

Integrating Artificial Intelligence in Undergraduate English Education: An Experimental Study

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Abstract: The present education system needs more innovative approaches, methods, and teaching techniques to help undergraduate students develop and practise their English language skills effectively. Artificial Intelligence (AI) has emerged as a valuable educational tool that enables both teachers and students to create engaging learning materials and enhance the teaching–learning process. The present study was conducted among undergraduate students to examine their learning styles, competency levels, and existing skills to explore how AI technology could support English language learning. The findings revealed that many students experienced difficulties in communication, critical thinking, problem-solving, and digital competence. To address these challenges, a series of AI-based learning activities was introduced as part of the instructional programme. The results showed that students adapted well to the AI-supported learning environment and participated more actively in classroom activities. Their language learning became more engaging, interactive, and effective. Students' performance was evaluated using an AI-assisted analytical rubric, which provided a systematic assessment of their competencies and overall progress. A comparison of the pre-test and post-test scores revealed significant improvements in students' English language proficiency and the development of essential 21st-century skills, demonstrating the positive impact of AI-integrated instruction.

Keywords: Artificial Intelligence, 21st-century skills, Digital competence, Online Education, Pedagogical Education.

1. Introduction

English is the most widely spoken language in the world and serves as the global language of communication. It plays a vital role in employment, business, tourism, higher education, academic discourse, and international collaboration (Salih & Omar, 2021). As a result, English has become one of the most widely learned languages, with nearly two billion people studying it worldwide (Grenier & Zhang, 2021). To become proficient in English, learners need to develop competence in the four essential language skills: listening, speaking, reading, and writing (Grabe & Stoller, 2002).

Despite its global importance, many learners face challenges in acquiring English effectively. Research has shown that these difficulties often arise from limited exposure to English outside the classroom, inadequate language knowledge (Tokoz-Goktepe, 2014), and the complex and irregular nature of English spelling (Ulicheva et al., 2018). Many learners also experience anxiety and fear of making mistakes when speaking English in front of others, which reduces their confidence and willingness to communicate (Cumming et al., 2018).

Recent advances in Artificial Intelligence (AI) have provided innovative solutions to many of these challenges (Baranwal, 2022; Kannan & Munday, 2018). AI refers to computer systems that simulate human intelligence and are capable of learning, understanding, and processing human language (Sindermann et al., 2021; Xiaohong & Yanzheng, 2021). AI-powered tools create supportive and low-pressure learning environments where students can practise English at their own pace without fear of criticism. Studies have shown that AI can improve reading comprehension (Xu et al., 2019), provide opportunities for repeated language practice (Kim, 2019), and help



learners improve their English pronunciation (Noviyanti, 2020). In addition, AI supports teaching and learning through features such as automated assessment, instant feedback, adaptive learning experiences, intelligent tutoring systems, and predictive learning analytics (Pokrivcakova, 2019).

AI technology also promotes continuous learning by keeping students engaged and motivated throughout the learning process. When face-to-face classroom instruction is combined with AI-powered online resources, learners become more actively involved in their studies and gain valuable digital skills alongside language proficiency. This blended approach enhances interaction between teachers and students while encouraging independent learning and greater learner autonomy (Morris, 2010).

The present study aims to promote learner autonomy by integrating AI into English language teaching and learning. It seeks to examine how AI can support effective English language development while providing a flexible and uninterrupted learning experience through modern technology. The study also highlights the importance of incorporating AI literacy into the curriculum to prepare students for future academic and professional demands. As technology continues to reshape education, English language teaching must evolve to equip learners with both linguistic competence and digital skills. Since English serves as a global language and a gateway to opportunities in the 21st century, integrating AI into English education can contribute to a more inclusive, flexible, and future-ready educational system.

2. Objectives

The study aimed;

- a) To identify the strengths and weaknesses of the students through a pre-test.
- b) To enlarge learner autonomy in Artificial Intelligence.
- c) To develop 21st Century Skills through Artificial Intelligence for easy and effective language teaching and learning.
- d) To adopt an uninterrupted learning experience in English with the use of the latest technology.
- e) To include Artificial Intelligence as a subject of learning in the curriculum.
- f) To build a more flexible and inclusive education system for the future.

3. Methodology

The study applies Artificial Intelligence, English language teaching and learning methods such as mobile-assisted learning, computer-assisted learning, ICT-based language teaching, gamification, infographics, and the theory of multiple intelligences, etc. This study will be conducted through a pilot study, pre-test, post-test, rubric assessment and evaluation. The course was conducted for a period of one year. The performance of the samples was observed through individual assessment and rubrics.

4. Literature Review

The integration of Artificial Intelligence (AI) into higher education has attracted considerable attention because of its potential to change traditional approaches to teaching and learning. In undergraduate English education, AI-based technologies offer several opportunities, including personalised instruction, additional language practice, immediate feedback, and greater student participation. These technologies can also extend English learning beyond the traditional classroom by giving students flexible opportunities to practise and develop their language skills. Holmes et al. (2019) noted that AI can contribute to more personalised and learner-centred learning environments, while Zawacki-Richter et al. (2019) discussed its increasing use in teaching, assessment, and student support in higher education.

One area that has received particular attention is the role of AI in promoting self-directed learning and critical thinking. AI-powered learning platforms can provide students with learning materials suited to their needs, immediate feedback, and access to a variety of digital resources. These features can encourage students to become more responsible for their own learning instead of depending entirely on teacher-directed instruction. Activities such as independent research, problem-solving, questioning, and reflection can also encourage learners to examine information carefully and make informed decisions. Ananiadou and Claro (2009) identified critical thinking, problem-solving, and learner autonomy as important competencies for 21st-century education. Similarly, Holmes et al. (2019) suggested that AI can support learner-centred approaches by adapting learning experiences to individual needs. Thus, AI in English education may contribute not only to language development but also to the development of students' higher-order thinking skills.

AI-supported learning environments may also help undergraduate students develop communication and collaboration skills. Learning English involves more than learning vocabulary and grammar; students need opportunities to interact with others, express their ideas, negotiate meaning, and respond appropriately in different situations. AI-supported platforms can provide opportunities for online discussions, collaborative writing, peer feedback, virtual interaction, and project-based learning. Luckin et al. (2016) observed that intelligent technologies can contribute to more interactive and personalised learning environments, while the OECD (2021) emphasised communication and collaboration as important skills in contemporary education. In undergraduate English classrooms, technology-supported activities can therefore give students more opportunities to use English in meaningful and collaborative contexts. In this way, language development and interpersonal skills can be developed alongside one another.

Another important issue discussed in the literature is the connection between AI integration and digital competence. As digital technologies have become increasingly important in higher education and the workplace, technological competence has become an essential part of undergraduate education. AI-integrated English classrooms can introduce students to intelligent tutoring systems, adaptive learning platforms, multimedia resources, automated feedback tools, and interactive language-learning applications. Redecker (2017) identified digital competence as an important component of effective participation in digitally mediated learning environments. UNESCO (2021) also recognised the increasing role of AI and digital technologies in education while emphasising the need for learners to use these technologies effectively and responsibly. Regular interaction with AI-based educational tools may therefore help English students become more confident in using technology for learning, academic research, communication, and other educational activities.

Flexibility and learner autonomy are also important themes in research on AI-supported education. Unlike conventional classroom teaching, AI-based learning environments can make learning materials and practice activities available beyond fixed classroom hours. Students can often access these resources at their own pace and focus on areas that require additional attention. Holmes et al. (2019) explained that AI can support adaptive and personalised learning experiences, while Zawacki-Richter et al. (2019) identified personalised learning and assessment as important applications of AI in higher education. This flexibility is particularly useful for undergraduate English learners, who may differ considerably in their language proficiency, learning pace, technological experience, and individual learning needs. AI-supported learning can consequently encourage learner autonomy by allowing students to identify their difficulties, practise particular language skills, and monitor their own progress.

Personalised instruction is another frequently discussed benefit of AI in education. Undergraduate English classrooms often include students with different levels of language proficiency and different learning preferences. Meeting the individual needs of every learner can be difficult, particularly in larger classes. AI-based adaptive systems may help address this challenge by analysing student performance and providing suitable learning materials, feedback, and practice activities. Chen et al. (2020) discussed the potential of AI-enabled adaptive

technologies to support personalised learning, while Zawacki-Richter et al. (2019) identified adaptive learning and intelligent tutoring as important applications of AI in higher education. In English language learning, such systems may assist students in identifying difficulties related to vocabulary, grammar, pronunciation, reading, writing, listening, and communication. AI can therefore serve as an additional resource through which teachers can respond to the different learning needs of their students.

The potential of AI to support creativity and innovation has also become an important consideration in technology-enhanced English language education. AI-supported learning activities can involve digital storytelling, multimedia presentations, creative writing, simulations, problem-solving tasks, and other authentic language-learning activities. Such activities encourage students to use English in meaningful situations instead of focusing mainly on memorisation and reproduction. Luckin et al. (2016) suggested that intelligent technologies can encourage innovative approaches to learning by creating new forms of interaction and engagement. UNESCO (2021) similarly emphasised that AI should be used to enhance human learning and creativity rather than simply replace existing educational practices. For undergraduate English students, appropriate use of AI can therefore create opportunities to experiment with language, develop original ideas, and connect classroom learning with real-life communication.

AI has also been increasingly associated with assessment, feedback, and learner reflection. Traditional assessment practices often provide feedback at particular stages of the learning process, whereas AI-based systems can offer more immediate responses to student performance. Learning analytics and automated feedback can help students identify errors, monitor their progress, and recognise areas where further practice is needed. This type of continuous feedback can support self-assessment and reflective learning. Holmes et al. (2019) identified feedback and learner support as important potential applications of AI in education. These features are especially relevant to English language learning, where regular practice and timely feedback can play an important role in improvement. AI can therefore be viewed not only as a source of learning materials but also as a possible tool for ongoing formative assessment.

Technology-supported learning has also been linked with the development of lifelong learning habits. Dweck (2006) associated continued effort and reflective learning with a growth-oriented approach to learning. AI-supported environments that provide self-assessment, personalised feedback, and learning analytics may encourage students to monitor their progress and make changes when necessary. Over time, students may begin to view learning as an ongoing process rather than something limited to classroom instruction. They may also develop habits of independent practice and continuous improvement. This is particularly relevant to undergraduate English learners because developing and maintaining English proficiency generally requires regular practice beyond the formal classroom environment.

Despite the considerable potential of AI in education, the literature also stresses the importance of careful pedagogical integration. Zawacki-Richter et al. (2019) observed that much of the research on AI in higher education has concentrated on technological applications, while pedagogical and educational issues require greater attention. The effectiveness of AI does not depend simply on the presence of technology; its educational value is closely related to how it is connected with learning objectives, teaching methods, assessment practices, and teacher guidance. UNESCO (2021) likewise emphasised the importance of human-centred and responsible approaches to the use of AI in education. Therefore, in undergraduate English education, AI needs to be used as a complement to teaching rather than as a replacement for the teacher. Its value lies in creating meaningful opportunities for students to participate actively in the learning process.

The reviewed literature shows that AI has considerable potential to support undergraduate English education in several ways, including personalised instruction, immediate feedback, flexible learning, digital competence, learner autonomy, communication, collaboration, creativity, and critical thinking. At the same time, there is a need for more empirical research into the actual effectiveness of AI-integrated English instruction in specific



educational settings. Much of the existing literature focuses on the possibilities and applications of AI, while comparatively fewer studies have experimentally examined changes in students' English language performance and related competencies after systematic AI-based instruction. An experimental study can help address this issue by comparing students' performance before and after an AI-integrated instructional intervention. Such an approach can provide evidence of whether AI-supported instruction leads to measurable improvements in English language learning and contributes to the broader competencies required in contemporary higher education.

Overall, the literature provides a useful theoretical and pedagogical basis for examining the integration of Artificial Intelligence into undergraduate English education. Previous studies suggest that AI can contribute to personalised, interactive, flexible, and technology-rich learning environments. However, its effectiveness needs to be examined through systematic empirical research rather than being assumed from its technological potential alone. The present experimental study is situated within this context and seeks to examine the effectiveness of integrating AI into undergraduate English education, with particular attention to its influence on students' language learning and broader educational development.

5. Entry Behaviour

At the start of the study, a pre-assessment was conducted to evaluate the students' baseline knowledge, skills, and attitudes toward English language learning and 21st-century competencies. To understand the knowledge and skill set of learners in the English Language, an AI technology classroom environment was developed in a new way to engage the learners. The study was conducted among 100 college students pursuing the 1st year of undergraduate studies in English at various colleges in Madurai district, Tamil Nadu. The research was conducted through pre-test, post-test, and analytical rubric assessment. It was understood from the pre-test that 60% of students are struggling to communicate in the English language. In addition, they face a lack of confidence, stage fright, mispronunciation, and reduced fluency when speaking. Many of them have learning difficulties like dyslexia, too. Moreover, the study revealed that most of the learners lack the skills required at the undergraduate level.

Furthermore, the research created activities using AI technology and English language teaching and learning methods like mobile-assisted learning, computer-assisted learning, ICT language teaching, gamification, infographics, and the theory of multiple intelligences, which have improved the students' English language skills. In addition, the study utilised the methodological tools of Mobile Apps, online video conferencing (Zoom, Google Meet), Interactive e-Games, Web 2.0, Augmented Reality and Virtual Reality, infographics, Brain Gym, Vlog, Social Websites (WhatsApp, FB, Instagram, Twitter, and more), ChatGPT, Chatbots, Google Bard, and effective AI tools, which have improved the English language skills of the learners.

Students were engaged in peer activities, pair work, and individual activities, including chatbots, Generative AI tools, self-introduction, Video-talk, fluency check, Paralinguistic communication, Pronunciation check, Wuzils, Rhetorical speech, Role-play, Debate, mini-drama, Story chain, Shadow Speaking, Translation, TED Talk, Creative Writing and speaking, chat and find, etc. Computer- and mobile-assisted tasks, Online Worksheets, flashcards, pictures, models, and audio-video clips were used as classroom materials. Students were often motivated to execute the tasks with the help of AI tools. The tasks were practised in such a way that motivation and entertainment played a pivotal role in practising each activity. Both teacher-led and learner-led classrooms were organised with rule-free learning conditions. It has been found that AI technology improves the English skills of Undergraduate students. The learners were able to adapt, create, and be flexible in using the English language. AI technology plays a prime role in the learning process.

6. Exit Behaviour

The study was directed through a variety of learner-centred and interactive activities, including brainstorming and problem-solving tasks, creative speaking and writing exercises, picture description activities, mind mapping, role-play, group discussions, oral presentations, and activities based on real-life situations. These activities were



carefully designed to encourage active participation, enhance language acquisition, and develop higher-order thinking skills among the learners. By engaging students in meaningful communication and collaborative learning experiences, the study aimed to improve their overall English language proficiency while simultaneously fostering essential 21st-century skills.

As the learning process progressed, advanced Artificial Intelligence (AI) tools were exclusively allotted for English language training and practice. The integration of AI technology provided learners with innovative opportunities to improve their language skills through personalised and interactive learning experiences. For example, tools such as Gamma.ai, Opus.pro, Chatbase.co, Typeset.io, Jenni.ai, and Typli.ai were introduced and extensively practised during the learning process. These AI-powered platforms enabled students to generate content, organise ideas, improve writing quality, develop presentations, receive instant feedback, and engage in self-directed learning. The use of these tools also encouraged students to become more confident and independent learners while enhancing their digital literacy skills.

For this research, an innovative testing and evaluation procedure known as the Analytical Rubric Assessment was employed. This assessment method provided a comprehensive framework for evaluating multiple dimensions of student performance, allowing for a detailed analysis of learners' strengths and areas for improvement. Following the instructional intervention, a series of assessments was administered to evaluate the students' learning outcomes and the development of their English language abilities.

These exit assessments were specifically designed to measure growth and improvement in critical thinking, communication, collaboration, creativity, productivity, and adaptability. The assessment process focused not only on linguistic competence but also on the broader competencies required for success in contemporary educational and professional environments. By comparing students' performance before and after the integration of AI technology in the classroom, significant improvements were observed in various aspects of the learning process. The learners demonstrated greater engagement, improved communication skills, enhanced creativity, and increased confidence in using English for academic and practical purposes.

The exit behaviour analysis and post-test scores revealed remarkable achievements in terms of English language development. The findings indicated that incorporating AI-assisted learning strategies positively affected students' proficiency levels and overall learning outcomes. Furthermore, the post-test Analytical Rubric scores demonstrated substantial progress across all assessment criteria, highlighting the effectiveness of AI-supported instruction in enhancing English language learning. The Post-test Analytical Rubric score is shown below.

7. Result and Discussion

It has been observed that the pre-test standard score was 5, and that during post-test practice, the indicators improved from 5 to 29. Therefore, it seems evident that students' confidence levels, cognitive skills, digital competence, and performance improved through practising the AI-driven prototype remedial course, enabling learners to acquire and produce the language in various contexts more effortlessly. The substantial increase in scores demonstrates the effectiveness of the intervention in addressing learners' language difficulties and enhancing their overall learning outcomes. Integrating Artificial Intelligence in the education provided students with opportunities for personalised practice, immediate feedback, and continuous engagement, which contributed significantly to their progress. As learners interacted with the course materials, they became more confident in applying language skills, solving problems, and communicating effectively. The improvement in digital competence further indicates that students developed the ability to use technology as a supportive learning tool. These findings suggest that integrating an AI remedial course created a productive learning environment that fostered language development, independent learning, and greater academic achievement among the English undergraduate students.

8. Findings

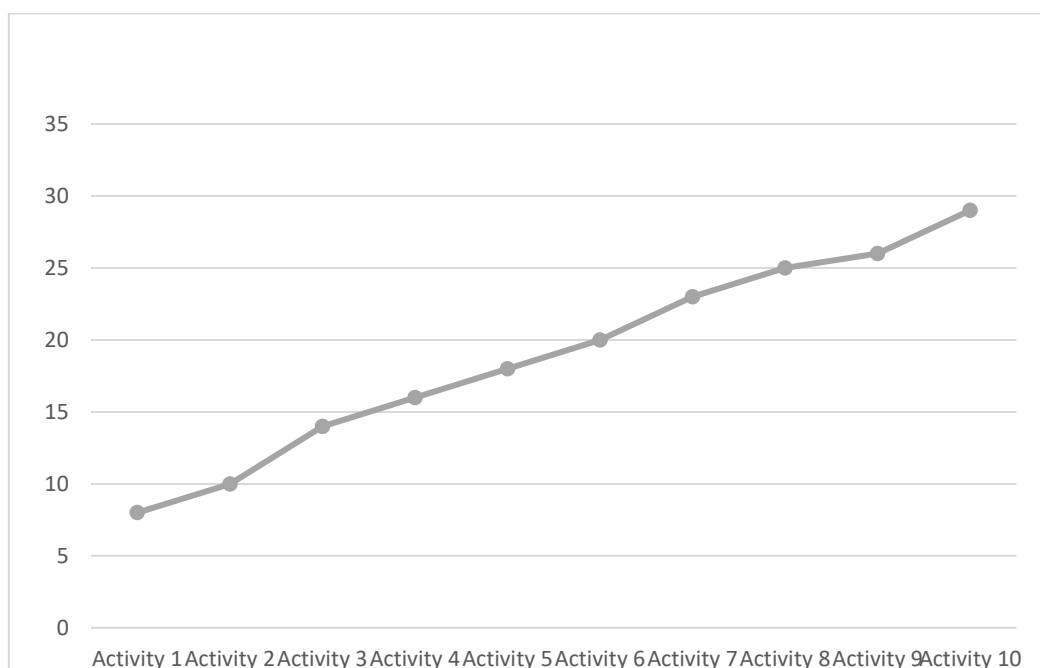
Analytic Rubric of Activity - 1

Teaching English Through AI Technology						
Tasks	Advanced (7-9)	Proficient (4-6)	Basic (2-3)	Minimal (0-1)	Score (10)	Remarks
Task – 1 Complete the picture using Quick-Draw AI	Used the AI tool effortlessly	Took time to use the tool	Discussed with their friends to use the AI tool	Couldn't do it properly	5	Confidence improved
Task – 2 Poem writing in Gemini AI	Good previous knowledge of the AI tool, so made the poem easily	Took more time to get used to the AI tool and did the task	Got help from friends to use the AI tool and made the poem	Don't know how to use the AI tool to do the task	6	Participation brought up
Task – 3 Chat with AI	Made some interesting conversations using the AI tool	Made grammatical errors while chatting	Didn't respond further, stopped in the middle of the chat	Struggled to use it	5	Made to be brisk
Task – 4 Hello-Talk AI Tutor	Attended with full confidence	Attended with fluent language	Attended with a positive spirit	Attended and responded adequately	6	Reasoning and problem-solving skills got improved
Task- 5 Speak with speechify.com	Spoke with full confidence	Spoke with fluent language	Spoke with a positive spirit	Spoke and responded adequately	7	Creativity and retrieving have developed

Total score 29/50

Table 1. Rubric Rating of Activity 1

Consolidated Analytical Rubric of Development in English through AI Technology



Performance Level Activities

9. Limitations and Research Gaps

This study was confined to undergraduate (UG) students; therefore, its findings may not apply to school students or postgraduate learners. The investigation focused exclusively on teaching English using Artificial Intelligence. As a result, the effectiveness of this approach in teaching other academic subjects was not explored. In addition, the experimental intervention was implemented over a limited period, which may not have been sufficient to determine the long-term effects of Artificial Intelligence on students' English language proficiency and the development of 21st-century skills.

A review of the selected theses showed that most researchers relied on questionnaires, surveys, direct interviews, and statistical tools to collect and analyse data. Although these methods are useful for gathering information, they may not provide a complete picture of students' actual skills and competencies. To address this limitation, the present study adopts a Pre-Test and Post-Test design. This approach allows the researchers to assess students' existing skills, identify their learning needs and preferences, and measure their progress more accurately after integrating Artificial Intelligence.

The study used an analytical rubric as the primary assessment technique.

10. Conclusion

Teaching English through AI technology offers a powerful and effective approach to English Language Teaching (ELT). Introducing AI technology in classroom instruction for teaching the English language provides students with a comprehensive and personalised learning experience that promotes self-directed learning, critical thinking, collaboration, communication, digital literacy, adaptability, creativity, innovation, relevance, personalisation, and lifelong learning. The integration of AI-powered tools and resources enables learners to engage with language learning activities in a more interactive, flexible, and meaningful manner. These technologies help learners access

a wide range of learning materials, receive immediate feedback, and develop language skills at their own pace according to their individual needs and abilities.

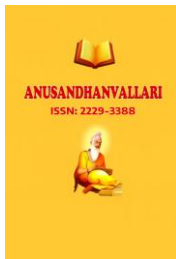
As the growth of the English language increases day by day, it may enable learners to continue to navigate the complexities of the modern world, and AI technology will play a progressively crucial role in preparing students for success in the 21st century and beyond. AI-based learning environments encourage active participation and increase students' motivation and engagement in the learning process. They also provide opportunities for continuous practice, personalised support, and enhanced interaction, which contribute significantly to language acquisition and overall academic achievement.

As it has been in existing behaviour, the students of the experimental group were led by an expert teacher or guide in an AI technology classroom mode. The results improved enormously, and they were able to use AI technology for better English learning. The findings indicate that the combination of expert guidance and AI-supported instruction creates a productive learning environment that enhances students' performance and confidence in using the English language. Furthermore, the positive outcomes observed in the experimental group demonstrate the effectiveness of integrating technological innovations into language education.

This study suggests that if teachers employ effective teaching methods that facilitate students' learning, it will be valuable for the upcoming generation. Therefore, the thoughtful integration of AI technology into English language classrooms can contribute significantly to educational development and help learners meet future academic, professional, and social challenges with greater competence and confidence.

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