed November 10, 2024). Babbel uses a similar game-like approach, focusing on interactive dialogues and exercises that place learners in everyday situations, such as ordering food or asking for directions. This helps learners become more comfortable using the language in real-world situations (Babbel, n.d., accessed November 10, 2024). In virtual reality, platforms like ImmerseMe and ENGAGE allow learners to practice language skills in immersive 3D environments. These environments look like real-world places, such as restaurants or marketplaces, helping learners build confidence as they use the language in realistic scenarios (ImmerseMe, n.d., accessed November 10, 2024; ENGAGE, n.d., accessed November 10, 2024). Additionally, AI chatbots like Replika simulate real-life conversations, giving learners a chance to practice speaking and

comprehension. Replika provides instant feedback and corrections, helping users improve their conversational fluency and feel more confident in their language skills (Replika, n.d., accessed November 10, 2024).

In conclusion, AI-based interactive simulations are transforming language learning. They enhance learning process more engaging and personalized for each student. These simulations create realistic and personalized learning experiences that help students practice language in ways that feel closer to real-life situations. As Sherry Yang (2023) points out, 'AI-generated simulations are nearly visually indistinguishable from the real world,' which means that learners can immerse themselves in virtual environments that closely resemble real-life settings (p. 3). For example, students might practice ordering food in a virtual restaurant or asking for directions in a simulated city. This kind of practice helps learners feel more confident and prepared to use the language in actual conversations outside of the classroom.

As technology continues to improve, these simulations are expected to play an even more essential role in language education, supporting learners in mastering new languages faster and more effectively. AI-powered simulations bring real life situations into virtual learning situations. This makes learning a language more practical and fun. This approach allows learners to not only understand the language but also feel ready to use it confidently in everyday life.

3.6 Future Directions and Ethical Considerations in AI-Driven Language Learning

As AI technology continues to improve, it brings new, exciting ways to help people learn languages. AI can create customized learning environments that keep students focused and allow them to practice skills more effectively. Learning a language depends on the brain's natural ability to recognize patterns, remember words, and understand grammar rules. While AI cannot directly 'place' knowledge in a person's mind, research shows that AI tools can increase learners' motivation and confidence, which are crucial for retaining and using a new language over time. AI can make the learning experience feel more personal by adapting lessons to fit each learner's needs, strengths, and challenges. For instance, if a student struggles with certain vocabulary or grammar, AI can provide extra practice in those areas. This personalized support can help learners remember language skills better and feel more confident as they progress. Over time, with continued practice and support, AI can help

learners build a stronger foundation in the language, making it easier for them to use it in real-life situations (Jia & Tu, 2024).

One exciting application of AI in language learning is real-time translation and interpretation. Imagine a tool that provides quick translations or helpful hints during a live conversation in a different language. This feature allows learners to engage with the language directly, rather than just memorizing vocabulary and grammar rules out of context. Research shows that learning language in real-life situations helps people retain words and phrases more effectively, as they actively use them in meaningful ways. For example, as Fan, Gong, and Gong (2023) state, "ChatGPT can effectively enhance students' second language acquisition efficiency" (p. 49), helping learners practice language more naturally, as they would in everyday situations.

AI's instant support is valuable because it keeps learners focused on the conversation without requiring them to mentally translate each word or phrase. Since AI can "enter human contexts and understand human language" (Fan et al., 2023, p. 50), it enables learners to stay engaged and follow along with the conversation smoothly. This continuous flow lets learners focus more on expressing themselves rather than getting distracted by frequent translations. As learners hear and practice new words in real-life situations, they are more likely to remember them and feel confident using them.

Additionally, AI makes this approach even more effective by offering personalized help. For instance, it can create "customized learning plans for students" based on each person's needs, helping to target specific language challenges and enhance learning outcomes (Fan et al., 2023, p. 50). By adapting to the learner's progress and providing relevant exercises, AI helps students practice more effectively and build language skills faster. This personalized, context-driven support means that learners can improve not only their vocabulary but also their fluency, making language learning both engaging and practical.

Another useful feature of AI is that it can create personalized learning paths. It can monitor each student's progress, identify areas where they have difficulties, and quickly provide exercises to help with specific skills. For example, if a student struggles with verb conjugation, AI can instantly offer exercises and feedback to help them improve. As Fan, Gong, and Gong (2023) explain, 'ChatGPT can assist teachers in teaching according to their aptitude,

customize personalized learning plans for students and improve teaching pertinence' (p. 49). This focused practice helps students learn faster than they would with a single, standard approach for everyone.

Ethics and privacy are important factors to consider as AI becomes more widely used in education. AI-driven tools often gather and analyze personal data to create customized learning experiences, including information on each student's progress, strengths, and challenges. According to Fan, Gong, and Gong (2023), there is a need for strong data protection and transparency to make sure that data is gathered and used in a responsible way. They also warn of ethical risks like data leakage, bias, and academic integrity concerns, highlighting the importance of clear guidelines and secure data practices so that students and parents can feel confident their information is safe.

Another ethical concern is fairness and bias in AI algorithms. Since AI systems learn from large sets of data, they can inherit any biases present in that data, which may lead to uneven support for all learners. Fan, Gong, and Gong (2023) note that using a variety of balanced data sources can reduce these risks, making AI tools more neutral and objective. They also emphasize the importance of following ethical standards in AI design to ensure high-quality, reliable outcomes that serve a diverse range of students fairly.

AI tools are becoming valuable for language learning by offering interactive experiences that allow learners to practice the language in situations that resemble real life. Virtual reality (VR) and augmented reality (AR) are especially useful in this area, as they can recreate environments like restaurants, shops, or city streets, encouraging students to use specific words and phrases relevant to each setting. This way, learners don't just memorize vocabulary, but actively use language in realistic, everyday situations, which makes it easier to remember. As Wang (2024) explains, VR technology creates highly realistic and engaging learning spaces that boost student involvement and understanding (p. 174). When learners practice language in these realistic environments, they make connections between words and real-life experiences, which helps the language stick in their memory. The more they practice in such settings, the more likely they are to remember and confidently use these words and phrases in real conversations.

As AI technology continues to advance, developers are focusing on making these tools even more responsive to students' emotions and engagement levels. Modern AI systems can recognize signs of frustration, boredom, or excitement, which allows them to adapt their content and pace to keep students engaged and motivated. For instance, if a learner feels frustrated or stuck, the AI can slow down, provide extra hints, or offer encouragement to help the student move forward. By tuning in to each learner's emotional responses, AI tools create a more personalized and supportive experience that keeps students feeling positive about their language learning journey. This emotional responsiveness makes AI tools more adaptable to the needs of each learner, enhancing their overall learning experience and helping them stay motivated (Jia & Tu, 2024).

In conclusion, these advancements illustrate how AI can support the brain's natural learning processes by providing engaging, realistic practice environments. When paired with traditional language learning, AI offers a balanced approach that helps learners build foundational skills while enhancing their practical communication abilities. With the increasing role of AI in education, it should be noted to balance innovation with ethical use. Protecting student privacy, ensuring fairness, and addressing emotional needs will help make AI a trusted and effective educational tool (Jia & Tu, 2024).

4 Findings and Discussion

The findings show that, even though traditional language teaching methods have some weaknesses, they are still important for building a strong foundation in language learning. Teaching methods, like Grammar-Translation, Direct, and Audio-Lingual, emphasize learning grammar rules, memorizing, and practicing repeatedly to help students understand language structure well (Larsen-Freeman & Anderson, 2011). However, these methods often lack engagement and practical application, making it difficult for students to transition from theoretical knowledge to real-world communication. The lack of interactive activities and personal attention in traditional methods can slow progress and lower motivation, especially in larger classrooms where students get less individual feedback.

AI-driven tools offer a valuable complement to traditional methods by addressing these specific weaknesses. Rather than replacing traditional approaches, AI improves how students learn by making the process more lively, adjustable, and attentive to each individual's needs. A key benefit of AI is that it can give instant, personalized feedback, which is hard to do in a

regular classroom (Frankford et al., 2024). With AI, learners can receive instant corrections and guidance during practice exercises, which helps them improve faster and retain information more effectively. This personalized feedback helps students strengthen their grammar skills learned from traditional methods and gives them a chance to practice using it in real conversations.

Another strength of AI in language learning is its ability to engage students through interactive simulations, which traditional methods often lack. AI-powered platforms can create real-life situations where learners can practice speaking and listening skills in a safe and controlled environment. This is particularly helpful for learners who may struggle with anxiety or lack confidence when using the language in practical situations. Using AI tools, learners can practice real communication in a safe way, without worrying about making mistakes in front of others, which helps build their confidence in real conversations (Cao et al., 2023).

In addition to its academic support, AI also plays a role in addressing the emotional and motivational aspects of learning. Traditional methods usually focus on mental learning, often ignoring the emotional challenges students face, like anxiety or low motivation. AI-powered support bots can help by offering encouragement and emotional support, making learning less stressful and more motivating (Cao et al., 2023). By providing both mental and emotional support, AI helps students stay engaged and motivated during their language-learning journey, while still using the structure of traditional methods.

In summary, while traditional methods are crucial for building a solid foundation in language learning, they can benefit from the support of AI tools. AI can fill in the gaps by providing real-time feedback, personalized learning experiences, and emotional support, helping learners apply their foundational knowledge more effectively in practical communication. The following table shows how traditional learning methods compare to AI-driven solutions. Traditional methods are reliable but often less adaptable and engaging. AI solutions, on the other hand, offer personalized, interactive, and supportive learning experiences.

Table 3 Traditional vs. AI Learning Methods

| Aspect | Traditional Methods | AI-Driven Solutions |
|-----------------------|---|--|
| Engagement | Can be repetitive and less engaging (Larsen-Freeman & Anderson, 2011) | Provides interactive, real-world scenarios that increase engagement (Cao et al., 2023) |
| Personalized Learning | One-size-fits-all approach, limited individual attention (Larsen-Freeman & Anderson, 2011) | Offers personalized learning paths and adaptive content (Frankford et al., 2024) |
| Feedback | Delayed or generalized feedback (Larsen-Freeman & Anderson, 2011) | Delivers real-time, tailored feedback for immediate improvement (Frankford et al., 2024) |
| Emotional Support | Focuses mainly on cognitive learning, lacking emotional support (Larsen-Freeman & Anderson, 2011) | Provides emotional support bots to reduce anxiety and boost motivation (Cao et al., 2023) |
| Practical Skills | Emphasizes grammar and theory, less on conversation (Larsen-Freeman & Anderson, 2011) | Simulates real-world communication to improve practical skills (Frankford et al., 2024) |
| Limitations of AI | AI-generated feedback is sometimes too generic, hindering progress (Frankford et al., 2024) | Relying too much on AI for feedback can be unhelpful without more adjustments (Frankford, 2024). |

The advancements in AI that form the foundation of large language models like GPT-4 has changed the way we learn languages, offering a more advanced and adaptable alternative to traditional rule-based systems. Older AI systems relied heavily on fixed rules, which made them struggle with changing contexts and complex language inputs. As Ma et al. (2020) noted, these systems lacked flexibility, especially when faced with new phrases or evolving sentence structures. Unlike these earlier systems, GPT-4 and other LLMs bring adaptability and a deeper understanding of context to language learning, allowing learners to interact with AI that can recognize and respond to the nuances of language. OpenAI (2023) highlights

that GPT-4 performs well across different languages and tasks, handling idioms, cultural references, and complex grammar that rule-based models often could not manage.

LLMs like GPT-4 also offer learners a flexible and personalized learning experience, providing real-time feedback and interactive simulations that adjust to each individual's needs. This real-time feedback lets learners know immediately if they are on the right track, making language practice more effective and engaging. According to OpenAI (2023), GPT-4 can understand a wide range of user inputs, improving the quality of language practice by creating responses that feel natural. Additionally, improvements in reducing "hallucinations," or inaccurate outputs, make GPT-4 more reliable for educational settings than earlier AI models (OpenAI, 2023).

Platforms like Duolingo and Rosetta Stone have adopted these interactive and AI-driven features, creating learning environments that feel more engaging and practical. For example, Duolingo uses real-time feedback, gamification, and speech recognition to make language learning both fun and educational. Xu et al. (2024) explain that Duolingo tailors exercises to fit each learner's level, giving instant feedback to help learners improve effectively. Similarly, virtual reality environments like ImmerseMe and ENGAGE simulate real-life situations, allowing learners to practice language in realistic settings, such as a restaurant or marketplace (ImmerseMe, n.d.; ENGAGE, n.d.).

While LLMs bring many benefits, such as enhanced understanding of language and real-time response, they still have limitations. Vázquez Martínez et al. (2024) point out that these models have yet to fully capture the complexities of human language learning, which includes understanding subtle emotions, cultural nuances, and the dynamic flow of real conversations. Despite these challenges, the personalized and flexible features of LLMs address many of the weaknesses of traditional language learning methods, which often rely on delayed feedback and one-size-fits-all instruction. To provide a clearer summary, the following table presents key findings and discussions from the study of LLMs in language learning:

Table 4 Traditional Rule-Based Systems vs. Large Language Models (LLMs)

| Aspect | Traditional Rule-Based Systems | Large Language Models (LLMs) |
|-----------------|---|---|
| Flexibility | Rigid, based on fixed rules and limited to predefined language tasks (Ma et al., 2020) | Highly flexible, adapts to various contexts and handles complex language inputs (OpenAI, 2023) |
| Feedback | Feedback is often delayed or generalized, particularly in large classroom settings (Xu et al., 2024) | Provides real-time, personalized feedback tailored to the learner's input (Xu et al., 2024) |
| Error Handling | Struggles with handling complex errors or evolving language usage (Ma et al., 2020) | Capable of correcting errors in real time, with improved factual accuracy and reduced hallucinations (OpenAI, 2023) |
| Engagement | Limited engagement, often based on repetitive grammar and translation exercises (Vázquez Martínez et al., 2024) | Interactive simulations with multimedia elements create an engaging learning experience (Sherry Yang, 2023) |
| Personalization | One-size-fits-all approach, difficult to adapt to individual learners (Vázquez Martínez et al., 2024) | Offers personalized learning paths and adjusts content based on the learner's performance (Xu et al., 2024) |

AI technology brings many valuable benefits to language learning by providing personalized and realistic practice experiences. Tools like real-time translation and virtual reality (VR) give students a chance to engage directly with language in real-world scenarios, such as virtual marketplaces or conversations with AI, which makes learning more practical and memorable. This hands-on approach helps learners connect language to everyday situations, improving both memory and practical language skills (Fan, Gong, & Gong, 2023; Wang, 2024).

In addition, AI can also adjust to meet each student's individual needs. It can monitor how well a student is doing and offer exercises that focus on the areas where they need more practice. AI can also recognize signs of frustration or enthusiasm, adjusting its pace or content to match the learner's emotional state, which creates a supportive and motivating

environment (Jia & Tu, 2024). These features make AI a powerful tool for personalized learning, helping students stay engaged and build confidence as they practice language in meaningful ways.

However, as with any technology, using AI in education comes with ethical responsibilities. Issues like data privacy, fairness in AI algorithms, as well as any unintended errors need to be addressed. AI often collects personal data to create tailored learning experiences, so it's essential to keep this information secure. AI developers must also work to make sure AI tools treat all students equally, providing fair learning opportunities for everyone, regardless of background.

When combined with traditional learning methods, AI provides a balanced and effective approach to language education. Traditional methods build foundational skills in grammar and structure, while AI adds an engaging and practical layer that helps students apply what they've learned in real-life settings. Together, these methods make language learning both comprehensive and enjoyable, preparing students with strong basics and real-world skills they can use confidently. The table below shows how AI helps in language learning by adding personalized support, real-life practice, emotional awareness, and balanced learning. It also points out some important ethical concerns for safe and fair use.

Table 5 Future Directions and Ethical Considerations in AI-Driven Language Learning

| Aspect | Key Points | Supporting Sources |
|---------------------|--|---|
| Personalization | AI tracks progress, provides targeted exercises, and boosts motivation and confidence. | Jia & Tu, 2024; Fan, Gong, & Gong, 2023 |
| Real-World Practice | Real-time translation and VR simulate realistic scenarios (e.g., marketplaces) to connect language to real-life us | Fan, Gong, & Gong, 2023; Wang, 2024 |
| Emotional Response | AI recognizes learners' emotions, adjusting pace/content to keep students engaged and positive. | Jia & Tu, 2024 |
| Ethical Concerns | Privacy, fairness, and bias in data need attention to ensure a safe and fair learning experience. | Fan, Gong, & Gong, 2023 |
| Balanced Learning | AI complements traditional methods, enhancing foundational and practical language skills. | Jia & Tu, 2024 |

5 Conclusion

In conclusion, both traditional methods and AI-driven tools play valuable roles in language learning. Traditional methods establish a strong foundation in grammar and structure, essential for understanding the basics of any language. However, these methods often lack the engaging, personalized, and immediate support many learners need to stay motivated and confident. Without these elements, students may find it difficult to apply what they learn to everyday situations, as traditional approaches tend to emphasize rules over real-world usage. By contrast, AI tools—especially advanced models like GPT-4—bring new possibilities to language learning. They offer personalized learning experiences, with tailored exercises that address each learner's unique strengths and weaknesses. Additionally, AI provides real-time feedback, enabling learners to correct mistakes immediately and stay on track.

Interactive simulations also allow students to practice language in realistic scenarios, making learning more enjoyable and relevant. This practical method helps learners develop skills they can use confidently in real-life conversations. However, AI does have limitations; although it

can offer tailored feedback, this feedback sometimes feels too generic or standardized, lacking the depth and nuance a human teacher might provide. Since AI relies on patterns from vast amounts of data, it may not fully capture the personal touch that helps some learners connect more deeply with the material.

Using both traditional methods and AI-driven tools creates a balanced approach to language learning. Traditional methods build a strong foundation in key areas such as grammar, vocabulary, and sentence structure, which are essential for mastering a language. At the same time, AI adds flexibility, making learning more interactive and engaging. AI tools let students practice in practical, real-world scenarios, helping them gain confidence and use the language more naturally. This blend combines the stability of traditional teaching with the modern, hands-on practice that AI provides, resulting in a more effective learning experience.

Together, traditional methods and AI tools provide a well-rounded approach to language learning. While traditional methods offer a solid base in grammar and language structure, AI enhances the experience with personalized and practical elements. This helps learners get a clear and complete understanding of the language and improves their skills in communicating in daily life.

AI technology has unique strengths that help keep students engaged. It can adapt to each student's specific needs, track their progress over time, and even respond to their emotional states. For instance, if a student feels frustrated or bored, AI can adjust the pace or offer different activities to maintain interest and motivation. This personalized attention makes the learning experience more supportive and effective.

Additionally, tools like real-time translation and virtual reality (VR) create immersive and realistic environments for practicing language as learners would in daily life. VR, for example, can simulate settings like restaurants or markets, allowing students to use language in practical situations. This hands-on practice helps learners retain new words and phrases more effectively and apply what they've learned when they need it. In summary, this balanced approach mixes the dependable nature of traditional teaching methods with the flexibility and engagement of AI. This combination offers a complete and useful way to learn.

With the growth of AI in language learning, it's important to think about ethical concerns to make sure it is used fairly and responsibly. One primary concern is data privacy. AI tools often

collect information about students to personalize learning, so it is essential to keep this data secure to protect students' privacy. Another important issue is fairness; AI systems should provide equal learning opportunities to all students, regardless of background. However, because AI learns from large datasets that may contain unintentional biases, there is a risk of unfair treatment for some students if these biases are not carefully managed.

Although AI tools are powerful and offer many benefits, they work best alongside traditional teaching methods. Traditional teaching provides structure and foundational knowledge, while AI brings adaptability and engagement, making the learning experience more complete. As AI technology continues to evolve, it holds great potential to become more natural and human-like. Future advancements may allow AI to better understand emotions, social cues, and cultural context, making language learning even more engaging and connected to students' everyday lives.

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