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Navigating The Algorithm: AI Opportunities and Challenges in Medical English

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ABSTRACT

This study employed a qualitative descriptive design to explore the opportunities and challenges perceived by health students at STIKES Darussalam Lhokseumawe in utilizing AI for English language learning. Data were collected through semi-structured interviews with 18 purposively selected students from the nursing program and analyzed using a thematic analysis approach. The findings revealed three overarching themes. First, students recognized AI as a powerful facilitator of personalized learning, providing on-demand, context-specific practice in medical English through chatbots and writing tools. Second, they navigated significant challenges, including anxiety over AI hallucinations and concerns about superficial learning and skill atrophy. Third, a crucial institutional guidance vacuum was identified, where the absence of formal policies or pedagogical support amplified these challenges and created ethical ambiguities. The study concludes that while students are proactively and resourcefully leveraging AI, the full potential of these tools is hindered without institutional scaffolding. This research underscores the urgent need for pedagogical integration, clear ethical guidelines, and faculty development to transform AI from a precarious, student-driven tool into an effectively supported educational resource.

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1. INTRODUCTION

The rapid and pervasive integration of Artificial Intelligence (AI) into the fabric of higher education represents a paradigm shift, offering unprecedented opportunities to redefine pedagogical approaches and personalize the learning experience. By processing huge amounts of linguistic data and responding to learner input, AI apps can provide learners with real-time corrections, targeted suggestions, and individualized skill development paths (Holmes et al., 2019).

This transformation is particularly salient in the domain of language acquisition, where AI-powered tools—ranging from intelligent tutoring systems and chatbots to automated writing evaluators and pronunciation coaches—are demonstrating significant potential to augment traditional methods. Within this evolving educational landscape, English for Specific Purposes (ESP), and more specifically, English for Medical Purposes (EMP), emerges as a critical area

of focus. English is crucial for medical students' professional development as it is the dominant language in research, healthcare communication, and international nursing practice (Nassriati & Hajar, 2024). The ability of healthcare professionals to communicate effectively in English is not merely an academic exercise but a fundamental component of safe and competent clinical practice, facilitating access to the vast corpus of international medical literature, enabling participation in global health discourse, and ensuring clear communication in multicultural patient settings.

Consequently, nursing students at institutions such as STIKES Darussalam Lhokseumawe face immense pressure to achieve proficiency in medical English, as it is required to meet both academic requirements and future professional demands. However, these students often encounter unique challenges, including resource constraints, curriculum time limitations, and pedagogical approaches that may not fully address their specific lexical and communicative needs. This confluence of technological advancement and pressing educational necessity forms the critical context for this proposed descriptive qualitative research, which seeks to investigate the opportunities and challenges for health students at STIKES Darussalam in leveraging AI tools for learning English, thereby filling a significant gap in the literature regarding the contextualized application of AI in ESP settings within Indonesian health education.

The exigency for EMP proficiency among Indonesian health students is underscored by the globalized nature of modern healthcare. The medical field is inherently international, with English serving as its *lingua franca*. Medical English courses are crucial in medical education, providing students with the linguistic capabilities needed for worldwide medical practice and collaboration (Guan & Scott, 2024). Premier medical journals, international clinical guidelines, major conferences, and a significant proportion of online medical databases are predominantly published in English. For students and future professionals, a deficiency in English skills can act as a formidable barrier to staying abreast of the latest medical advancements, ultimately impacting the quality of care they can provide. Furthermore, within the ASEAN economic community, the mobility of health professionals is increasing, and proficiency in English is a key competency for those seeking to work or collaborate across borders. At a national level, regions attracting international patients or collaborating with foreign health organizations require a workforce capable of effective communication.

Despite this clear need, traditional EMP instruction in many Indonesian nursing and health colleges often struggles under the weight of large class sizes, limited contact hours, and a pedagogical focus that may prioritize general English over the specific communicative tasks—such as taking patient histories, explaining procedures, or writing clinical notes—that students will encounter in their professional practice. It supports Khalili and Tahririan (2023) who found that teaching ESP to medical students faces challenges such as inappropriate materials, low motivation, and heterogeneous classes. Participants believe listening, speaking, reading, and writing skills are essential but not systematically practiced, and courses are not efficient. This gap between the required professional competency and the constraints of traditional classroom instruction creates a pressing need for innovative, scalable, and accessible supplementary learning solutions.

It is within this gap that AI-driven language learning tools present a compelling opportunity. The capabilities of AI in language education have expanded dramatically, moving far beyond

simple vocabulary apps. Modern AI platforms utilize Natural Language Processing (NLP) and machine learning to provide personalized, interactive, and immediate feedback. AI-powered chatbots can simulate patient interactions, allowing students to practice medical dialogues in a low-stakes, repetitive environment. Automated writing evaluation tools can provide instant feedback on the grammar, structure, and even the stylistic appropriateness of clinical case reports or research abstracts. Moreover, speech recognition software can offer precise feedback on pronunciation, a crucial element for avoiding miscommunication in clinical settings. The potential of these tools to offer just-in-time, individualized learning aligns perfectly with the principles of adult learning and can empower students to take control of their language acquisition journey outside the formal classroom.

The efficacy of such tools is increasingly supported by empirical research. A study by Kohnke et al. (2023) demonstrated the significant benefits of ChatGPT in supporting language learning, highlighting its utility in facilitating vocabulary acquisition, engaging in conversational practice, and providing writing assistance, all of which are core components of EMP. As stated by (Normurodovna, 2025), English training in ESP focuses on vocabulary, abilities, and settings relevant to certain industries, like as commerce, medical, engineering, and tourism. Their research affirms that Generative AI tools like ChatGPT have the potential to improve language teaching by providing individualized and interactive learning experiences. This revolution is not merely about efficiency; it is about creating more authentic and engaging learning environments.

However, the integration of AI is not a panacea and is fraught with its own set of challenges and complexities. The mere availability of technology does not guarantee its effective or appropriate adoption. For students, key challenges include digital literacy and the critical ability to evaluate the accuracy of AI-generated outputs. In the academic writing field, for instance, (Granjeiro et al., 2025) discovered that AI downsides include technical errors, over-standardization of writing style, and ethical issues with authorship and accountability. AI's weaknesses include its inability to recognize and apply goals while creating written work, which is a critical component of an effective writing process (Beck & Levine, 2024). Using AI reduced the time spent composing the review paper, but necessitated more thorough fact-checking (Kacena et al., 2024). AI language models, while sophisticated, can still "hallucinate" or produce plausible-sounding but incorrect or nonsensical information, a particularly dangerous prospect in a field where terminological precision is paramount.

Furthermore, issues of data privacy, equity of access to premium features of AI tools, and the potential for over-reliance leading to the erosion of independent critical thinking skills are significant concerns. Students may also lack the metacognitive awareness to effectively integrate AI tools into a coherent learning strategy, using them for superficial assistance rather than deep learning. From an institutional perspective, a lack of clear guidelines or pedagogical frameworks for the ethical and effective use of AI can lead to inconsistent and potentially counterproductive applications. These challenges are echoed in the literature. Su et al., (2023) investigated the collaborative learning of English with AI and found that while students benefited, successful integration required careful instructional design and guidance. They caution that without enough scaffolding, students may be unable to properly use AI tools to increase their learning. This underscores that the role of the educator evolves from a knowledge

deliverer to a learning facilitator who guides students in navigating and critically engaging with AI-generated content.

The novelty of this research lies in its specific, contextualized focus. While studies on AI in language learning are proliferating, there is a distinct scarcity of research that investigates this phenomenon through the lens of EMP for health students in the Indonesian context, and more specifically within the unique environment of an institution like STIKES Darussalam Lhokseumawe. Much of the existing literature originates from Western, technologically affluent, or general ESL contexts. The experiences, perceptions, readiness, and constraints of nursing and public health students in Aceh represent a significant knowledge gap. This study does not seek to merely test the efficacy of a specific tool but rather to undertake a holistic exploration of the lived experiences of these students as they navigate the emerging AI ecosystem. It will delve into their awareness of available tools, their motivations for use (or non-use), the perceived opportunities they identify for their professional English development, and the multifaceted challenges they encounter—be they technological, pedagogical, linguistic, or ethical. This nuanced, emic perspective is crucial for developing a realistic understanding of AI's role in this specific setting.

The findings of this qualitative descriptive study will yield significant practical and theoretical benefits. Theoretically, it will contribute to the burgeoning fields of AI in education and ESP by providing rich, empirical data from an under-researched context, thereby helping to refine existing models of technology acceptance and integration. Practically, the outcomes will be invaluable for stakeholders at STIKES Darussalam and similar institutions across Indonesia. For curriculum developers and lecturers, the findings will inform the design of effective pedagogical strategies, professional development programs, and much-needed institutional policies that guide the ethical and effective use of AI for language learning. For students, the research process itself may raise awareness and catalyze more informed and critical engagement with AI tools. Ultimately, by mapping the opportunities and challenges in detail, this research aims to empower future healthcare professionals in Lhokseumawe to harness the power of AI strategically, enhancing their English communication skills and, by extension, their capacity to contribute to a higher standard of healthcare both locally and globally.

2. RESEARCH METHOD

This study employs a qualitative descriptive research design to explore in depth the opportunities and challenges perceived by nursing students at STIKES Darussalam Lhokseumawe in utilizing AI for learning English. A qualitative approach is deemed most appropriate as it allows for a rich, detailed, and nuanced understanding of the participants' experiences, perceptions, and lived realities, which cannot be quantified through statistical means. This design is focused on describing the phenomenon in its natural setting and providing insights into the complex interplay of factors from the participants' own perspectives. The methodology was informed by the principles of qualitative inquiry as detailed by (Creswell & Poth, 2018) who emphasize that such an approach is invaluable when a problem needs to be explored to understand a central phenomenon and the context in which it is experienced. This study seeks to do precisely that by placing the voices and experiences of the student participants at the forefront of the investigation, thereby generating a thick, descriptive account of their engagement with AI technologies in their academic pursuits.

The participants for this study will be selected from the population of active undergraduate students in the nursing programs at STIKES Darussalam Lhokseumawe for the 2023/2024 academic year. A purposive sampling technique will be utilized to recruit participants who have direct experience using AI tools (such as ChatGPT, Gemini, QuillBot, or AI-powered language learning applications) for their English language learning activities. This non-probability sampling method is chosen to ensure that the selected individuals can provide information-rich cases relevant to the research questions. The sample size involved 18 participants, whereby data collection ceased when no new themes or insights emerged from subsequent interviews. All participants were provided with a detailed information sheet outlining the study's purpose, procedures, risks, and benefits, and written informed consent was obtained before their involvement, ensuring adherence to ethical principles of voluntary participation and confidentiality.

Data were collected primarily through semi-structured in-depth interviews. This method was chosen for its flexibility, allowing the researcher to guide the conversation with a set of predetermined open-ended questions while also permitting the exploration of emergent themes and probing deeper into interesting or unexpected responses from participants. An interview protocol was developed to ensure consistency, covering key areas such as the types of AI tools used, perceived opportunities for enhancing English skills, encountered challenges (technical, pedagogical, and ethical), and strategies for overcoming obstacles. Each interview was anticipated to last approximately 35 to 40 minutes and was conducted in a quiet, private room to ensure comfort and minimize distractions. With permission from the participants, all interviews will be audio-recorded to ensure accuracy and subsequently transcribed verbatim by the researcher to facilitate meticulous analysis. Supplementary data will be gathered through a brief demographic questionnaire to characterize the sample and through document analysis of any relevant institutional policies or guidelines regarding AI use, which will provide valuable contextual background.

The data analysis will follow a systematic process of thematic analysis as outlined by (Braun & Clarke, 2006), which provides a flexible and rigorous method for identifying, analyzing, and reporting patterns (themes) within the qualitative data. The process will involve six phases. First, the researcher engaged in repeated active reading of the transcribed interviews and documents to achieve familiarization with the depth and breadth of the content. Second, initial codes were generated that identify interesting features of the data systematically across the entire dataset. Third, these codes were collated and sorted into potential overarching themes, gathering all data relevant to each potential theme.

Fourth, these candidate themes were reviewed and refined, first in relation to the coded extracts and then in relation to the entire dataset, to ensure they form a coherent pattern. Fifth, the essence of each theme was defined and named to create a clear and concise narrative. Finally, the analysis was woven into a scholarly report, selecting vivid, compelling extract examples that vividly illustrate the themes and link the analysis back to the research questions and existing literature. To enhance the trustworthiness and credibility of the findings, strategies such as member checking, where participants were allowed to review the transcripts and preliminary interpretations, and peer debriefing with fellow researchers were employed to provide an external check of the analytical process.

3. RESULTS AND DISCUSSION

This study embarked on an exploratory journey to understand the nuanced experiences of health students at STIKES Darussalam Lhokseumawe regarding their utilization of Artificial Intelligence (AI) for English language learning. Through in-depth interviews with eighteen participants from the nursing programs, a rich tapestry of perceptions emerged, revealing a complex interplay of empowerment and apprehension. The analysis, following Braun and Clarke (2006) thematic approach, crystallized the data into three overarching themes: AI as a Personalized Learning Facilitator, Navigating the Perilous Landscape of AI Dependence, and The Institutional Guidance Vacuum. These themes collectively paint a picture of a student body that is highly resourceful and intrinsically motivated yet operates in an environment lacking the necessary scaffolding to maximize the benefits and mitigate the risks of AI adoption.

AI as a Personalized Learning Facilitator

The most prominent finding from this research was the students' overwhelming recognition of AI tools as powerful allies in personalizing and enhancing their English learning journey. Participants consistently described how AI broke down the barriers of time, pace, and access that often characterize traditional classroom settings. The opportunity for on-demand, interactive practice was hailed as a significant advantage. A majority of participants reported using chatbots like ChatGPT and Gemini to engage in simulated conversations. One nursing student elaborated, "Before clinical practice, I asked ChatGPT to act as a patient with specific symptoms. I practice asking about their pain level, medical history, and giving simple advice in English. It doesn't judge me for being slow or making grammar mistakes, so I can practice the same dialogue until I feel confident."

This finding aligns with recent research by Kohnke et al. (2023), who noted that generative AI chatbots provide a low-anxiety environment for language practice, allowing learners to engage in meaningful interactional routines that are crucial for developing fluency. The students' use of AI for role-playing specific medical scenarios demonstrates a sophisticated understanding of English for Specific Purposes (ESP), moving beyond generic language practice to contextually relevant application. A study by Derakhshan et al. (2025) also found that students of medicine demonstrated significant academic and professional achievements by demonstrating empathy and communication competence through role-playing with AI-driven robots. Li et al. (2024) also reported the effectiveness of big language models such as ChatGPT in improving the English academic writing proficiency of non-native speakers in medical education.

Furthermore, participants extensively utilized AI's capabilities for vocabulary building and writing assistance. Tools like QuillBot and the paraphrasing features within ChatGPT were frequently mentioned for helping them draft, refine, and proofread academic texts, including journal article summaries and patient report assignments. A student stated, "I write my assignment in Indonesian first, then ask AI to translate and help me structure it in proper academic English. It also suggests more professional vocabulary that is common in public health journals." This use of AI as a digital literacy scaffold supports the assertions of Su et al., (2023) who found that AI collaboration can help students overcome the initial barrier of a blank page and engage more deeply with complex content by offloading basic linguistic challenges. The students were not merely copying AI output; they were engaging in an iterative process of

negotiation, critically evaluating suggestions and adapting them to their needs, thereby actively developing their metalinguistic awareness and disciplinary lexicon.

Navigating the Perilous Landscape of AI Dependence

Despite the enthusiasm, the students' narratives were equally fraught with descriptions of significant challenges, revealing a keen awareness of the pitfalls associated with AI reliance. A central theme that emerged was the pervasive anxiety over accuracy and "hallucinations." Many participants expressed constant vigilance, knowing that AI can generate plausible-sounding but entirely incorrect information. A participant shared a cautionary tale: "I once asked for the English term for a specific medical instrument, and the AI gave me a term that sounded right. I used it in a presentation, and my lecturer corrected me. It was embarrassing and could be dangerous if it happened in a real clinical setting." This incident underscores a critical limitation identified in the literature. Bender et al. (2021), in their paper on the dangers of large language models, they warned about the inherent risks of these systems fabricating information, a problem that is acutely magnified in high-stakes fields like healthcare, where terminological precision is non-negotiable. The students' experiences confirm that without developed digital critical literacy skills, the convenience of AI can inadvertently become a source of error.

Another profound challenge was the pedagogical risk of superficial learning and skill atrophy. Several academically high-achieving participants voiced a meta-cognitive concern that over-reliance on AI for grammar correction and text generation could hinder their long-term development. "I feel my writing is getting better, but I'm worried I'm not really learning the rules," one student confessed. "It's like using a calculator for arithmetic before you really understand multiplication. The AI gives me the answer, but the process is hidden." This insight touches upon a fundamental debate in educational technology: the difference between learning and performance. AI enhances immediate performance (e.g., producing a correct sentence) but may not always support the underlying learning processes (e.g., internalizing grammar rules). This finding resonates with the concerns raised by Zawacki-Richter et al. (2019), who, in their systematic review of AI in education, highlighted the need for pedagogical designs that ensure AI supports rather than substitutes for the cognitive effort necessary for deep learning. The students' self-awareness of this paradox is a remarkable finding, indicating a level of critical engagement with technology that is often overlooked.

The Institutional Guidance Vacuum

A crucial and perhaps the most significant theme emerging from the data is the complete absence of formal institutional or pedagogical guidance. Students reported navigating the AI landscape entirely on their own, relying on peer recommendations, online tutorials, and trial-and-error. This lack of scaffolding was identified as the primary amplifier of the challenges previously discussed. Participants expressed a strong desire for structured support, wishing for their lecturers to provide guidance on which tools are reliable, how to use them ethically, and how to critically evaluate their outputs. "We are all using this, but no one talks about it in class," one participant noted. "It feels like a secret tool. Some lecturers suspect we use it and think we are cheating, while others seem unaware. We need rules and help to use it properly." This situation places the burden of developing critical AI literacy entirely on the student, an unfair and inefficient expectation.

This finding directly connects to the concept of "orchestration" in technology-enhanced learning. Dillenbourg (2016) argues that the effectiveness of digital tools in education is not inherent but is dependent on the pedagogical orchestration by educators—the design of tasks, rules, and social configurations that surround tool use. Yang et al., (2024) also believe that AI literacy is an important facet of digital literacy that every person should have in today's digitally advanced environment. While technology has enormous potential, the human dimension, notably educators' values, digital competences, and cultural sensitivity, is critical to the success of AI integration (Selwyn, 2022).

The current STIKES Darussalam represents a classic case of dis-orchestration, where a powerful technology is released into the learning environment without any supportive framework. The resulting student anxiety about plagiarism and academic integrity is palpable. Participants were deeply confused about the line between acceptable use (e.g., using AI to brainstorm ideas or check grammar) and unethical practice (e.g., submitting AI-generated text as their own). This ambiguity creates a stressful learning environment and hinders the potential for AI to be integrated in a transparent and educationally sound manner. The institution's silence on the matter, as perceived by the students, is a significant barrier to unlocking the positive opportunities identified in the first theme.

Synthesis and Implications

The results present a clear dichotomy: students are proactively leveraging AI to create personalized, context-rich English learning experiences that address the specific gaps in their ESP training, yet they are doing so while navigating a minefield of misinformation, potential skill degradation, and institutional ambiguity entirely on their own. Their experience is one of simultaneous empowerment and vulnerability. This study's novelty lies in uncovering this precise dynamic within the context of Indonesian health education, a setting where the stakes for accurate communication are exceptionally high.

The discussion, therefore, must move beyond a simple listing of opportunities and challenges. The data suggests that the challenges are not inherent flaws of the technology but are rather exacerbated by the lack of a supportive ecosystem. The students' resourcefulness demonstrates a high degree of motivation and digital nativeness, but motivation alone is insufficient to mitigate the risks of AI hallucinations or ensure the development of long-term language competencies. The central implication of this study is that institutions of higher education, particularly in vocational fields like healthcare, can no longer afford to ignore the pervasive use of AI by students. There is an urgent need to move from an ad-hoc, student-driven model to a pedagogically integrated one.

This requires a multi-faceted approach. First, institutions must develop clear, ethical guidelines for AI use that distinguish between permitted assistance and academic misconduct. Second, and most importantly, faculty development is critical. Lecturers need training to become facilitators who can guide students in critically engaging with AI outputs, designing assignments that leverage AI creatively while ensuring core learning objectives are met, and explicitly teaching AI literacy as a core competency for future healthcare professionals. As Crompton and Burke 2023) posit, the role of the educator is evolving from a knowledge transmitter to a learning coach who mediates the student-AI interaction to ensure it is productive and ethical. By

providing this essential scaffolding, STIKES Darussalam and similar institutions can transform the current perilous landscape into a structured learning environment where the remarkable opportunities of AI can be fully and safely harnessed to produce a generation of health professionals who are not only clinically competent but also proficient and critical users of technology for global communication.

4. CONCLUSION AND SUGGESTIONS

In conclusion, this qualitative study elucidates the complex dual reality experienced by nursing students at STIKES Darussalam Lhokseumawe in harnessing AI for English language learning. The findings affirm that students are independently and resourcefully utilizing AI tools as powerful facilitators for personalized, context-specific language acquisition, particularly in practicing medical dialogues, building disciplinary vocabulary, and refining academic writing. However, this autonomous exploration occurs within a significant vacuum of institutional guidance, exacerbating profound challenges related to the reliability of AI-generated content, the risk of superficial learning, and deep-seated ethical ambiguities. The core implication of this study is that the perceived opportunities and challenges are not inherent to the technology itself but are fundamentally shaped by the lack of a pedagogical ecosystem designed to support its ethical and effective use. Therefore, the students' journey is characterized by a precarious balance between empowerment and vulnerability, where their intrinsic motivation is the primary driver against a backdrop of institutional silence.

Based on these conclusions, concrete suggestions are offered. For the institution, STIKES Darussalam must urgently develop and disseminate clear, pragmatic policies and ethical guidelines on AI use that define acceptable collaboration versus academic misconduct. More crucially, a comprehensive program for faculty development is imperative to equip lecturers with the skills to transition from knowledge transmitters to learning coaches who can effectively mediate student-AI interactions. Lecturers should be supported to design AI-integrated assessments that promote critical evaluation rather than passive consumption and to explicitly teach AI literacy as a core competency for future healthcare professionals. For students, the institution should facilitate workshops focused on developing critical digital literacy skills, specifically teaching strategies to verify AI outputs and use these tools reflexively to deepen rather than replace the learning process.

For future researchers, this study opens several avenues for inquiry. An immediate next step would be to develop, implement, and evaluate the effectiveness of a specific AI literacy intervention program based on these findings, measuring its impact on both students' critical engagement skills and their English language proficiency. Furthermore, this research focused solely on the student perspective; a critical complementary study would be to investigate the perceptions, readiness, and specific needs of the faculty and institutional leadership regarding AI integration, thereby providing a holistic view of the ecosystem necessary for change. Ultimately, longitudinal research is required to investigate the long-term effects of AI tool usage on the retention of language skills and the development of clinical communication competencies among healthcare students, offering deeper insights into the enduring pedagogical impacts beyond immediate performance.

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