Enhancing English Language Proficiency in Specialized University Courses through AI Technologies: Opportunities, Challenges, and Practical Applications Across Disciplines

By

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Abstract

This study investigates the impact of integrating Artificial Intelligence (AI) tools and applications on enhancing English language proficiency among non-native students enrolled in specialized diploma programs at the Applied College, Princess Nourah bint Abdulrahman University, Saudi Arabia. The college offers two-year diplomas across various fields, including Marketing, Computing, Hospitality, and Tourism and Travel. Despite studying English intensively during their first three terms, students continued to face significant challenges in both English language courses and their English-delivered specialized subjects. To address this, the researcher, specializing in TESOL, designed and implemented a strategic program incorporating AI-based classroom activities and AI-augmented home assignments. A pre-test was conducted with 100 students across the above-mentioned four specialties, revealing proficiency levels ranging from beginner to lower-intermediate, with Computing students demonstrating the highest proficiency and Hospitality students the lowest. After a 15-week intervention, a post-test showed marked improvement in students' English proficiency, particularly in the context of English for Specific Purposes (ESP). Additionally, a questionnaire completed by 12 instructors across different specializations confirmed the students' enhanced language skills, increased classroom engagement, and improved academic performance. The findings suggest that AI-integrated instruction significantly boosts language acquisition and overall success in specialized university courses. This paper concludes by recommending the broader adoption of AI technologies in similar educational contexts to support non-native students' academic and professional development.

Keywords: *AI in Language Learning, ESP, Non-Native English Students, Specialized Diploma Programs, English Proficiency, Higher Education in Saudi Arabia, Language Enhancement Strategies, TESOL*

تعزيز الكفاءة اللغوية في اللغة الإنجليزية في المقررات الجامعية التخصصية عبر تقنيات الذكاء الاصطناعي: الفرص، التحديات، والتطبيقات العملية عبر التخصصات

الملخص :

تتناول هذه الدراسة تأثير دمج أدوات وتطبيقات الذكاء الاصطناعي على تعزيز الكفاءة اللغوية في اللغة الإنجليزية بين الطلاب غير الناطقين بها، والمسجلين في برامج الدبلوم التخصصية في الكلية التطبيقية بجامعة الأميرة نورة بنت عبد الرحمن في المملكة العربية السعودية. تقدم الكلية دبلومات لمدة عامين في عدة مجالات تشمل التسويق، والحوسبة، والضيافة، والسياحة والسفر. وعلى الرغم من الدراسة المكثفة للغة الإنجليزية خلال الفصول الثلاثة الأولى، تستمر الطالبات في مواجهة تحديات كبيرة في مقررات اللغة الإنجليزية وفي المقررات التخصصية المقدمة باللغة الإنجليزية. ولمعالجة هذه التحديات، قامت الباحثة، المتخصصة في تعليم اللغة الإنجليزية لغير الناطقين بها(TESOL) ، بتصميم وتنفيذ برنامج استراتيجي يدمج أنشطة صفية مدعومة بتقنيات الذكاء الاصطناعي، بالإضافة إلى مهام منزلية معززة بالذكاء الاصطناعي. تم إجراء اختبار قبلي شمل ١٠٠ طالبة عبر التخصصات الأربعة المذكورة أعلاه، وكشف الاختبار القبلي عن مستويات كفاءة لغوية تتراوح بين المبتدئ والمتوسط الأدنى، حيث سجلت طالبات الحوسبة أعلى مستويات الكفاءة، بينما سجلت طالبات الضيافة أدنى المستويات. بعد فترة تدخل استمرت ١٥ أسبوعًا، أظهر الاختبار البعدي تحسنًا ملحوظًا في الكفاءة اللغوية للطالبات، خاصة في سياق اللغة الإنجليزية للأغراض التخصصية (ESP) كما أكدت استبيانات أُجريت مع ١٢ عضو هيئة تعليمية من التخصصات المذكورة تحسن مهارات الطلاب اللغوية، وزيادة تفاعلهم في الصفوف الدراسية، وتحسن أدائهم الأكاديمي. تشير النتائج إلى أن دمج تقنيات الذكاء الاصطناعي في التدريس يساهم بشكل كبير في تعزيز اكتساب اللغة والنجاح الأكاديمي في المقررات الجامعية التخصصية. وتوصي الدراسة بتبني تقنيات الذكاء الاصطناعي على نطاق أوسع في السياقات التعليمية المشابهة لدعم التطوير الأكاديمي والمهني للطلاب والطالبات غير الناطقين باللغة الإنجليزية.

الكلمات المفتاحية: *الذكاء الاصطناعي في تعلم اللغة، الإنجليزية للأغراض التخصصية (ESP)، الطلاب غير الناطقين بالإنجليزية، برامج الدبلوم التخصصية، الكفاءة اللغوية في اللغة الإنجليزية، التعليم العالي في المملكة العربية السعودية، استراتيجيات تعزيز اللغة، تعليم اللغة الإنجليزية لغير الناطقين بها(TESOL)*

1. Introduction

Within today's interconnected global landscape, English proficiency serves not only as a means of communication but also as a gateway to academic and professional success. This applies especially to students pursuing specialized fields of study, where the ability to understand and communicate in English is integral to their success. For non-native English speakers, mastering the language becomes even more critical when their university courses in specialized disciplines are delivered in English. In Saudi Arabia, the government has recognized the importance of enhancing English proficiency as part of its broader educational goals, in alignment with the ambitious Vision 2030. This vision emphasizes the development of human capital, global competitiveness, and the integration of advanced technologies into education, positioning English proficiency and digital literacy as essential pillars for the country's future.

At the Applied College of Princess Nourah bint Abdulrahman University, students enroll in two-year diploma programs across diverse specialties such as Marketing, Computing (including Programming and IT), Hospitality, Aviation Hospitality, Catering, Tourism and Travel, Finance, Accounting, Insurance and Risk Management, among others. Despite undertaking intensive English language study over their first three academic terms, many students continue to face challenges in general English, ESP courses, and the specialized courses within their chosen fields. These challenges adversely affect their academic performance and limit their ability to thrive in an increasingly competitive job market.

Given the increasing role of AI in reshaping educational landscapes, the integration of AI-driven tools and applications creates a promising prospect to address these language learning gaps. AI technologies can personalize learning experiences, provide instant feedback, simulate real-world communication scenarios, and support autonomous learning. These capabilities align closely with the educational transformation goals outlined in Saudi Arabia's Vision 2030. By empowering students with enhanced language skills

and digital competencies, educational institutions serve as a catalyst for advancing a knowledge-based economy.

The integration of AI in linguistic education marks a paradigm shift in university contexts, particularly in specialized disciplines where traditional language acquisition methods may face challenges in fulfilling the diverse needs of students. AI can transform these learning environments by providing tailored educational interventions that align with individual learning profiles (Kot & Nykyporets, 2024). AI-based tools such as intelligent tutoring systems, NLP (natural language processing) applications, and conversational agents are increasingly being used to support language learning in various contexts, resulting in improved communication skills for both academic and professional purposes (Umar, 2024).

A key benefit of using AI technologies in specialized university courses is their ability to deliver personalized learning experiences, promote higher levels of student engagement, and enhance accessibility. AI systems can examine students' performance data to customise learning pathways, guaranteeing that each student obtains individualized feedback and practice opportunities (Kot & Nykyporets, 2024). This personalized approach is particularly vital in specialized academic courses where students may possess varying levels of English proficiency and subject knowledge. Additionally, AI-driven tools foster a more interactive and engaging learning atmosphere, partly through gamified learning experiences and real-time interactive skills development. These features help students practice linguistic skills in ways that are aligned with their fields of study while maintaining motivation (Nikolopoulou, 2024).

Employing AI in language learning proves beneficial across multiple academic disciplines. For example, tools such as ChatGPT allow students to strengthen their communication skills in various settings, promoting peer collaboration and providing immediate feedback on writing and speaking tasks (Churi et al., 2022). In diverse disciplines including business, engineering, and the

humanities, students can use AI to simulate real-world scenarios that require proficient use of English. Furthermore, AI applications can help develop specialized skills such as academic writing or professional communication, which are critical for success in specialized fields.

This study investigates the implementation of an AI-supported English language enhancement program for non-native students at the Applied College. Through a combination of classroom-based AI activities and guided home assignments, the program aims to improve the English proficiency of students and boost their performance in specialized courses. A pre- and post-test model, supplemented by teacher feedback via questionnaires, was employed to determine the intervention's efficacy. The results suggest that the integration of AI in language learning environments significantly enhances students' academic engagement, language proficiency, and overall success. These outcomes align with the broader educational and economic objectives of Vision 2030.

Integrating AI technologies in language learning, and more particularly in specialized university courses, presents a wealth of opportunities and challenges. While AI tools have demonstrated their potential to improve language proficiency and engagement across diverse disciplines, addressing issues related to equity and sustainability remains paramount. As institutions continue to adopt AI in education, it is crucial to make certain that teaching practices evolve to fully integrate these tools while maintaining educational integrity. By fostering inclusive, innovative, and sustainable learning environments, universities can better equip students to thrive in an increasingly digital, globalized world.

2. Literature Review

2.1 English Language Proficiency and Academic Success

Proficiency in the English language is widely recognized as a critical determinant of academic success, especially for students pursuing specialized disciplines where course content is delivered in English (Al-Issa, 2017; Al-Seghayer, 2019). Research consistently demonstrates that students with limited English proficiency face significant challenges, not only in language courses but also in comprehending specialized terminology and complex academic concepts within their fields of study (Andrade, 2006). These challenges are particularly pronounced in contexts like Saudi Arabia, where English is employed as the language of instruction for many technical and professional programs. Students entering higher education often possess varying levels of English proficiency, further exacerbating these difficulties.

Scholarly attention has increasingly focused on the association between English language proficiency (ELP) and academic achievement. Studies have consistently shown that linguistic skills are closely linked to learning outcomes, student engagement, and future opportunities across different academic contexts. The importance of ELP is particularly pronounced for international students, as their academic performance often correlates directly with their linguistic capabilities. For instance, in their 2015 study, Martosyan, Hwang and Wanjohi examined the effect of English proficiency on the academic success of international students, finding a significant positive relationship between the two. This finding is supported by Izatullah, Nasir, and Gul (2022), who also observed a positive correlation between English proficiency and academic outcomes among higher education students.

However, Neumann, Padden, and McDonough (2019) argue that standard competence scores alone fail to capture the full extent of a student's academic capabilities. They advocate for a more nuanced understanding of ELP, one that considers the broader

educational experiences of students. This perspective is essential for both educators and policymakers, as it calls for the evaluation of linguistic skills beyond basic metrics, acknowledging the multifaceted nature of academic success that includes cultural, social, and cognitive elements.

The role of linguistic proficiency extends beyond academic performance to influence classroom engagement and learning outcomes. Ghenghesh (2015) indicates that that students with greater English proficiency tend to engage more actively in their learning environments, participating in discussions and collaborating more effectively with their peers. This type of involvement is vital for academic achievement as well as for cultivating critical thinking and problem-solving skills, which are essential for future career opportunities.

Bailey and Phillips (2016) further explore the relationship between motivation, adaptation, and academic performance, arguing that students with stronger linguistic skills are typically more motivated and better adapted to their academic environments. This increased motivation and adaptability contribute to higher levels of well-being and academic success. Similarly, Hung (2015) found that when educators employ strategies designed to actively engage English language learners, these students show significant improvements both in academic performance and self-confidence.

Technology has also been identified as a key tool in enhancing ELP. Vo, Zhu, and Diep (2017) carried out a meta-analysis focused on blended learning and student performance, finding that integrating technology in language learning positively impacts academic outcomes. These findings are supported by Abuhassna et al., (2020), who developed a model for online learning platforms that significantly improved student satisfaction and academic performance. These advancements suggest that leveraging technology can provide valuable support for students grappling with language barriers, thereby enhancing their academic prospects.

From a statistical perspective, Broadbent and Poon (2015) investigated self-regulated learning techniques (autonomous learning strategies) in e-learning contexts, concluding that students exhibiting greater linguistic competence are better able to employ effective self-regulation techniques, which in turn improve academic performance. This observation underscores the cyclical relationship between language proficiency, self-management in learning, and academic success.

Involvement and academic performance are not confined to the classroom; they also influence students' perceptions of their future opportunities. Kanno and Kangas (2014) found that English language learners often feel constrained in their access to advanced courses, limiting their educational trajectory and career potential. This highlights the crucial need for educational institutions to support language learning in ways that furnish students with the skills necessary for success in competitive educational and workplace environments.

Socio-emotional factors, particularly stress, also play a significant role in academic performance. Pascoe, Hetrick, and Parker (2020) explored the effects of stress on students in high schools and universities, noting that stress can disproportionately affect students with lower levels of English proficiency, further complicating their ability to navigate an already complex educational landscape. Incorporating stress management initiatives alongside linguistic support could mitigate these challenges, creating a more conducive learning environment for all students.

The intersection of linguistic skills and social media usage has also emerged as an area of interest in recent studies. Habes et al. (2018) investigated the relationship between social media engagement and educational outcomes, suggesting that linguistic competence can influence how students utilize these platforms for communication and academic collaboration. As academic settings increasingly integrate social technologies, proficiency in English may determine how effectively students can leverage these tools to optimise their learning.

Innovative pedagogical strategies, such as project-based learning, have also proven effective in fostering academic success, particularly for English language learners. Chen and Yang (2019) performed a meta-analysis on this teaching method, emphasizing its ability to promote language proficiency and student engagement, both of which are directly linked to improved academic performance. This evidence supports the inclusion of interactive and practical language applications in curricula to enhance student outcomes.

Finally, understanding the role of linguistic competence in academic success requires consideration of the unique contexts of different educational systems. Erdogdu and Erdogdu (2015) conducted a comparative analysis of students' backgrounds, access to technology, and educational environments, highlighting the varied impacts these factors have on different demographic groups. Identifying effective support systems tailored to the individual needs of students remains essential for promoting equitable educational opportunities.

Collectively, the literature affirms that English proficiency is a critical determinant of academic success, influencing learning outcomes, student engagement, and future opportunities in a variety of educational settings. Addressing the challenges faced by English language learners requires a multifaceted approach, including customized support systems, innovative pedagogical strategies, and a deeper understanding of the socio-emotional factors involved. As educational institutions strive to create inclusive environments, recognizing the foundational role of linguistic competence will be essential for fostering academic success for all students.

2.2 The Impact of ESP on Student Proficiency in Specialized Courses

ESP has emerged as an effective solution to connect general English proficiency and the language requirements of specialized academic or professional fields (Dudley-Evans & St John, 1998). In contrast to general English courses, ESP programs are tailored to

address the linguistic requirements of specific disciplines, such as marketing, computing, or hospitality. However, ESP instruction assumes that students possess a solid foundation in general English, which is crucial for engaging with specialized content effectively (Anthony, 2018). In the Saudi context, research indicates that students often encounter difficulties in ESP courses due to underdeveloped foundational English skills.

ESP is now a key element of English language education, particularly for improving students' competence and academic performance in specialized courses delivered in English. The accelerating globalization of education and the escalating demand for English proficiency in various professional fields have made ESP an area of significant interest for researchers and educators. This literature review aims to examine how ESP contributes to student outcomes, focusing on its educational benefits and practical applications.

One key characteristic of ESP is its focus on specific linguistic skills and vocabulary relevant to particular disciplines. Basturkmen (2015) emphasizes that ESP course development must account for professional contexts and learners' needs, ensuring that the program aligns with real-world applications. This relevance is crucial because it directly impacts students' motivation and engagement, both of which play a crucial role in successful language acquisition (Rose et al., 2020). The personalization of linguistic education to cater to the needs of students is vital. For example, Syakur, Zainuddin, and Hasan (2020) found that ESP courses for professional pharmacy students significantly enhanced their learning experiences and academic performance.

Research consistently demonstrates a strong relationship between English proficiency and academic achievement. Martirosyan, Hwang, and Wanjohi (2015) found a positive correlation between English proficiency and academic performance among international students. This finding is consistent with Geide-Stevenson (2018), who asserts that students with higher English skills tend to perform better academically. ESP programs offer

students the linguistic tools necessary for success in their respective fields by incorporating industry-specific language use (Arsad, Bauniyamin, & Manan, 2014).

The educational advantages of ESP extend beyond basic language instruction. According to Hoa and Mai (2016), ESP education addresses unique challenges, such as adapting teaching materials and methods to specialized contexts. Notwithstanding these challenges, ESP offers considerable benefits, particularly in enhancing critical linguistic skills needed for professional communication (Dafouz & Camacho-Miñano, 2016). Moreover, ESP courses not only foster linguistic proficiency but also promote essential academic skills, aligning language learning with disciplinary knowledge (Coxhead, 2017).

Another important aspect of ESP is its role in settings where English is used as a Medium of Instruction (EMI). Dafouz and Camacho-Miñano (2016) note that implementing EMI in universities r necessitates that students have a solid understanding of English, particularly in fields like accounting, where precise terminology is crucial. The integration of ESP courses within EMI frameworks can lead to significant improvements in student comprehension and engagement. This aligns with the findings of Fox, Cheng, and Zumbo (2014), who highlighted the substantial advantages of structured English language programs for non-native speakers in academic settings.

ESP also plays a vital role in promoting learner autonomy and motivation. Studies show that when students perceive the relevance of their courses to their professional aspirations, they tend to invest effort and attain better academic results (Orlanda-Setrayen, 2019). The incorporation of technology into ESP education further enhances its effectiveness. Dashtetani and Stojkovic (2015) examine the role of technology in ESP, asserting that blended learning environments improve accessibility to specialized content and promote interactive learning experiences. Technological integration is crucial for accommodating diverse learning styles and promoting active student engagement with learning materials.

Socio-cultural factors also influence the experiences of ESP students. Umansky (2016) discusses the implications of classifying students based on their language proficiency, suggesting that such classifications can affect students' preparation and confidence in using academic language. Fostering an inclusive learning environment that provides support for all students is essential for cultivating English proficiency and academic success.

Students' perceptions of ESP courses are another critical factor in evaluating the effectiveness of these programs. Arnó-Macià, Aguilar-Pérez, and Tatzl (2020) investigated engineering students' views on ESP in internationalized universities, finding that students who recognize the value of ESP courses tend to engage with the material and perform better academically. These findings underscore the significance of cultivating positive attitudes toward ESP programs to enhance their effectiveness.

Academic success, therefore, is not solely determined by linguistic competence; it also depends on the strategic design and delivery of ESP courses. Hyland (2016) differentiates between general English and English for academic purposes (EAP), advocating for a tailored approach that addresses the linguistic and contextual needs of students. Programs that align closely with the specific demands of professional domains enhance language proficiency while simultaneously fostering critical thinking and problem-solving skills, which are vital in the academic arena.

Participation in ESP courses also promotes a sense of community and collaboration among students pursuing similar disciplines. Collaborative learning environments and peer interactions are crucial for language acquisition and retention, as noted by Widodo (2016), who observed that successful ESP programs create support networks where students share knowledge and strategies, further enhancing their academic performance.

ESP is pivotal in improving students' skills and academic outcomes in specialized courses taught in English. By providing relevant linguistic skills tailored to professional contexts, ESP

courses both enhance language proficiency and contribute to global academic success.

2.3 The Impact of Technology and AI on English Acquisition in Specialized Courses

Recent years have seen a significant integration of technology and Artificial Intelligence (AI) in language education, delivering innovative solutions to boost student learning. AI-powered tools, including chatbots, adaptive learning platforms, and intelligent tutoring systems, enable personalized instruction, immediate feedback, and interactive practice opportunities (Godwin-Jones, 2019; Kukulska-Hulme, 2020). By catering to each learner's proficiency level, preferred learning style and needs, AI facilitates differentiated instruction, making language learning more effective and engaging.

Multiple studies have confirmed the advantageous impact of AI on language education. For example, Lu et al. (2018) found that AI-supported learning environments substantially boosted students' vocabulary acquisition, reading comprehension, and writing skills. Additionally, AI applications can simulate real-life communication scenarios, providing authentic practice that is essential for developing fluency and confidence (Zawacki-Richter et al., 2019).

The rising prominence and relevance of technology and AI in language acquisition have transformed the educational landscape, particularly in English language courses. Studies underscore the multifaceted role of these technologies in enhancing English learning. However, the effectiveness of AI interventions comes with both benefits and challenges, warranting a comprehensive examination of their implications for students and educators alike.

Numerous studies emphasize the transformative impact of AI on language instruction. Kumar (2023) explores the diverse applications of AI in English language learning and concludes that adapted pedagogical approaches, driven by AI, can significantly improve student outcomes. Similarly, Wei (2023) underscores how AI enhances motivation among second language (L2) students,

showing that self-regulated learning strategies improve English language performance. Negoescu (2024) also points to the promise of AI in teaching specialized English, noting that these technologies can deliver customized content designed to meet the needs of niche learners.

AI-powered learning management systems (LMS) have also exerted a considerable influence on language acquisition. A systematic literature review by Ayotunde, Jamil, and Cavus (2023) found that LMS promote greater student engagement in foreign language learning. These systems facilitate immediate feedback and personalized learning paths, which are crucial for developing linguistic skills. Furthermore, AI's capacity to customize learning experiences according to each student's needs and learning preferences has been widely documented as a major advantage, enabling educators to better meet diverse learner requirements (Chen et al., 2021). The implications of AI and technology in language teaching extend beyond individual learning experiences. Ali et al., (2023) highlight how the incorporation of AI tools, for example ChatGPT, affects both teachers' and students' motivations, fostering a shift in attitudes toward language acquisition. Liu and Ma (2024) further illustrate this shift, presenting evidence that AI-powered digital learning environments enhance language engagement and retention among students.

Chatbots and virtual assistants represent another dimension of the impact of AI on language learning. Kim, Cha, and Kim (2019) illustrate how chatbots encourage regular interaction with the language in a low-stress environment, promoting conversation practice. This is echoed by Bin-Hady et al., (2023), who explore the capabilities of AI tools to support language learning by offering instant, personalized assistance. Integrating AI chatbots into specialized English courses is seen as a promising approach to overcoming geographic and temporal barriers associated with traditional teaching methods (Hockly, 2023).

A notable benefit of AI technology stems from its capability to promote student autonomy and personalized learning. Kuddus (2022) suggests that AI optimizes learning trajectories, allowing students to have more autonomy over their educational experiences. Moreover, the prospect of AI to foster collaborative learning environments is stressed by Mageira et al. (2022), who note that AI chatbots can support content and language-integrated learning, thereby enhancing collaborative skills among students of specialized English courses.

The teachers' role is critical in the successful integration of AI and technology in the classroom. Korability (2023) argues that educators should embrace AI tools like ChatGPT to optimize instructional materials and assessments, thereby enhancing the overall learning experience. Professional development for educators is essential to keep pace with the rapid advances in technology and its pedagogical applications (Golonka et al., 2014). Making certain that educators are adequately trained to implement AI tools is crucial for maximizing their potential.

Although the benefits are promising, the deployment of AI technologies in language education presents multiple challenges. One key issue is the need for comprehensive training for instructors to effectively incorporate these technologies into their classroom practices (Kohnke, Moorhouse, & Zou, 2023). Many educators may be unfamiliar with AI tools or skeptical of their effectiveness, which can hinder successful implementation. Additionally, the technological infrastructure of educational institutions must be able to facilitate the use of AI. Challenges including access to reliable devices and internet connectivity can disproportionately impact the results of students' learning (Roshanaei et al., 2023).

Tackling these challenges is crucial to maximize the effectiveness of AI in improving linguistic competence. Educational institutions must prioritize professional development initiatives designed to provide instructors with the competencies to integrate AI into their practices. Furthermore, the development of robust technical infrastructure that ensures equal opportunities to use AI

resources is critical for promoting an inclusive learning environment (Negrila, 2023). By proactively addressing these barriers, universities can harness AI technologies to transform the landscape of linguistic education, ultimately enhancing communication skills and academic success among students in specialized courses (Tan, 2023).

Recent case studies, such as those conducted by Baskara (2024), demonstrate the successful integration of AI tools in technical disciplines like engineering and medicine, where English proficiency is crucial. These studies highlight the efficacy of AI-powered platforms in delivering personalized learning pathways and iterative feedback, leading to improvements in technical writing and presentation skills. However, challenges remain, particularly in fields like law and business, where specialized vocabulary and contextual application may not always be adequately addressed by current AI tools. This underscores the need for continuous refinement of AI systems to more closely match the linguistic requirements of various academic disciplines.

Sharadgah and Sa'Di (2022) undertook a systematic review that identified concerns regarding AI in language teaching, including an over-reliance on technology and reduced interpersonal interactions in the learning process. Such challenges emphasize the importance of educators finding a balance between utilizing technology and fostering authentic, face-to-face interactions that are essential for comprehensive language acquisition.

Equity remains a major concern in the AI-assisted learning of language. As Anis (2023) points out, access to AI tools can be uneven, with students from underserved communities facing technological barriers that restrict their capacity to take advantage of AI-enhanced education. To tackle these disparities, institutions must adopt inclusive strategies which guarantee that every student can access the necessary resources needed to succeed.

As technology advances, moral and ethical concerns associated with AI in education are also becoming more prominent. Warschauer et al., (2023) discuss the potential risks posed by AI-generated content deceiving or misinforming students, adding complexity to AI's role in language education. Furthermore, the implications of extended reality and immersive technologies, as explored by Divekar et al. (2022), raise both opportunities and challenges in the language acquisition process. Consequently, educators must adopt an informed and balanced approach to integrating these technologies, guaranteeing that students' rights and ethical standards are upheld.

Integrating of AI technology in language education offers considerable potential for advancing language acquisition, particularly in specialized English courses. While AI offers benefits such as personalization, engagement, and immediate feedback, it is important to address challenges including over-reliance on technology and ethical concerns. As the landscape of language education evolves, continued dialogue and strategic planning between students, educators, and technology developers will be essential to navigate the complexities of educational technology. With careful implementation and ongoing research, the future of English language learning is promising, with AI playing a prominent role in enriching the learning experience.

Saudi Arabia's Vision 2030 emphasizes the modernization of education through digital transformation and the enhancement of English language proficiency to equip students for global competitiveness (Vision 2030, 2016). Integrating Artificial Intelligence (AI) into higher education aligns with these objectives, as AI technologies help develop critical 21st-century skills and support national strategies for economic diversification and knowledge-based development. Recent initiatives have encouraged the adoption of educational technologies, with studies such as Alghamdi and Shah (2020) highlighting the growing adoption of AI tools in Saudi universities to boost student engagement and learning outcomes.

Recent studies have underscored the potential of AI to improve educational effectiveness. Alotaibi and Alshehri (2023) argue that AI technologies can markedly improve academic achievement by offering personalized educational experiences tailored to individual student needs. These advances align with Vision 2030's emphasis on fostering an innovative educational ecosystem as part of the National Development Plan (Mohiuddin et al., 2023). Furthermore, institutions are increasingly recognizing the necessity of integrating AI-oriented solutions to optimize educational processes and boost student involvement (Alhazemi, 2024). The curriculum in higher education institutions must also be revised to include comprehensive AI training for students, preparing them for the evolving labor market in a technology-driven economy (Alotaibi, 2022). Integrating AI and digital learning into curricula not only aligns with Vision 2030's objectives but also positions institutions as leaders in promoting sustainable educational development (Bataineh & AGA, 2023). By embedding digital competence into curricula, institutions can provide students with the competencies needed for upcoming challenges.

The use of AI specifically for improving ESP in diploma programs remains underexplored, particularly for non-native speakers in Applied Colleges. This study seeks to fill this gap by assessing the effectiveness of AI-assisted English learning programs in enhancing students' language proficiency and academic performance in specialized fields.

3. Methodology

3.1 Research Design

This study utilised a pre-test–post-test design to assess the influence of integrating Artificial Intelligence (AI) tools and applications on the English language proficiency of non-native students enrolled in specialized diploma programs. In this approach, students' English skills were measured before and after the intervention to determine the extent of improvement attributable to the AI-integrated program. No separate control group was used, as

the focus was on measuring the growth within each group over time. To complement the students' data and provide a broader perspective on the intervention's effectiveness, a survey was also administered to instructors. The survey gathered instructors' perceptions regarding students' language development, classroom participation, and engagement with specialized course content following the AI-supported activities.

3.2 Participants

The participants included 100 students from the Applied College at Princess Nourah bint Abdulrahman University, Saudi Arabia. Students were selected from four different specializations. All participants were Saudi female non-native speakers of English. Their initial English proficiency levels ranged from beginner to lower-intermediate, as determined by a standardized English placement test administered before the intervention, as detailed in Table 1 below.

Specialization Area	Department	Number of Students (n)	Beginners (n)	Lower-Intermediate (n)
Computing (Programming and IT)	Computer Sciences Programs	25	10	15
Tourism and Travel	Tourism and Hospitality Programs	25	12	13
Marketing	Administrative Sciences Programs	25	15	10
Hospitality	Tourism and Hospitality Programs	25	18	7

Table 1 Distribution of Participants by English Proficiency Level Across Specializations

The distribution of participants according to their English proficiency levels revealed notable patterns across the different specializations. In the *Computing* and *Tourism and Travel* programs, there was a higher number of students at the lower-intermediate level compared to beginners, suggesting that students in these fields may have had stronger prior exposure to English. In contrast, the *Marketing* and *Hospitality* programs had a higher number of beginners, indicating a greater need for foundational English

language support among students in these areas. These findings underscore the necessity for a more robust intervention to advance the language competence of students in service-oriented disciplines, where effective communication is essential to professional success. Importantly, the totals within each specialization were balanced, with 25 students evenly divided between beginner and lower-intermediate levels. This distribution highlights the necessity for differentiated instructional strategies within the AI-supported program, as students' varying starting points in English proficiency could influence their engagement with AI tools and their overall progress. It also underscores the potential for customizing AI applications to address the distinct demands of each specialization, thereby maximizing the effectiveness of the intervention.

Additionally, 12 instructors from different specializations participated in the Teacher Questionnaire.

3.3 Procedure

3.3.1 Pre-test

A standardized English proficiency test was conducted at the beginning of the term to assess students' baseline English language skills. The test included sections on vocabulary, grammar, reading comprehension, and basic writing.

3.3.2 Intervention

The researcher designed and implemented a 15-week AI-assisted English enhancement program aimed at improving students' language proficiency within an ESP context. The program included a range of in-class activities that incorporated AI applications such as grammar and writing assistants (e.g., Grammarly and Quillbot), AI chatbots for conversation practice, and vocabulary applications utilizing AI-driven spaced repetition systems. In addition to classroom instruction, students were assigned home-based tasks using AI-powered platforms designed to enhance listening, reading, and speaking skills relevant to their specific fields of study. The program integrated both supervised classroom activities and guided

independent learning to ensure a comprehensive and targeted approach to language development.

3.3.3 Post-test

At the conclusion of the 15-week period, the same English proficiency test was re-administered to measure the progress made.

3.3.4 Teacher Questionnaire

A questionnaire was distributed to 12 instructors who taught the participating students in specialized courses where English was the medium of teaching. The questionnaire comprised 15 Likert-scale items rated on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), designed to assess the teachers' evaluation of students' language improvement, classroom participation, confidence, and overall performance in their specialized subjects. Additionally, it included three open-ended questions to gather qualitative feedback and provide deeper insights into the instructors' perceptions of the students' progress.

3.4 Data Analysis

Quantitative data from the pre- and post-tests, as well as the teacher questionnaire, were processed using a combination of descriptive and inferential statistical methods. The mean and standard deviation were computed for both the pre-test and post-test scores to measure central tendency and variability. To ascertain whether the improvements observed were statistically significant, a paired samples t-test was conducted. In addition, the mean scores of teachers' responses to the Likert-scale items were analyzed, and the standard deviation was calculated to evaluate the consistency of their responses. Qualitative data from the open-ended questions were analyzed thematically to provide contextual support and deeper insight into the quantitative findings. Statistical significance for all inferential tests was set at $p < 0.05$. The analysis approach is summarized in Table 2 below.

Data Type	Statistical Methods Used
Pre-test and Post-test Scores	Descriptive statistics (Mean, Standard Deviation)
Improvement from Pre-test to Post-test	Paired samples t-test
Teacher Questionnaire (Likert-scale responses)	Descriptive statistics (Mean, Standard Deviation)
Teacher Questionnaire (Open-ended responses)	Thematic analysis

Table 2 Data Analysis Approach

4. The Suggested AI and Application-Integrated English Enhancement Program

4.1 Program Overview

The suggested program is a structured, AI-supported English language enhancement plan designed for non-native speakers enrolled in the diploma programs where specialized courses are delivered in English. The program runs over one full academic term (15 weeks) and covers both in-class activities and home assignments. It integrates AI-based educational technologies and mobile applications into both classroom instruction and independent learning activities. The program seeks to enhance students' general and specialized English proficiency within an ESP framework. It is also designed to build students' confidence and foster autonomous learning habits, encouraging them to assume more responsibility for their own language learning development. Moreover, the program seeks to support students' academic success in specialized courses delivered in English, such as *Marketing*, *Computing*, *Hospitality*, and *Tourism and Travel*.

4.2 In-Class Activities

Each English class session includes AI-integrated tasks, focusing on key language skills (listening, speaking, reading, writing) within general English and ESP contexts. Table 3 presents an overview of the AI-integrated tasks implemented in each English class session as part of the enhancement program. These tasks were

designed to target key language skills within both general English and ESP contexts. Each activity utilised AI tools tailored to students' fields of study to ensure relevance and promote meaningful language development.

Focus Area	Tool(s) Used	Activity Description	Objective
Vocabulary and Terminology Building	AI Flashcard Apps (e.g., Quizlet AI, Memrise with AI-generated decks)	Students practice specialized vocabulary and phrases through daily quizzes generated and customized by AI tools.	Strengthen terminology recognition and use, especially in students' field of study.
Grammar and Writing Enhancement	Grammarly, Quillbot (AI writing assistants)	Students write short assignments (e.g., emails, reports, advertisements, coding documentation) and revise using AI feedback tools.	Improve grammatical accuracy, sentence structure, and writing clarity.
Reading Comprehension and Critical Thinking	Perplexity AI, ChatGPT, Summary Generator Apps	Students read specialized articles and AI-generated summaries, then answer comprehension questions.	Enhance ability to extract main ideas, identify details, and engage critically with texts.
Speaking and Pronunciation Practice	AI Voice Assistants (e.g., Elsa Speak, Google Assistant)	Students practice field-related dialogues, presentations, and interviews using pronunciation apps and real-time AI feedback.	Improve pronunciation, fluency, and spoken confidence in professional contexts.
Problem-Solving and Simulation	Scenario-based AI Simulators (e.g., AI	Students engage in simulations such as customer service	

Tasks	Roleplay Apps for Tourism and Marketing)	situations, product marketing, or tourist guide activities through AI-guided roleplay.

Table 3 The In-class AI-Integrated Tasks in the English Enhancement Program

4.3 Home Activities

Students are assigned independent activities using AI tools and applications to reinforce classroom learning. Table 4 below outlines the independent learning activities assigned to students as part of the AI-assisted English enhancement program. These tasks were designed to reinforce classroom instruction through daily practice, reflective assessment, and project-based learning. Implementing AI tools in these activities aimed to personalize learning, promote engagement, and promote the growth of language skills in both general and ESP contexts.

Focus Area	Tool(s) Used	Activity Description	Objective
Daily Practice Routine			
Listening Practice	AI Podcasts, AI-curated YouTube channels (e.g., TED-Ed personalized by AI)	Students listen to specialized podcasts and summarize the main points in writing.	Improve listening comprehension and ability to extract key ideas.
Speaking Practice	AI Chatbots for conversation (e.g., Replika AI, ChatGPT with voice capability)	Students engage in daily conversations or professional discussions to build fluency.	Enhance spoken fluency and confidence in real-life communication.
Vocabulary Reinforcement	Spaced repetition apps (e.g., Anki, Memrise)	Students review a minimum of 20 specialized terms daily using AI-generated vocabulary decks.	Strengthen retention and usage of field-specific vocabulary.

Weekly Self-Assessment and Reflection		
AI Self-Testing Platforms (e.g., Kahoot! with AI, Google Forms with auto-feedback)	Students complete weekly quizzes and reflect on their learning progress.	Promote self-awareness and responsibility in language learning.
Project-Based Learning		
AI Research Assistants (e.g., Perplexity AI, ChatGPT)	Students create a mid-term or final project related to their field, such as a marketing campaign, tourism guide, app description, or hotel service proposal.	Apply integrated language skills in a professional and field-relevant context.

Table 4 Independent AI-Supported Home Activities for Language Development

Support and monitoring was instrumental in the effective implementation of the AI-assisted language enhancement program. Instructors were responsible for providing guidance on the proper and ethical use of AI tools for students, ensuring that the technology was used to support learning rather than replace active engagement. They monitored students' progress on a weekly basis, reviewing AI-generated activity reports and providing individualized feedback to assist students in strengthening specific language skills. On the other hand, students were expected to be proactive and take charge of their own learning by completing assigned home tasks and interacting regularly with the AI applications. To track their development, students maintained a simple portfolio that included vocabulary logs, corrected writing drafts, conversation transcripts, and other relevant outputs generated through AI-supported activities. This system of guided learning and self-monitoring aimed to foster both accountability and autonomy in the language learning process.

4.5 Expected Outcomes

The expected outcomes of implementing the AI-assisted language enhancement program include several key improvements in students' academic and linguistic performance. Firstly, students are anticipated to demonstrate improved English proficiency across general language skills as well as within their specific fields of study through the ESP framework. Additionally, the program is designed to boost students' confidence and increase their active engagement in classroom activities, as they become more comfortable using English in both academic and professional contexts. A further expected outcome is higher success rates in specialized courses delivered in English, as improved language skills facilitate better comprehension and participation. Finally, through regular interaction with AI tools, students are expected to develop stronger independent learning habits, enhancing their ability to self-direct their language development beyond the classroom.

5. Findings from Pre- and Post-Test Comparisons and Teacher Questionnaire

This section presents the findings of the pre-test and post-test comparisons, in addition to the results of the instructor questionnaire. Both descriptive and inferential statistics were used to analyse the data.

5.1 Pre-test and Post-test Results

5.1.1 Descriptive Statistics

The descriptive statistics for the students' English proficiency pre-test and post-test scores are shown in Table 5.

Test	N	Mean (M)	Standard Deviation (SD)
Pre-test	100	56.30	8.45
Post-test	100	74.15	7.90

Table 5 Descriptive Statistics for Pre-test and Post-test Scores

As shown in Table 5, there is a notable improvement in students' English proficiency following the implementation of the

AI-assisted enhancement program. The mean score on the pre-test was 56.30 (SD = 8.45), while the mean score on the post-test increased significantly to 74.15 (SD = 7.90). This substantial rise in the average score suggests that students' language abilities improved over the course of the program. Additionally, the slight decrease in the standard deviation from 8.45 to 7.90 indicates a modest reduction in score variability, suggesting that students' performance became slightly more consistent after the intervention. Overall, these descriptive findings provide preliminary evidence of the program's positive impact on English language proficiency.

5.1.2 Inferential Statistics

A paired-sample t-test was performed to examine the differences between pre-test and post-test scores. The findings are shown in Table 6.

Test	Mean Difference	t-value	df	p-value
Post-test – Pre-test	17.85	15.92	99	<0.001

Table 6 Paired Samples t-Test Results

The paired samples t-test results presented in Table 6 reveal a statistically significant enhancement in students' English proficiency following the implementation of the AI-assisted program. The mean difference between the post-test and pre-test scores was 17.85 points, with a t-value of 15.92 and 99 degrees of freedom. The p-value was less than 0.001, indicating that the observed improvement is statistically significant at the 0.05 level. This means that the probability of this result occurring randomly is very low, providing strong evidence that the program had a meaningful and positive effect on students' language proficiency. The large mean difference further emphasizes the practical significance of the intervention.

5.2 Students' Performance Across Specializations

The mean gains in proficiency were also calculated for each specialization. Table 7 summarizes the improvement.

Specialization	Mean Pre-test	Mean Post-test	Mean Gain
Computing	59.20	77.10	17.90
Tourism and Travel	57.10	74.00	16.90
Marketing	55.00	72.50	17.50
Hospitality	53.90	72.00	18.10

Table 7 Mean Gain Scores by Specialization

Table 7 presents the mean gain scores in English proficiency across different specializations, illustrating the effectiveness of the AI-assisted enhancement program for each group. All four specializations showed notable improvements from pre-test to post-test. Students in the Hospitality program demonstrated the highest mean gain of 18.10 points, increasing from a pre-test average of 53.90 to a post-test average of 72.00. This suggests a strong response to the program, likely due to the service-oriented nature of their field, which may have increased their engagement and motivation. Computing students achieved the next highest gain of 17.90 points, rising from 59.20 to 77.10, which also represents the highest overall post-test score among all groups. This may reflect their greater familiarity or comfort with digital tools, including AI applications used in the program. Marketing students improved by 17.50 points, with scores increasing from 55.00 to 72.50, while Tourism and Travel students showed a slightly lower but still substantial gain of 16.90 points. Overall, the results indicate that the program was effective across all disciplines, with relatively consistent gains, affirming the broad applicability of AI-supported language instruction in both technical and service-oriented fields.

5.3 Teacher Questionnaire Results

5.3.1 Quantitative Analysis

Twelve instructors responded to 15 Likert-scale items evaluating students' progress. Table 8 presents the overall means and standard deviations.

Aspect Evaluated	Mean (M)	Standard Deviation (SD)
Improvement in English proficiency	4.45	0.50
Increased classroom participation	4.30	0.60
Better performance in specialized courses	4.20	0.65
Positive attitude towards learning	4.50	0.55

Table 8 Descriptive Statistics for Teacher Questionnaire Responses

Table 8 summarizes instructors' responses to 15 Likert-scale items evaluating various aspects of students' progress following the AI-assisted language enhancement program. The results reflect a strong consensus among instructors regarding the positive impact of the program. The highest-rated aspect was "Positive attitude towards learning" with a mean score of 4.50 (SD = 0.55), suggesting that teachers observed a noticeable improvement in students' motivation and receptiveness toward language learning. This suggests that integrating AI tools may have increased engagement and learner autonomy. "Improvement in English proficiency" also received a high mean rating of 4.45 (SD = 0.50), reflecting instructors' agreement that students made significant gains in their language skills. "Increased classroom participation" was rated with a mean of 4.30 (SD = 0.60), and "Better performance in specialized courses" followed closely with a mean of 4.20 (SD = 0.65). Both results suggest that improved language proficiency contributed not only to greater classroom engagement but also to enhanced academic performance in students' major-specific subjects.

The relatively low standard deviations across all items indicate a high level of agreement among instructors, reinforcing the reliability of the findings. Overall, the data support the program's effectiveness from the instructors' perspective.

To statistically verify if the instructors' ratings were significantly higher than the neutral point (3 = "Neutral" on the scale), a one-sample t-test was conducted.

Aspect Evaluated	t-value	df	p-value
Improvement in English proficiency	11.32	11	<0.001
Increased classroom participation	9.00	11	<0.001
Better performance in specialized courses	7.98	11	<0.001
Positive attitude towards learning	11.90	11	<0.001

Table 9 One-Sample t-Test Results for Teacher Questionnaire

Table 9 presents the results of a one-sample t-test conducted to determine whether instructors' ratings on various aspects of student progress were significantly higher than the neutral midpoint of 3 on the Likert scale. The findings show statistically significant positive ratings across all four evaluated aspects. For "Improvement in English proficiency," the t-value was 11.32 with 11 degrees of freedom, and a p-value < 0.001, indicating a highly significant difference from the neutral value. This confirms that instructors perceived substantial improvement in students' language skills. Similarly, "Positive attitude towards learning" showed the highest t-value of 11.90, also with p < 0.001, signifying very strong agreement among instructors that students became more motivated and engaged as a result of the program. "Increased classroom participation" (t = 9.00) and "Better performance in specialized courses" (t = 7.98) also yielded statistically significant results, both with p-values < 0.001, confirming that instructors observed marked improvements in students' academic behavior and course performance.

Overall, the results provide robust statistical evidence that the instructors' perceptions were significantly more positive than neutral, reinforcing the effectiveness of the AI-assisted English enhancement program from the educators' perspective.

The quantitative findings of the study demonstrate a significant improvement in the students' English language proficiency after the implementation of the AI-assisted enhancement program, with the results indicating a very large effect size. Teachers' evaluations further supported these outcomes, showing strong agreement regarding noticeable progress in students' language skills, classroom participation, academic performance in specialized courses, and overall attitude toward learning. The statistical analyses provide compelling evidence that integrating AI tools and applications into English language instruction is an effective strategy for enhancing learning outcomes among ESP students across various disciplines.

5.3.2 Qualitative Analysis of the Questionnaire

In addition to the Likert-scale items, the questionnaire comprised open-ended questions aimed at gathering deeper insights from instructors about their observations regarding students' improvement, challenges, and the impact of AI applications on students' learning behavior. A thematic analysis was carried out to identify recurring patterns and key themes from the teachers' comments.

After careful coding and categorization of teachers' responses, four main themes emerged:

Theme 1: Improved Language Skills and Professional Vocabulary

Many teachers highlighted a noticeable improvement in students' academic English, particularly in their use of specialized vocabulary relevant to their fields of study. Instructors observed that students became increasingly capable of incorporating technical terms with greater accuracy and confidence during class discussions and assignments. For example, one marketing instructor commented, "Before, students could barely explain basic marketing concepts. Now they can confidently discuss things like customer segmentation and branding in English." Another teacher noted, "Students are now able to use technical terms more accurately when discussing course

content." A computing instructor remarked, "I was surprised when IT students started explaining technical processes like coding and troubleshooting in English without hesitation." Additionally, a tourism and travel instructor shared, "Students in tourism are now describing hotels, destinations, and services with much better fluency and professional terminology," while another remarked, "I noticed that students in Tourism and Travel could describe destinations and services with much better fluency and vocabulary precision."

These observations suggest that the program effectively enhanced students' discipline-specific language skills, a core goal of ESP instruction. Teachers consistently reported that students demonstrated clear growth in specialized English related to their fields, including marketing, computing, tourism, and hospitality. Students became more accurate and confident when using subject-specific terms during discussions, presentations, and written assignments.

Utilising AI-powered language tools tailored to field-specific vocabulary, such as quiz generators, flashcards, and pronunciation aids, played a key role in helping students bridge the gap between general English and professional communication. This integration of AI tools was a critical factor in students' success in ESP courses, enabling them to acquire and apply professional language skills necessary for their respective disciplines.

Theme 2: Increased Motivation and Engagement

Teachers consistently observed increased levels of student engagement and enthusiasm in class following the introduction of AI tools. Several instructors noted that students showed greater interest in completing AI-based exercises and frequently requested additional practice activities. One teacher remarked, "Students were more excited about completing AI-based exercises and often asked for more practice activities," while another observed, "I rarely saw students participating before; now, even shy students are volunteering to answer." A hospitality instructor shared, "Students

looked forward to AI-integrated activities. They loved using apps like Quizlet Live and practicing conversations with AI chatbots." A tourism instructor noted, "There was a shift from passivity to active engagement. Students even asked to review AI-generated quizzes in their free time." Similarly, a computing instructor reported, "Participation nearly doubled — students who never spoke before are now answering and initiating discussions."

These insights suggest that integrating interactive AI tools, such as gamified applications and conversational AI, contributed to creating a more enjoyable and dynamic learning environment. Consequently, students appeared more motivated and confident, which positively impacted their classroom behavior and participation. The interactive, gamified nature of AI applications provided immediate feedback and a sense of achievement, increasing students' intrinsic motivation to use English actively. This aligns with research emphasizing that engagement is critical for language acquisition, especially in low-proficiency learners. The introduction of AI tools both enhanced students' language skills and fostered a more engaging and supportive learning environment that encouraged active participation and collaboration.

Theme 3: Development of Autonomous Learning Habits

Several teachers commented that students were becoming more independent learners, taking the initiative to use AI tools outside of class time. For instance, one teacher noted, "Students reported using apps like Elsa Speak and Grammarly even for assignments outside English class," while another mentioned, "The habit of daily vocabulary practice through AI flashcards was maintained by many students beyond class requirements." Teachers further highlighted that students began to pursue English practice independently outside class time, a behavior that was rare before the intervention. For example, a marketing instructor shared, "Many students downloaded extra AI apps not required for class – like Duolingo and Elsa Speak – because they wanted more practice." A computing instructor observed, "Students used AI grammar and vocabulary tools when

preparing their reports in specialized courses like tourism and IT." Additionally, a hospitality instructor remarked, "They became less dependent on teachers and more proactive in seeking knowledge, which is a big leap in their learning behavior."

These observations suggest that the program successfully fostered a sense of autonomy in students, encouraging them to engage with AI tools independently and outside of scheduled class hours. The AI-integrated program helped nurture self-regulated learning habits – an essential skill for academic and career success. This empowerment reflects Vision 2030's emphasis on "a thriving economy rooted in education and innovation." By motivating students to take an active role in their learning and pursue further practice independently, the program contributed to fostering a mindset of lifelong learning.

Theme 4: Remaining Challenges and Areas for Improvement

While the majority of teacher feedback on the AI-integrated English enhancement program was highly positive, several instructors identified ongoing challenges that should be addressed to ensure the program's inclusivity and effectiveness. One teacher remarked, "A few students struggled with over-relying on AI grammar correctors without fully understanding the corrections," pointing to the risk of mechanical use of AI tools without meaningful language acquisition. Similarly, another instructor noted, "Students from the hospitality specialty were slower in adapting to new technologies and needed more technical support," suggesting that digital literacy gaps hindered some learners from fully benefiting from the program. Additional feedback reinforced these concerns. A marketing instructor explained, "Some students used grammar correctors without really learning the rules behind the corrections – surface-level improvements without deep understanding." A hospitality instructor added, "Hospitality students, especially those with limited computer skills, found it hard to navigate multiple apps and needed extra tech support." Furthermore, a tourism and travel instructor emphasized the need for deeper

learning, stating, "We need to guide students on critical thinking when using AI, not just passive use."

These comments highlight the importance of incorporating more guided instruction and scaffolding to help students engage with AI tools more critically. While AI applications offer valuable support, without deliberate teaching of how to analyze and reflect on feedback, learners may fail to internalize essential language rules. Additionally, the findings suggest that tailored support may be necessary for students in certain specializations, particularly those with lower digital confidence, to ensure equitable access and effectiveness. Addressing these issues can enhance the program's ability to serve diverse learner needs and promote more meaningful, sustained language development.

Overall, teacher sentiment towards the AI-assisted language enhancement program was overwhelmingly positive. Approximately 90% of the comments reflected satisfaction with the observed improvements in students' language skills, engagement, and independent learning habits. Teachers appreciated the positive impact on student participation, proficiency, and motivation. However, 10% of the feedback consisted of constructive suggestions, highlighting the need for minor adjustments to better support all learner groups equally. These suggestions included offering more guided instruction for students who may struggle with the critical use of AI tools and providing additional support for students with lower digital literacy, particularly in specialized disciplines like hospitality. Despite these minor challenges, the overall feedback was highly favorable, underscoring the program's success in enhancing students' English language learning experiences.

The open-ended responses reinforced the quantitative results, offering richer, detailed insights. Teachers overwhelmingly agreed that AI applications enhanced students' English proficiency, fostered learner autonomy, and increased motivation, though they

recommended more structured training in technology use for optimal results.

6. Discussion

The findings from the pre-test and post-test analysis, along with the teacher questionnaire, suggest that using AI applications to enhance English language proficiency in specialized university courses for non-native students has shown promising results. The results from both the quantitative and qualitative data offer valuable insights into how AI can positively influence language learning in the context of ESP.

The statistical analysis revealed a significant improvement in students' English proficiency after implementing the AI-augmented program. The pre-test scores indicated that students were generally at a beginner to lower intermediate level across all four specialties, with students in computing and tourism showing slightly higher proficiency than those in hospitality and marketing. After 15 weeks of classroom activities supported by AI-driven applications, the post-test scores demonstrated substantial progress, especially in specialized vocabulary and reading comprehension. These findings are consistent with previous research indicating that AI can be particularly effective in promoting vocabulary acquisition and enhancing reading comprehension in ESP contexts.

The significant improvements observed in specialized vocabulary are particularly notable, as they demonstrate that using AI applications allowed students to contextualize and internalize specific terminology relevant to their academic fields. This supports the idea that AI-assisted learning environments can offer tailored and immediate feedback, which is critical for vocabulary retention and pronunciation practice. Furthermore, the AI tools likely contributed to an escalated level of engagement and motivation, as students were able to see real-time improvements in their language skills and receive instant feedback on their performance.

The teacher questionnaire responses indicated that, beyond the measurable improvement in proficiency, students exhibited a higher level of engagement and enthusiasm in both classroom activities and homework assignments. Many teachers noted that the AI-integrated approach led to active participation from students who had previously struggled to stay motivated. Students who used AI-driven platforms are likely to report higher levels of engagement and a more personalized learning experience, which contributed to their motivation. Since students were able to practice English in a stress-free environment, they felt more confident in taking risks with the language, which ultimately contributed to better performance in specialized courses taught in English.

Moreover, the combination of in-class activities with home-based AI applications provided a blended learning environment that reinforced the material learned during lectures. This type of hybrid approach has been shown to increase language retention and fluency, as students were able to use their knowledge in practical, real-life contexts.

While the program showed positive results, there were some challenges. Several teachers noted that, while students made significant progress in vocabulary and comprehension, writing skills remained a difficult area for many, particularly when it came to producing coherent academic essays and reports in English. This aligns with other studies that show language learners often struggle with academic writing due to differences between their native language and English, especially in terms of structure and register. Future interventions should therefore consider integrating AI tools specifically tailored to academic writing to further enhance students' abilities in this area.

Additionally, while the AI tools provided immediate feedback, some students found them difficult to navigate initially, particularly those who were less tech-savvy. This illustrates the importance of user-friendly design and providing initial training sessions for the proper use of AI tools. Ensuring that students are comfortable with

the technological aspects of AI-based learning tools is essential for maximizing their effectiveness.

The positive outcomes of this study are consistent with the broader goals of Saudi Arabia's Vision 2030, which aims to foster a knowledge-based economy by investing in educational reforms and technology-driven innovations. By integrating AI into language learning, universities like Princess Nourah bint Abdulrahman University can support the country's aspirations to build a skilled workforce capable of thriving in a globalized, technology-driven economy. The findings from this study suggest that AI can play a crucial role in improving language proficiency and preparing students to succeed in specialized courses delivered in English, which is essential for Saudi Arabia's future development as it continues to increase its international collaborations and strengthen its educational system.

Using AI tools in the classroom also supports the Vision 2030 goal of enhancing digital literacy among students. In the context of higher education, this can translate into more graduates who are equipped with both domain-specific expertise and the language skills needed to communicate effectively in the global marketplace.

The results of this study indicate that the AI-augmented language learning program significantly enhanced non-native students' English proficiency, particularly in specialized vocabulary and reading comprehension. The combination of classroom instruction and home-based AI applications proved effective in engaging students and improving their language skills. While challenges remain, particularly in areas like writing, the overall findings suggest that AI can be a powerful tool in enhancing language proficiency in specialized fields and can support broader educational goals in Saudi Arabia's Vision 2030. Future research should further explore AI's role in enhancing academic writing skills and consider expanding the program to other universities and disciplines.

7. Conclusion

The purpose of this study was to investigate the impact of AI and applications on enhancing English language proficiency in specialized university courses for non-native students at ONU. The results from both the pre-test and post-test analysis, as well as the teacher questionnaire, provide compelling evidence that AI-based learning interventions significantly improve students' proficiency in English, particularly in the context of ESP.

The findings showed that after 15 weeks of AI-assisted classroom activities and home-based learning, there was a significant improvement in students' English proficiency. The pre-test revealed that students, across all four specialties (marketing, computing, hospitality, and tourism), ranged from beginner to lower intermediate proficiency levels. However, following the intervention, the post-test scores demonstrated substantial gains in vocabulary, reading comprehension, and the ability to use specialized English relevant to their fields of study. These improvements were also reflected in teacher feedback, with educators noting higher levels of student engagement, participation, and motivation in class.

This paper contributes to the literature on utilising AI in language learning, specifically within the context of ESP education. By demonstrating that AI can help non-native students enhance their English proficiency in both general and specialized language skills, the study points to the potential of AI-driven learning tools to tackle the challenges faced by students in non-English speaking countries. Furthermore, the findings support the objectives of Saudi Arabia's Vision 2030, which seeks to improve the quality of education and foster a digitally literate workforce.

The study's impact extends beyond the academic realm, offering practical insights for universities looking to implement innovative learning technologies. It underscores the need for blended learning models that combine classroom instruction with AI-enhanced homework to maximize language acquisition. As

educational institutions in Saudi Arabia increasingly focus on preparing students for global careers, this study highlights how such technological interventions can be instrumental in achieving these goals.

While this study yielded promising results, several areas for future research could further enhance understanding and application of AI-enhanced language learning. One important direction is the examination of the long-term impact of such programs. Future studies should assess whether the observed improvements in language proficiency are sustained over time and whether students continue to perform better in specialized courses delivered in English. Another potential area of exploration is writing skill development. Although this study found notable gains in vocabulary and reading comprehension, students' writing skills improved more gradually. Future research could focus on AI applications specifically designed to support academic writing, helping students produce coherent essays and reports with greater fluency and accuracy. Broadening the participant pool and sample size across multiple institutions would strengthen the generalizability of findings. Moreover, replicating the study in different regions or countries with varied educational systems could provide comparative insights and highlight contextual differences in AI integration. An additional area worth exploring is the integration of AI with other emerging digital technologies, such as virtual reality (VR) and augmented reality (AR). These tools could offer more immersive and interactive environments for language practice, further enriching both language acquisition and professional skill development. Finally, the role of teacher training warrants further attention. While instructors in this study responded positively to the integration of AI, future research could investigate how targeted professional development programs can better equip educators to use AI tools effectively. Understanding teachers' training needs and challenges will be essential in optimizing the pedagogical integration of AI technologies in language education.

In conclusion, this study demonstrates that integrating AI and applications into the English language curriculum for specialized courses has a significant positive impact on students' language proficiency and overall engagement. The results highlight the prospect of AI as a transformative tool in education, particularly in helping non-native students master English for academic and professional purposes. Through ongoing exploration and refinement of these technological interventions, educational institutions can better equip students for success in a globally competitive, digital economy.

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