Research article

Leveraging Artificial Intelligence for English Reading: Taking ChatGPT as an Example

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ABSTRACT

Artificial Intelligence has wide-ranging potential in the field of education. This research primarily focuses on the applications of ChatGPT as an example in reading learning and teaching. Its affordances are reflected in providing online answers and interactions for learners, understanding the meanings of words, stimulating cognitive associations with words, analysing word families, exploring word origins, aiding in grammar and syntax analysis, and performing simple sentence translations. Artificial intelligence can assist teachers in adjusting the content of reading materials, creating personalised reading materials, and designing comprehension tests. However, Artificial Intelligence should also be regulated to avoid potential challenges of inaccuracy in specific areas, interpreting culturally loaded information, and increasing students' learning over-reliance on AI.

Keywords: Artificial Intelligence; ChatGPT; English reading; affordances; challenges

Introduction

With China's growing ties with the international community, English has become particularly important as a globally accepted language. Therefore, English learning usually includes four main aspects: listening, speaking, reading, and writing. Among them, reading is one of the essential components, aiming to improve students' reading comprehension skills and help them understand and analyse English texts. Cummins (2000) pointed out that the development of reading skills plays a crucial role in helping students move beyond basic interpersonal communication skills and acquire higher levels of cognitive academic language skills, such as comparing, categorising, evaluating, and making inferences(Cumming, 2015). Reading is also the foundation for an active and fulfilling life in all areas of society, including politics, community, and the arts(Amiama-Espaillat & Mayor-Ruiz, 2017). It also contributes to the development of lifelong learners and critical thinkers, as competent readers have a vast arsenal of strategies that are intrinsically motivating and actively engaged(Alexander et al., 2012).

The "College English Syllabus" in China prioritises reading and listening skills before speaking, writing, and translating, indicating that the intake of language materials is crucial for language proficiency(Zhang & Yang, 2019). However, there is a noted preference for listening over reading among Chinese ESL learners, which can be a misconception as reading is fundamental to developing listening skills, and 60% of the learners do not read due to the limited vocabulary and reading interests, 41% of them use handwriting to copy new words instead of embracing new technology(Youdao &Chinadaily, 2019).

University English reading learning still adopts the traditional learning method of word-by-word and sentence-by-sentence explanation of translation by the teacher(J. Hu & Wu, 2020; Yang, 2017); the teaching materials are slowly updated and have little relevance to students' interests or specialities. Students' interest in reading is generally low because they struggle to understand long and highly specialised articles, which leads to anxiety(Cao,2020).

The rise of Artificial Intelligence has opened up opportunities in many fields. In education, Artificial Intelligence is used in a wide range of applications, including language learning, assisted reading, automated writing assistance, and more. It provides interesting and interactive tools for education that can improve the learning experience and provide more resources and support for students(Huertas-Abril & Palacios-Hidalgo, 2023). ChatGPT is one typical AI related to advancing neural network models developed by OpenAI, Inc. These models employ deep learning techniques and are pre-trained using large-scale text datasets, which can be fine-tuned for different tasks("GPT-3," 2024). The AI's natural language generation ability is remarkable. The model can smoothly produce coherent conversations, respond to various questions and commands, and complete tasks such as article writing and code generation (Brown et al., 2020).

Recent studies have extensively examined the application of Artificial Intelligence (AI) in English writing(Fitria, 2021; J. Xia et al., 2022; Zhao, 2023, 2023). However, there is a notable gap in research regarding AI's assistive role in enhancing reading comprehension for energy-efficient learning. This study aims to investigate AI's supportive functions in university-level English reading instruction. Specifically, it will examine how AI facilitates English reading, the benefits and challenges of its integration, and potential future developments.

The Application of Artificial Intelligence in English Reading

Artificial intelligence (AI) represents a pre-trained neural network model leveraging deep learning and natural language processing methodologies. AI is trained on extensive textual datasets and demonstrates proficiency in comprehending and generating natural language text(Alqahtani et al., 2023). The model acquires linguistic nuances, syntactic structures, and contextual associations through pre-training, thus attaining robust natural language generation capabilities(Li, 2018). Consequently, AI emerges as a potent tool for natural language processing tasks, particularly adept at engaging in dialogue and addressing queries. In English reading

instruction, AI holds significant promise and utility. It is a supportive tool to enhance learners' comprehension of foreign language texts.

1. Vocabulary learning and comprehension

ChatGPT facilitates the provision of word definitions and illustrative example sentences, which are instrumental in deepening students' comprehension of new lexical items.

ChatGPT's capacity to promptly supply definitions and exemplify usage is evident in its response to queries such as the meaning of 'benevolent'. It articulates that 'benevolent' is an adjective denoting a characteristic of goodwill, kindness, compassion, and a desire to act generously and charitably. Furthermore, ChatGPT can furnish a spectrum of synonyms and antonyms corresponding to the queried term, expanding the learner's lexicon and contrasting related concepts.

For instance, synonyms for 'benevolent' might include 'kind', 'compassionate', 'generous', 'charitable', 'altruistic', 'philanthropic', 'gracious', and 'humanitarian', while antonyms could encompass 'malevolent', 'malicious', 'hostile', 'unkind', 'selfish', 'cruel', 'inconsiderate', 'malignant', and 'inhumane'. These linguistic counterparts provide a more nuanced understanding of the term's connotations and denotations.

Moreover, ChatGPT is adept at interpreting and elucidating colloquial idioms and their contextual usage. An idiom such as "Let's cross the bridge when we come to it" is interpreted by ChatGPT as a directive to address concerns as they arise rather than preemptively worrying about potential issues. This interpretation underscores ChatGPT's ability to demystify idiomatic language and its practical implications.

Beyond common vocabulary acquisition functions, ChatGPT also offers text translation services, which are particularly beneficial for comprehending content in languages commonly studied, such as English to Chinese or Spanish to German. Its translation proficiency is comparable to that of advanced translation engines like DEEPLE and Google Translate.

Additionally, ChatGPT can perform word association tasks by calculating related words or phrases based on word vectors, thereby assisting students in expanding their vocabulary networks. This process is facilitated by constructing word embeddings, which capture semantic relationships within a large text corpus.

ChatGPT further contributes to vocabulary acquisition by analysing word families and etymological exploration. It can elucidate the composition of words and their morphological variations, such as roots, affixes, and derivatives. For example, 'capital' can be expanded into a word family that includes 'capitalise', 'capitalism', 'capitalist', and 'capitalisation', each with its distinct yet related meaning.

Moreover, ChatGPT can provide etymological insights, tracing the historical development and semantic shifts of words, which can be an engaging new method for students to learn and remember new vocabulary. This etymological understanding enriches the students' linguistic knowledge and fosters a deeper appreciation for the evolution of language.

In summary, ChatGPT's role in vocabulary acquisition is multifaceted, encompassing definition provision, example sentence illustration, synonym and antonym identification, idiom interpretation, text translation, word association, word family analysis, and etymological exploration. These capabilities collectively enhance students' linguistic competencies and deepen their understanding of vocabulary within various contexts.

2. Grammar and syntax support

ChatGPT, particularly in the Natural Language Processing (NLP) domain, is endowed with sophisticated grammatical analysis capabilities. ChatGPT's proficiency in syntactic analysis is attributed to its pre-training on extensive textual data, which internalises various languages' grammatical conventions and structural nuances. This training enables ChatGPT to excel in comprehending and generating textual content, thereby facilitating the analysis of sentence structure, grammatical rules, and grammatical relationships.

For instance, consider the following financial statement:

The firm's shares have fallen sharply from their peak of $119 late last year, though at around $74 they remain above the $68 price at which they (or rather, shares in a "variable entity") are trading. shares in a "variable interest entity" linked to Alibaba and registered in the Cayman Islands) were floated last September.

ChatGPT has parsed the sentence in detail as follows:

The main clause is: "The firm's shares have fallen sharply from their peak of $119 late last year."

The concessive clause is: "Though at around $74, they remain above the $68 price."

The phrase "at which they" introduces a relative clause that provides additional information about the $68 price.

The sentence also contains parenthetical information enclosed in parentheses, which clarifies the shares being part of a "variable interest entity" linked to Alibaba. The sentence also contains parenthetical information enclosed in parentheses, which provides clarification about the shares being part of a "variable interest entity" linked to Alibaba, registered in the Cayman Islands, and floated last September.

ChatGPT's capacity to decipher intricate syntactic structures and semantic associations is noteworthy. It can adeptly process convoluted sentences encompassing multiple clauses, modifiers, and subordinate clauses while discerning the interconnections between these elements. The precision and efficiency of AI's understanding can significantly augment the efficacy of educators in lesson preparation and students in their exploration of sentence structure and meaning.

In an academic context, AI's role in syntactic analysis is significant. It offers a robust framework for systematically examining language constructs, thereby contributing to advancing linguistic studies and pedagogy. By automating the parsing of complex sentences, AI can facilitate a more profound understanding of language intricacies, thereby enhancing the learning experience for students and the instructional

strategies employed by educators

3. Generation of authentic language materials

The generation of authentic language materials stands as a pivotal application of ChatGPT within the sphere of language learning. Its capacity to produce genuine linguistic content offers language educators the ability to create realistic language materials, encompassing dialogues, news reports, and reading passages, that can be utilized by learners for study and practical application.

Such materials serve as a conduit for learners to engage in reading comprehension exercises and writing prompts, allowing them to enhance their linguistic competencies through interaction with authentic language content. Providing these authentic materials has been posited to bolster learners' motivation and elevate their overall language proficiency(Baskara & Mukarto, 2023). This exposure to genuine language materials is instrumental in fostering a deeper understanding and more nuanced grasp of the language, which can lead to an increase in learners' intrinsic motivation and proficiency levels.

Moreover, AI's role in language learning extends to supporting educators in customising personalised reading materials and preparing reading comprehension assessment questions. This capability can significantly alleviate educators' workload, allowing them to focus on other critical aspects of the educational process(An et al., 2023).

In essence, AI's capacity to generate authentic language materials holds substantial promise for the advancement of language learning. It enriches the learning experience by providing access to realistic linguistic content and supports educators in their efforts to create tailored learning experiences and streamline assessment processes. The integration of AI in this manner underscores its potential to revolutionise language teaching and learning, offering a wealth of benefits to educators and learners alike.

4. Provide personalised learning opportunities

Technology integration into language learning paradigms has been posited as a catalyst for enhancing learner autonomy. This is achieved through the deployment of personalised learning opportunities that are facilitated by technological tools. Such tools can be tailored to individual learners' unique needs and preferences, thereby providing customised feedback and empowering learners to assume greater control over their educational journey(Blue, 2022).

Personalised language learning support, enabled by technology, is instrumental in fostering a sense of ownership among learners and in nurturing their autonomy(Lee et al., 2024). Artificial intelligence (AI), in particular, has demonstrated an aptitude for adapting to individual learners' diverse language learning styles and delivering personalised feedback(Stojanov, 2023). This capability is pivotal in enhancing learners' language proficiency and bolstering their self-confidence.

Providing personalised learning support and feedback through AI deepens learners' comprehension of English reading materials, broadens their vocabulary, and refines their language application skills. Consequently, this leads to a more efficacious approach to English learning and reading practice. Furthermore, AI can facilitate self-reflection and self-assessment, which are integral components in cultivating learner autonomy(Jin et al., 2023).

Learners are allowed to engage in introspection regarding their language learning progress through interactions with AI(Afzaal et al., 2024). The feedback they receive on their performance enables them to gain a more profound understanding of their strengths and areas for improvement. Such insights can foster heightened self-awareness and encourage a more proactive stance in their learning endeavours.

Additionally, AI can facilitate language practice, a fundamental element in developing language learning autonomy(Woo & Choi, 2021). Interactions with AI provide a safe and non-judgmental environment for learners to hone their language skills(Patty, 2024). This can bolster learners' confidence and encourage them to take risks in their learning endeavours (Son et al., 2023). The instant feedback provided

by AI on learners' performance enables them to learn from their mistakes and make necessary adjustments in real time.

This real-time feedback is instrumental in helping learners develop a sense of control over their learning process and to take ownership of their learning journey. In summation, "Chatbots such as AI have the potential to promote autonomy in language learning by providing personalised language learning support, encouraging self-reflection and self-assessment, facilitating language practice, and providing instant feedback to learners" (Agustini, 2023). These attributes of AI are conducive to fostering a more autonomous approach to language learning, empowering students to navigate their language-learning journey with greater independence.

By cultivating their autonomy, learners are better equipped to thrive in an increasingly globalised world and succeed in their future endeavours. These insights underscore the transformative potential of AI in language teaching and learning, offering a compelling case for its continued integration into educational practices.

Challenges and Counteracts

Despite the potential for artificial intelligence technology to significantly enhance learning efficiency, persistent issues still need to be addressed.

Challenges

1. Limitations of Semantic Understanding

Semantic understanding poses a significant challenge for artificial intelligence (AI) systems, particularly in handling vague or ambiguous statements due to the lack of context-reasoning ability and background knowledge provisioning(Choi et al., 2024; L. Xia et al., 2023). This may result in inaccuracies in their responses. For instance, consider the sentence, "He hit the man with a stick." At the same time, humans can discern between different interpretations based on context. There are two different interpretations of this sentence. However, AI may struggle to do so, often opting for

literal translations without considering contextual nuances. As a consequence, AI-generated translations may lack depth and fail to capture the intended meaning accurately. The sentence is translated as the "he used the stick to hit the man", while another option "he hit the man who was holding a stcik" was missing. This limitation becomes significantly pronounced in longer texts or conversations where context plays a crucial role in interpretation. Consequently, while AI technology has made significant strides in language processing, its reliance on individual sentences hampers its ability to grasp the broader context effectively. Thus, to mitigate potential misinterpretations arising from AI limitations, providing more contexts and offering a complementary approach that integrates human analysis and interpretation remains indispensable in text information processing(W. Yang et al., 2023). In educational settings, learners are advised to contextualise machine-generated interpretations and prioritize contextual understanding over machine-generated translations for accurate comprehension.

2. Accuracy Problems in Specialized Areas

In the realm of professional and sensitive domains, particularly within the legal and medical sectors, the utilisation of artificial intelligence (AI) should be approached with a degree of circumspection and accompanied by a rigorous verification process (Rajpurkar et al., 2022; Kauffman & Soares, 2020). This caution is warranted due to the specialized and highly precise nature of knowledge within these fields. AI systems are predicated on generalized models derived from extensive textual data rather than an exhaustive lexicon of domain-specific terminologies. Consequently, these systems may lack the nuanced understanding of esoteric terminologies, regulatory frameworks, or intricate medical details that are characteristic of such specialised fields.The reliance on AI for problem-solving and decision-making in these fields can potentially disseminate inaccurate or incomplete information. Furthermore, interpreting complex issues within legal and medical contexts often entails legal liabilities and medical risks, which are governed by stringent regulations

and ethical guidelines. AI lacks the moral and regulatory consciousness necessary to ensure its information adheres to these pertinent legal and ethical standards(Chun & Elkins, 2024; Hauer, 2022). Consequently, an overreliance on AI-generated information could precipitate grave repercussions if it results in erroneous legal actions or medical decisions.

In light of these considerations, practitioners within these specialised fields must exercise discretion when integrating AI into their professional practices. A judicious approach that combines the strengths of AI with human expertise can foster an environment that maximises the benefits of AI while mitigating the risks associated with its limitations.

3. Handling Cultural Differences

Understanding the cross-cultural lexicon, phrases, proverbs, and idiomatic expressions with substantial cultural connotations constitutes another pressing challenge(Mohamed et al., 2024). In the realm of less common English and cross-cultural idioms and phrases, artificial intelligence (AI) systems may falter in accurately grasping their nuances(Karakaş, 2023). Furthermore, achieving semantic equivalence between source language and target language, particularly concerning idiomatic expressions, necessitates refinement. Given that idiomatic expressions often encapsulate historical or cultural allusions, AI systems may struggle to discern their deeper connotations directly. Consequently, AI responses may be limited to surface-level interpretations, potentially resulting in incomplete or inaccurate elucidations, particularly regarding the symbolism or contextual usage of idioms. Users may supplement AI-generated responses with additional contextual cues or recourse to authoritative sources for comprehensive explanations to mitigate such limitations.

4. Learning Dependency Problem

Within the realm of education, the use of AI, while boosting productivity, poses

potential risks for learners by promoting excessive reliance on technology over personal growth(Humble & Mozelius, 2022). Notably, learners may tend to rely excessively on AI-driven information acquisition, forsaking traditional accesses such as printed materials, classroom interactions, or expert guidance(Ifenthaler et al., 2024). Consequently, this exclusive dependence may engender a dearth of intellectual diversity and depth in knowledge acquisition(Karan & Angadi, 2023). Moreover, the proliferation of AI poses risks to cultivating innovative thinking and creativity among learners(Marrone et al., 2022). By leveraging AI's generative capabilities, individuals may neglect the cultivation of their creative aptitudes, thereby impeding their autonomy and inhibiting original expression(Habib et al., 2024). Furthermore, the uncritical acceptance of AI-generated responses may foster a misconception of infallibility among learners, overlooking the inherent limitations of AI systems(Karan & Angadi, 2023). Such misconceptions can potentially precipitate misunderstandings and inaccuracies in learning outcomes.

Suggestions

To decrease dependence on a single source of information, educators should encourage students to employ diverse resources, such as books, journals, specialised websites, and expert communication, to acquire comprehensive knowledge. This approach ensures students do not rely exclusively on one source. Additionally, educators should promote cultivating independent critical thinking abilities rather than relying solely on Artificial Intelligence (AI). It is crucial to inform learners about the constraints and applications of AI to foster their ability to analyse the information it generates with discernment. Emphasising the importance of verifying information obtained from AI rather than unquestioningly accepting it further promotes critical thinking. Teachers should provide guidance and supervision to ensure learners fully develop their skills and knowledge while utilising AI.

Conclusion

Educators and learners should adopt a multifaceted strategy to address the potential pitfalls of excessive reliance on AI in education. This approach involves promoting the utilisation of diverse information sources, including printed materials, scholarly journals, and expert consultations, to foster comprehensive knowledge acquisition. Simultaneously, it is crucial to cultivate critical thinking skills, empowering learners to analyse information and navigate complex learning environments independently. By educating learners about the limitations of AI and encouraging discerning use, educators can foster a culture of scepticism and critical evaluation of AI-generated outputs. Emphasising the importance of validation and independent inquiry further reinforces this mindset, promoting intellectual curiosity and a proactive approach to learning. Through ongoing guidance and supervision, educators play a pivotal role in ensuring that learners develop essential skills and knowledge while responsibly leveraging AI tools. This integrated approach ultimately cultivates active engagement and critical thinking skills essential for lifelong learning and success.

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