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The impact of Using AI Tools in Developing and Hindering 21st Century Skills Among ESL Students: a review article

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تأثير استخدام أدوات الذكاء الاصطناعي من ناحية تطوير واعاقة مهارات القرن الحادي والعشرين بين طلاب اللغة الإنجليزية كلغة ثانية

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الملخص

أحدث دمج أدوات الذكاء الاصطناعي في التعليم ثورة في كيفية تعلم الطلاب. يتيح الذكاء الاصطناعي تجارب تعليمية مخصصة ويحسن استراتيجيات التدريس، ونتيجة لذلك، يمكن للمعلمين تخصيص المزيد من الوقت للتواصل مع الطلاب وتقديم المساعدة، مما قد يؤدي إلى نتائج تعليمية أفضل بشكل عام، وخاصة لطلاب اللغة الإنجليزية كلغة ثانية. على الرغم من فوائد أدوات الذكاء الاصطناعي، تستكشف هذه الورقة الوصفية التأثير المزدوج لأدوات الذكاء الاصطناعي على تطوير وتدمير المهارات الأساسية في القرن الحادي والعشرين، بما في ذلك التفكير النقدي والتعاون والإبداع والتواصل. من ناحية أخرى، تشمل التحديات البارزة الإفراط في الاعتماد على التكنولوجيا، وانخفاض التفاعل والتواصل بين الأشخاص، وانخفاض قدرات التفكير النقدي. تسلط هذه الدراسة الضوء على مزايا وتحديات استخدام الذكاء الاصطناعي في سياقات اللغة الإنجليزية كلغة ثانية من خلال مراجعة الأدبيات الحديثة. وتؤكد النتائج الرئيسية على أهمية اتباع نهج متوازن لدمج أدوات الذكاء الاصطناعي في مناهج تعليم اللغة الإنجليزية كلغة ثانية لتحسين النتائج التعليمية. ويلخص هذا الاستعراض الأبحاث الحالية ويقدم توصيات عملية للمعلمين للاستفادة بشكل فعال من الذكاء الاصطناعي في بيئات تعلم اللغة

الكلمات الرئيسية: الذكاء الاصطناعي - مهارات القرن الحادي والعشرين - اللغة الإنجليزية كلغة ثانية

Abstract

Incorporating artificial intelligence (AI) tools in education has revolutionised how students learn. Artificial intelligence (AI)enables customised learning experiences and improves teaching strategies; as a result, teachers can dedicate more time to engaging with students and providing assistance, which can lead to better overall educational results, particularly for English as a Second Language (ESL) students. Despite the benefits of AI tools, this qualitative literature review paper explores the dual impact of AI tools on the development and destruction of essential 21st-century skills, including critical thinking,

collaboration, creativity, and communication. On the other hand, notable challenges include over-reliance on technology, reduced interaction and interpersonal communication, and a decline in critical thinking abilities. This study highlights the advantages and challenges of using AI in ESL contexts by reviewing recent literature. The key findings underscore the importance of a balanced approach to integrating AI tools into ESL curricula to optimise educational outcomes. This review synthesises current research and offers actionable recommendations for educators to leverage AI in language learning settings effectively.

Keywords: Artificial intelligence (AI) - 21st-century skills - English as a Second Language (ESL)

Introduction

In the 21st century, education has dramatically shifted, primarily fueled by technological advancements. Incorporating artificial intelligence (AI) tools into educational practices has opened new and exciting avenues for teaching and learning, especially in English as a Second Language (ESL). As technology evolves rapidly, AI tools have emerged as pivotal resources within language learning environments, transforming traditional methodologies and enhancing students' overall educational experiences (Hwang & Chen, 2020).In recent years, ESL students have increasingly turned to AI applications that promise tailored learning experiences and immediate feedback, essential for effective language acquisition. As globalisation continues to expand, the demand for proficient language skills has surged, necessitating innovative instructional approaches that can meet the diverse needs of learners. The rise of AI technologies in educational settings has not only changed how ESL education is delivered. However, it has also prompted educators to rethink their strategies to leverage these tools for developing 21st-century skills.

21st-century skills encompass a comprehensive set of competencies essential for success in today's rapidly changing world. These skills include critical thinking, collaboration, communication, and creativity—crucial not only for academic achievement but also for professional development and personal growth in an increasingly interconnected society (Partnership for 21st Century Skills, 2019). As the world becomes more globalised and technology-driven, the importance of these skills cannot be overstated. They are necessary for effective communication, problem-solving, and collaboration across

diverse environments.In the context of ESL education, the integration of AI technologies presents a unique opportunity to examine their effects on developing these vital 21st-century skills. As educators increasingly incorporate AI tools into their teaching practices, it is essential to assess their impact on students' ability to cultivate the competencies necessary for success in the modern world (Partnership for 21st Century Learning, 2019).

This paper argues that while AI tools offer substantial opportunities for enhancing 21st-century skills among ESL students, they also introduce challenges that may impede skill development. This paper aims to identify the solution to such a problem. Although AI tools have the potential to enhance the learning experience based on 21st-century skills significantly, they may also lead to an over-reliance on technology that undermines the skills they are designed to cultivate. The thesis of this paper posits that while AI tools can dramatically improve language acquisition and skill development, their improper use may inhibit the growth of essential competencies among ESL learners. By analysing the advantages and drawbacks of AI integration, this paper aims to provide educators with a deeper understanding of the intricate interplay between AI tools and 21st-century skills, ultimately guiding them in creating effective and balanced learning environments for ESL students.

This paper employs a qualitative literature review approach, analysing recent studies published in educational technology journals. This review systematically analysed existing literature on AI tools and their impact on ESL students' 21st-century skills. The focus was on identifying peer-reviewed articles, conference proceedings, and educational reports published within the last decade (2013–2023) to ensure the relevance and currency of the findings. About 35 peer-reviewed articles and reports were identified. Each study was systematically analysed to extract key findings, focusing on how AI technologies influence 21st-century skills. The thematic analysis allowed for a balanced discussion of advantages and challenges, ensuring a comprehensive evaluation of the current research landscape.

Literature Review

Recent studies highlight the transformative role of AI tools in enhancing language learning (Godwin-Jones, 2018). AI-driven applications allow students to learn at their own pace, which fosters

effective language acquisition. Popular platforms such as Duolingo and Rosetta Stone have gained widespread acclaim for their adaptive learning features, enabling learners to progress at individualised speeds (González et al., 2021). Smith (2020) also emphasises that tools like Duolingo adapt to learners' unique requirements, promoting engagement and retention. These tools utilise algorithms to tailor exercises to users' needs, enhancing vocabulary retention and grammatical understanding (Lee, 2022). Similarly, Luckin et al. (2016) suggest that intelligent tutoring systems enhance motivation by providing tailored feedback. Liu et al. (2022) further demonstrate that AI chatbots foster real-time conversational practice, improving fluency and communication.

AI tools are particularly effective in facilitating the acquisition of foundational language skills.Chen and Zhang (2023) found that platformssuch as Duolingo significantly improve speaking and writing skills through adaptive learning. By assessing learners' proficiency and customising content, these tools create personalised learning experiences that improve retention of vocabulary, grammar, and pronunciation (Li et al., 2022).

This paper's main components are divided into three parts: the development of 21st-century skills, the Destruction of 21st-century Skills and a balanced approach to the integrations of AI tools in language learning.

1. Development of 21st-Century Skills

Integrating AI tools in ESL education has shown significant potential to enhance 21st-century skills, particularly critical thinking, collaboration, communication, and motivation.

A. Critical Thinking

Research indicates that AI tools can effectively promote critical thinking skills. These tools encourage deeper cognitive engagement by presenting students with complex problems that require analysis and evaluation (Woolf, 2010).AI can present learners with complex scenarios that require problem-solving and analytical skills. For example, AI-based simulations can challenge students to make decisions based on language use in real-life contexts (Kukulska-Hulme & Shield, 2020). AI tools can promote critical thinking by challenging students to analyse and evaluate information. According to Smith and Lee (2023), interactive AI platforms that use gamification techniques

encourage students to solve complex problems, thus enhancing their analytical skills.

In more detail, AI-driven platforms that simulate real-life situations require learners to evaluate options and decide based on their language skills (Kukulska-Hulme & Shield, 2020). Another example is that language processing software encourages learners to analyse sentence structure and grammar usage, promoting critical engagement (Lai, 2020). Moreover, platforms that require students to evaluate information or make decisions based on given data can enhance analytical skills (Zhang, 2020). platforms like Duolingoincorporate gamified elements that challenge learners to think critically about language use in context (Lai et al., 2021). Furthermore, the Knewton platform uses algorithms to present learners with challenges tailored to their skill levels, promoting deeper engagement (Chen & Zhang, 2023).

B. Collaboration

AI platforms facilitating group projects enable students to work together remotely, enhancing collaborative skills. Many collaborative platforms, such as discussion forums and project management tools, allow students to engage in teamwork, facilitating peer-to-peer learning. This collaboration enhances language skills and promotes social interaction and teamwork (Johnson et al., 2021). Additionally, many AI tools facilitate group projects by enabling students to collaborate online. Tools like Google Classroom allow real-time feedback and communication, promoting teamwork and peer learning (Johnson & Johnson, 2019; Johnson, 2022). Specifically, virtual classrooms and language exchange apps facilitate group projects and peer feedback. These tools promote teamwork and collective problem-solving, which are important aspects of 21st-century skills (Li & Wang, 2021). AI fosters collaboration through interactive platforms, allowing ESL students to engage in peer review processes using tools like Grammarly, enhancing writing skills and encouraging collaborative learning (Johnson, 2022).AI-driven platforms often incorporate collaborative features, allowing ESL students to collaborate on projects, thus fostering teamwork and communication (Zhang, 2020).

C. Communication

Chatbots are interactive AI tools that allow students to practice conversational skills in a low-risk environment, improving their language proficiency (Dale, 2021). Research indicates that students using AI-driven language practice reported increased confidence in their speaking abilities (Chen, 2022). Many language practice apps allow students to practice conversational English in a low-stakes environment. Such interactions can boost confidence and improve fluency (Thorne et al., 2018). Additionally, AI tools enhance communication abilities by offering real-time feedback, which is emphasised by Many studies. For example, Garcia(2023) stated that AI language tutors provide instant corrections and suggestions, enabling students to practice and improve continuously. Li et al. (2023) clarify the role of Interactive AI applications in providing immediate feedback on language use. Li et al. (2023) confirmed that this feature is crucial for developing communication skills. They add that tools utilising natural language processing allow instant feedback on pronunciation and grammar, which can build confidence in communication. Moreover, AI language applications, such as Duolingo and Babbel, provide opportunities for immersive language practice. These tools often include speech recognition technology that helps students refine their pronunciation and fluency (Garcia, 2023).

D. Motivation and Engagement

It is known that these days, we are dealing with the digital generation, so the learners are enjoying using AI tools. AI tools can enhance motivation, a critical factor in skill retention. Gamified language learning apps, for example, can make learning more engaging and enjoyable, leading to increased practice and reinforcement of skills (Thompson, 2023). Higher levels of engagement can translate into better long-term retention, as students are more likely to remember information they find interesting and relevant.Gamification elements in AI tools make learning enjoyable, encouraging consistent practice (Kapp, 2012). González-Gómez et al. (2020) argue that interactive features in AI platforms foster active participation, creating an engaging learning environment.

2. Destruction of 21st-Century Skills

While AI tools provide numerous benefits, their misuse or over-reliance can hinder skill development. Issues such as dependency on AI reduced social interaction, and stifled creativity have raised concerns.

A. Over-reliance on technology

Research indicates that students who excessively depend on AI for answers tend to exhibit lower critical thinking and problem-solving abilities (Hwang & Chang, 2019). Over-reliance on AI for language tasks can inhibit independent thinking. Many studies have demonstrated the negative results of exaggerated use of AI. For example, Nguyen et al. (2022) found that students who frequently used AI tools for homework displayed lower levels of critical thinking than those who engaged in traditional learning methods. In addition, a study by Wang et al. (2023) found that students who frequently used AI tools for homework reported lower levels of independent problem-solving skills. The convenience of AI tools may lead students to seek quick answers rather than engage deeply with the material. This behaviourcan stifle curiosity and hinder the development of self-directed learning skills (Hwang et al., 2021).

Moreover, the convenience of AI tools can lead to a decline in independent learning. Thompson (2022) found that students who relied heavily on AI for grammar and vocabulary often struggled during assessments that required spontaneous language use. Research indicates that when students depend too heavily on AI for answers or language corrections, they may not develop the necessary critical thinking and problem-solving skills for language use (Smith & Jones, 2023). This dependence can hinder their ability to retain skills in real-world contexts where AI assistance is unavailable.

Excessive dependence on AI can result in superficial understanding and passive learning. Students may rely on AI-generated responses rather than engaging in deeper cognitive processes (Baker & Inventado, 2014; Nguyen et al., 2022). Thompson (2022) cautions that over-reliance on AI can impair critical thinking and problem-solving abilities. More reliance on these technologies may lead to decreased interpersonal skills, as students may opt for AI-generated responses instead of engaging in meaningful conversations (Hwang & Chang, 2019). Additionally, formulaic AI responses can stifle creativity, as

students may become accustomed to standardised answers rather than developing original ideas (Kukulska-Hulme, 2020).

B. Reduced Social Interaction and Communication

AI tools often prioritise written communication (e.g., chatbots and language apps) over verbal interaction. As a result, ESL students may excel in reading and writing but need help with speaking and listening skills. Many studies emphasise the negative impact of AI on the interaction and communication in EFL learning and EFL teaching process. A study by Martinez (2023) found that students who relied predominantly on AI for language practice showed lower retention of conversational skills. Face-to-face interactions, which are crucial for developing fluency and confidence, may decline, leading to gaps in communication proficiency(Krashen, 1982). In addition, Thorne (2020) stated that face-to-face communication allows nuanced understanding and cultural exchange, which AI cannot replicate. Using AI tools can lead to isolation, as students may prefer digital interactions over face-to-face communication. This shift can hinder the development of social skills, which are crucial for effective collaboration in diverse settings (Smith et al., 2020). The shift toward online learning environments, bolstered by AI tools, has resulted in fewer opportunities for in-person interaction. Patel (2023) notes that this trend can lead to social anxiety and decreased confidence in communication skills. Nguyen and Hsieh (2023) found that engaging with native speakers and understanding cultural references are essential for true language mastery. They added that long-term reliance on AI may limit exposure to these critical aspects, leading to superficial language retention without the depth of understanding from real-life interactions. Thorne (2020) emphasises that meaningful conversations significantly enhance language learning, yet AI-driven activities often replace these interactions. The interaction between students and AI may diminish opportunities for face-to-face communication. Effective language learning often hinges on social interaction, and excessive use of AI could limit the development of conversational skills (Duffy et al., 2020). According to a study by Patel (2023), ESL students who predominantly use AI for language practice reported feeling less confident in real-life communication scenarios.

C. Creativity and critical thinking

The formulaic nature of AI responses may limit creative expression. Many studies have drawn attention to the negative role of AI in stifling creativity. It can stifle students' original thought processes, leading to a reliance on pre-existing structures rather than creative exploration (Gulson & Symes, 2007). Miller and D'Amico (2021) argue that when students lean on AI-generated content, they may miss opportunities to engage deeply with language and develop their unique voices. Research by Zhao (2021) suggests that when students receive formulaic responses from AI, they may become less inclined to explore innovative ideas and solutions. Baker et al. (2019) state that students may miss out on developing their unique voice and perspective in language use when they rely on AI-generated content because AI-generated content can limit students' creative expression. Additionally, Miller (2023) argues that when students use AI to generate ideas or complete assignments, they may become less inclined to engage in original thought processes.

AI's structured and formulaic responses can stifle creativity. Students accustomed to AI-generated content may need help to think divergently or develop original ideas (Miller & D'Amico, 2021). Shearer (2021) notes that open-ended discussions or problem-solving tasks are necessary for learners to cultivate critical thinking skills. AI's formulaic responses can stifle creativity. When students rely on AI-generated content, they may need help to think divergently or produce original ideas (Miller, 2023).

3- A balanced approach

To maximise the benefits of AI while mitigating its drawbacks, educators must integrate these tools thoughtfully, ensuring they complement rather than replace traditional language-learning methods. The findings indicate a complex relationship between AI tools and the development of 21st-century skills among ESL students. While these technologies offer significant advantages, such as personalised learning and immediate feedback, educators must remain vigilant about their potential drawbacks, including over-reliance and reduced social interaction (Hwang & Chang, 2019).

A balanced approach is essential, where AI tools and traditional teaching methods are integrated into the curriculum. Strategies include

setting limits on AI usage to prevent dependency, fostering peer collaboration, and encouraging creative projects that require original thought (Thompson, 2023). This balanced approach is vital for creating learning environments that prioritise skill development while harnessing the strengths of both AI and conventional educational practices. A blended learning model—incorporating AI tools and face-to-face instruction—emerges as an ideal approach. Research suggests that combining technology with in-person interactions enhances student engagement and retention of language skills (Chen & Zhang, 2023). Educators can use AI platforms for individualised practice while fostering collaboration through group discussions and peer-driven projects in the classroom.For example, a flipped classroom model, where students engage with AI-driven resources at home and collaborate on interactive tasks during in-person sessions, encourages a balance between technology and traditional interaction (Baker et al., 2019). This model not only allows learners to benefit from the adaptive capabilities of AI but also ensures the development of critical interpersonal and problem-solving skills essential in real-world contexts (Miller & D'Amico, 2021).

To sum up , while AI tools present transformative opportunities for ESL education, their successful integration requires a thoughtful approach emphasising balance. Educators should strive to create a learning environment that combines the innovative potential of AI with the invaluable experiences provided by traditional teaching methods, thus preparing learners for the complexities of communication in the 21st century.

Conclusion

This review highlights the dual impact of AI tools on developing 21st-century skills among ESL students, presenting significant opportunities and noteworthy challenges. AI technologies have revolutionised language learning by offering personalised feedback, adaptive learning paths, and engaging, gamified experiences that foster critical thinking, collaboration, communication, and creativity. However, the risks associated with over-reliance, reduced social interaction, and diminished creativity necessitate a thoughtful approach to their integration. A balanced methodology, combining AI with traditional teaching practices, is essential for maximising the benefits of these tools while addressing their potential drawbacks. For instance, while AI excels at providing individualised practice and immediate feedback,

traditional methods ensure the development of interpersonal skills, cultural understanding, and independent critical thinking. Together, these approaches can create a comprehensive learning environment that equips students with the competencies to thrive in a complex and interconnected world. Ultimately, the future of ESL education lies in leveraging AI as a complement to—not a replacement for—human interaction and creativity. Thoughtful integration will allow educators to harness the transformative power of AI while nurturing the independent and collaborative skills essential for navigating the challenges of the 21st century.

Recommendations for Educators

To ensure a balanced and effective integration of AI tools in ESL education, educators can adopt the following strategies:

1. Integrate AI Thoughtfully: Educators should incorporate AI tools as supplements to, rather than replacements for, traditional teaching methods. Blended learning models that combine face-to-face instruction with technology can maximise the benefits of both approaches (Graham, 2019).
2. Encourage Critical Engagement: Teachers should foster an environment where students critically engage with AI outputs. Encouraging discussions about the reliability of AI-generated information can enhance critical thinking skills (Shearer, 2021).
3. Promote Social Interaction: Creating opportunities for students to practice language skills in real-world contexts is crucial. Group projects, peer reviews, and conversational clubs can complement AI tools and enhance social learning (Duffy et al., 2020).
4. Integrate AI Mindfully: Educators should incorporate AI tools to complement traditional teaching methods, ensuring students engage in independent and collaborative learning activities.
5. Encourage Creativity: Assign tasks that require students to create original content using AI tools as a supplementary resource rather than a primary one.
6. Foster Collaboration: Incorporate collaborative projects that require students to work together while using AI tools, ensuring that social interaction remains a key component of learning.

7. Provide Training: Educators should receive training on effectively integrating AI tools into their teaching practices, ensuring they can guide students in using these technologies responsibly.

Future Research Directions:

While current research highlights the immediate benefits and drawbacks of AI in language education, there is a need for longitudinal studies to assess long-term skill retention. Future research should explore how ongoing interaction with AI tools affects the retention of language skills over time, particularly in diverse learning environments. Investigating the balance between AI-assisted learning and traditional methods can provide insights into optimal educational strategies for ESL learners.

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