

Language Learning at the Brink of Singularity: AI's Impact on Educational Paradigms

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Abstract

This comprehensive study investigates the integration of Artificial Intelligence (AI) tools in English language education over 28 weeks from 2023 to 2024. The focus was on utilizing ChatGPT for initial corrections and feedback, DeepL Write for advanced refinements, and generative voice AI for pronunciation practice. This multifaceted approach aimed to exploit the unique capabilities of each AI technology, offering a holistic language learning experience that addresses composition, grammar, sentence structure, vocabulary enhancement, and pronunciation. The methodology was grounded in the practical application of AI tools to facilitate various aspects of language learning, based on the premise that AI can significantly augment traditional teaching methods. The study meticulously evaluated the effectiveness of this integration through participant questionnaires, capturing both qualitative and quantitative insights into learning outcomes. Key findings include a marked enhancement in composition abilities, with 64% of participants recognizing improvement; 72% highlighted ChatGPT's role in facilitating idea generation, sparking new avenues of creativity; 688% reported notable improvements in grammar and sentence structure; an equal percentage observed significant enrichment in vocabulary; 80% appreciated AI-generated feedback; and 76% expressed overall satisfaction with AI integration. These results underscore AI's potential to transform language education by offering personalized learning experiences that adapt to individual learner needs. The findings are pivotal to the discourse on human uniqueness in the age of technological singularity, demonstrating that while AI can replicate and support language skill

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acquisition, human creativity, emotional intelligence, and the ability to convey complex worldviews through language remain unparalleled. The study highlights a synergistic relationship where technology enhances learning outcomes while reaffirming the unique capabilities defining our humanity. Despite AI's advancements, the human ability to embody and express complex worldviews through language remains a testament to our distinct nature, inviting ongoing dialogue on balancing technological innovation with preserving humanistic educational values.

Keywords: AI, ChatGPT, Writing, Pronunciation, DeepL

Background of the Study

In 2009, Trilling and Fadel proposed the concept of 21st-century skills education. In September 2013, Osborne and Frey from Oxford University published a groundbreaking paper suggesting that approximately 47% of 702 professions could be automated within 10 to 20 years due to advances in machine learning and mobile robotics. They pointed out that low-income jobs are at higher risk of automation, whereas high-income and professional jobs require creative judgment and interpersonal skills, making them less susceptible to automation. The utilization of AI, Big Data, and Robotics is considered essential in the Web 3.0 era.

Currently, technological advancements are surpassing the construction of educational methodologies. The evolution of AI, Big Data, ICT, and mobile technologies is notable, with almost all university students owning smartphones and utilizing these technologies. Traditional education emphasized the transmission of systematic knowledge, but modern education is designed through new processes of communication and collaboration using the internet, mobile devices, AI, and Big Data. In this context, promoting “intrinsic motivation” in learning requires emphasizing “collaborative learning” to maximize each learner’s potential. Investigating the changes and educational effects brought by the utilization of AI and ICT is an essential issue (Obari et al., 2022).

Recent technological innovations are driving revolutionary changes in teaching methods and learning processes in English education. This chapter examines the central technological advancements and their integration into English education. Specifically, it explores how technologies like ChatGPT have transformed language learning paradigms.

Natural language processing technologies, such as ChatGPT, provide customized learning experiences tailored to individual learners, significantly evolving traditional educational methods. This technology allows learners to

progress at their own pace and receive instant feedback on individual questions. Additionally, ChatGPT, as a conversational AI, is highly effective for actual conversation practice. Thus, AI enables interactive learning environments both inside and outside the classroom, offering dynamic and participatory educational experiences.

The introduction of this technology also presents educators with opportunities to explore new teaching strategies. Educators can enrich learning content and incorporate diverse educational approaches using AI. For example, using ChatGPT, students can simulate real-world communication scenarios and promote immediate language use.

With technological evolution, English education is becoming more accessible, effective, and tailored to individual needs. However, this progression also presents new challenges, such as digital literacy and mastering new teaching methods. Therefore, it is crucial to maximize the benefits of technology by utilizing it to its fullest potential.

Modern AI technologies are demonstrating significant effects in the field of English education. Particularly, the ability to monitor learners' progress and weaknesses in real-time and provide optimized learning plans based on this data is noteworthy. AI-powered tutoring systems and pronunciation diagnostic tools enable tailored instruction to meet individual learners' needs, achieving effective learning support (Kim & Lee, 2020).

AI models centered around language processing have various applications in English education. Among them, ChatGPT, developed by OpenAI, is particularly notable. ChatGPT is a model based on GPT (Generative Pre-trained Transformer) and can generate responses close to natural human conversation by learning from large volumes of text data. This model excels in text generation, comprehension, and dialogue generation, making it highly valuable for potential use in English education.

For English learners, consistent and immediate feedback significantly enhances learning effectiveness. Using ChatGPT, learners can receive real-time suggestions for correcting grammatical and vocabulary errors in their English writing. Additionally, through natural dialogues, it is possible to support the improvement of learners' communication skills and acquisition of cultural background knowledge.

Furthermore, models like ChatGPT are expected to provide consistent educational support in environments where teachers are not always present and on large-scale online education platforms. This facilitates individualized English learning tailored to each learner's pace. Thus, AI technologies, including ChatGPT, are predicted to become crucial elements for providing more efficient and high-quality learning experiences in the future of English education.

Released in mid-May 2024, ChatGPT-4.0 Omni version is an extended version of ChatGPT-4.0 developed by OpenAI. It supports multimodal input, allowing the inclusion of text, images, and audio. It possesses advanced conversational abilities, maintaining consistency even in prolonged conversations. With an expandable API, it can be customized for various fields, including business and education. Through real-time data access, it provides up-to-date information, making it highly effective in customer service, education, and content generation. It is a next-generation AI technology expected to have diverse applications.

English Education Using ChatGPT and AI

English Education Using ChatGPT 3.5/AI

This study investigates the impact of artificial intelligence tools such as ChatGPT 3.5, DeepL, DeepL Write, and speech synthesis technology on improving the written and spoken English abilities of 25 university students over 28 weeks. The aim of this study was to systematically evaluate the application of AI in a series of tasks aimed at enhancing writing, pronunciation, and presentation skills. These tasks included photo-based essays, bilingual presentations, and regular writing exercises, utilizing AI tools for essay training and auditory support. The students learned how to use engineering prompts with ChatGPT 3.5.

Research Methodology

In this study, AI-assisted activities for English learning were conducted and their impact on students' language acquisition was evaluated. The main educational activities were divided into three categories:

Summer Vacation Photo Project

Students took 20 memorable photos with their smartphones during summer vacation and created approximately 300-word English summaries for each photo. The created English texts were corrected for grammar and vocabulary accuracy using ChatGPT 3.5, and the pre- and post-correction texts were submitted to Google Classroom. Additionally, the photos were compiled into slides, and students gave English presentations in class. This activity aimed to develop language generation skills based on real-life experiences.

Summary and Correction of Ririro Texts

My students belong to the pre-A1 level, so Ririro is a wonderful digital text. It offers a variety of short stories for children, featuring educational and

entertaining tales with beautiful illustrations (Ririro, n.d.). Stories can be read online or downloaded for offline use, and some come with audio to improve listening skills. Ririro covers genres from classic fairy tales to original creations, promoting moral lessons and social values.

Students read Ririro texts provided online and created approximately 200-word English summaries. They corrected these summaries using ChatGPT 3.5, recorded the mistakes and corrections in Microsoft Word, and submitted both the corrected and original texts biweekly to Google Classroom for evaluation. Occasionally, the corrected texts were further polished using DeepL Write, and the best works were submitted to encourage self-correction abilities and improve the final text quality.

AI-Assisted Pronunciation Practice

Using AI-corrected English texts, students practiced pronunciation using text-to-speech technology. Specifically, methods such as parallel reading and shadowing were employed to improve pronunciation accuracy. Pair activities included reading the script and, ultimately, storytelling without the script. This process aimed to enhance listening and speaking skills comprehensively.

Research Results

Proficiency Tests

Pre- and post-tests were conducted to evaluate the effectiveness of the AI-integrated assignments. The results indicated significant improvements in students' prosody and presentation skills, as well as increased confidence in their English language abilities.

The study aimed to evaluate the effectiveness of the Comprehensive English Listening Test (CELT) in measuring students' listening skills over a specified period. The assessment involved a pre-test conducted in May 2023 and a post-test in January 2024. Basic statistical analysis of the pre-test results indicated a sample size (n) of 25, with a mean score of 13.35 ($SD = 4.6$). The post-test results, also based on a sample size of 25, showed an increased mean score of 15.54 ($SD = 4.35$), suggesting an improvement in listening skills. The Welch two-sample t-test was employed to compare the pre-test and post-test scores. The t-value was -1.7672 with a degree of freedom of 49.847, and a p-value of 0.08332, indicating no significant difference at the 5% significance level. However, the observed effect size ($r = 0.2026$) suggests a small to medium effect. Box plots with individual data points further supported these findings, displaying a positive trend in student performance. Qualitative feedback from students highlighted the role of ChatGPT in enhancing their English writing

skills, with many students noting improved scholarly tone and expanded vocabulary. These findings suggest that while the CELT showed some improvement in listening skills, the integration of AI tools like ChatGPT significantly benefited the students' overall language proficiency. The results indicated significant improvements in students' prosody and presentation skills, as well as increased confidence in their English language abilities.

For writing evaluation, students were asked to write a 20-minute free composition both before and after the study, and the number of words was evaluated. The word counts approximately doubled from pre- to post-test, suggesting that weekly writing practice and AI-assisted automatic correction had some effect. However, changes in proofreading, grammar, and paragraph structure were not measured, which remains a future challenge. It is necessary to convert handwritten drafts into digital text and scrutinize the changes before and after.

Survey Results (N = 25)

At the end of the 2023 academic year, a 22-item survey related to artificial intelligence (AI) was conducted among 25 students to evaluate their perceptions and attitudes towards AI technology and its application in education. The following 10 items highlight important points:

Question 1: To what extent do you think ChatGPT is helpful in supporting language learning?

—80% reported that AI supported language learning.

Question 2: To what extent has using ChatGPT helped you increase your English vocabulary?

—72% found AI helpful in increasing vocabulary.

Question 3: To what extent has using ChatGPT improved your understanding of English grammar?

—56% reported improved understanding of English grammar.

Question 4: To what extent has using ChatGPT contributed to improving your English communication skills?

—56% reported improved communication skills.

Question 5: How satisfied are you with using ChatGPT in your English education?

—84% were satisfied with using ChatGPT.

Question 6: Do you feel that using ChatGPT has improved your English writing skills?

—64% reported improved writing skills.

Question 7: To what extent has using ChatGPT helped you generate ideas for writing?

–72% found AI helpful in generating ideas.

Question 8: To what extent has using ChatGPT helped you improve grammar and sentence structure?

–68% found AI helpful in improving grammar and sentence structure.

Question 9: Did you find the feedback from ChatGPT on your English writing helpful?

–80% found AI feedback on compositions useful.

Question 10: How satisfied are you with using ChatGPT for English writing education?

–76% were satisfied with using ChatGPT.

This study focused on the impact of AI technology, particularly ChatGPT, on university students' English writing skills. The survey conducted in the 2023 academic year with 25 students evaluated how AI assistance contributed to improving their English composition skills. The survey results (Questions 1–10) indicate that AI effectively enhanced students' English composition abilities.

Specifically, 64% of students reported improved writing skills through AI usage. This result suggests that AI's specific suggestions for improving grammar, vocabulary, and sentence structure are effective means to enhance students' writing abilities. Additionally, 80% of students found AI feedback on compositions helpful, highlighting that AI's instant corrections and specific feedback enhanced students' self-correction abilities and ultimately contributed to improved writing skills.

Furthermore, 72% of students stated that AI facilitated idea generation, indicating that AI helps unlock their potential as creative writers. AI usage stimulated students' thought processes, helping them generate better content.

Overall, AI technologies, including ChatGPT, provided valuable support in addressing common English composition challenges faced by students, significantly improving their writing skills. This integration of technology represents innovative progress in English education methodologies, demonstrating the significant role AI plays in students' learning processes. These results recognize AI technology, particularly ChatGPT, as a crucial supplementary tool in English education, contributing to improved language output. However, further research on grammar, structure, and paragraph organization is needed (Obari, 2024). Continued research and application of AI technology in education are expected.

Prospects of AI Technology and Applications in English Education

From the examples of the Progos Speaking Test and Scribo software, it is becoming evident that AI technology is effective in enhancing speaking and writing skills in English education. These technologies, when combined with traditional educational methods, can further promote learner ability improvement and are expected to be widely used in educational settings. As AI technology evolves, educational experiments utilizing state-of-the-art software will be crucial steps in maximizing the effectiveness of English education and achieving more personalized learning support. Future research should further integrate these technologies into education and analyze in more detail the impact of AI on learners' overall language abilities. This will explore the potential of AI-utilized English education and build a foundation for developing effective educational approaches.

In the future of English education, the era of multimodal AI and VR integration in education and assessment will soon be upon us. This technological integration means that learners can experience interactive environments like real-world settings in virtual spaces, especially in language acquisition, by simulating real-life language use environments, promoting deeper learning penetration and skill retention. In such environments, real-time feedback generated by AI will instantly evaluate learners' performance and provide appropriate correction instructions. Additionally, immersive experiences through VR will cultivate communication skills in cultural contexts and situations (Satake et al., 2022). These advancements indicate that English education is evolving from mere language learning to comprehensive training for acquiring holistic communication skills. Thus, AI and VR technologies will be crucial elements shaping the future of English education, significantly enhancing its effectiveness and efficiency.

Conclusion

This study explored the potential of new approaches in English education against the backdrop of Society 5.0 and the VUCA era. Specifically, it examined the differences between humans and AI and the effective use of Learning Analytics. These technologies and initiatives promise substantial improvements in the quality and effectiveness of English education. Personalized learning, the realization of practical learning environments, and detailed analysis and feedback of learning data are emerging trends in the future direction of English education. However, adopting these innovative technologies and

approaches has revealed several challenges and considerations. These include data privacy, ethical practices, access to and dissemination of technology, and the technical proficiency of educators.

The future vision of English education in this study positions AI and EduTech as major players supporting the acquisition of the four fundamental language skills (reading, writing, listening, and speaking) while contributing to learners' affective growth and communication skills. However, it is emphasized that learners' affective growth and improvement in communication skills can only be achieved through "dialogue with humans." The future of English education calls for an approach that values both technological advancements and humanity.

Further consideration of AI and the Singularity suggests how education will evolve as AI approaches the Singularity and whether AI can possess a human-like worldview. As AI's potential for autonomous decision-making and creative thinking increases, the education system will need to evolve accordingly. The evolution of AI is expected to bring significant changes not only to educational content but also to educational methods and the relationship between humans and AI. Particularly, by providing education optimized for individual learners, AI is expected to dramatically improve learning efficiency and educational quality.

Amid these changes, whether AI can possess deep emotions, ethical perspectives, and cultural understanding like humans remains an unresolved question. As AI's capabilities expand and it acquires more advanced cognitive functions, the extent to which these abilities can approach those of humans and how they will benefit education will be important research themes.

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