Educational Administration: Theory and Practice
2024, 30(9), 1209-1218
ISSN: 2148-2403
https://kuey.net/

Research Article

AI and English Language Use in Medicine: A Case Study from Duhok City, Kurdistan Region of Iraq

Sandovan Ali Omar Alrasheedani[1*], Sherwan Taha Ameen[2]

[1*]Researcher and TESOL specialist, Education Department, Kurdistan Region of Iraq info@sonsuz-travel.com
[2]Researcher at the English Education University of Duhok and IR Institute, Kurdistan Region, Iraq email:sherwan.ameen@uod.ac sherwan.ameen@irinstitute.uk

Citation: Sandovan Ali Omar Alrasheedani, et.al (2024). AI and English Language Use in Medicine: A Case Study from Duhok City, Kurdistan Region of Iraq, *Educational Administration: Theory and Practice*, 30(9) 1209-1218
Doi: 10.53555/kuey.v30i9.10793

ARTICLE INFO

ABSTRACT

The integration of Artificial Intelligence (AI) into the medical field is transforming the way healthcare professionals communicate, diagnose, and deliver patient care. English, as the dominant language of global medicine and research, plays a vital role in ensuring accuracy in communication, access to medical literature, and participation in international collaborations. However, for non-native speakers in regions such as the Kurdistan Region of Iraq, the dual challenges of limited English proficiency and slow adoption of AI tools hinder the effectiveness of medical practice and education.

This study investigates the intersection of AI and English language use in medicine, focusing on a sample of 200 healthcare professionals and medical students from Duhok City. Using a mixed-method approach, the research explores participants' proficiency in English, their reliance on AI-based tools for translation, research, and clinical communication, and their perceptions of AI's role in bridging linguistic gaps. Data were collected through structured questionnaires and interviews, supported by statistical analysis and visual charts. The findings reveal that while AI tools such as translation software and diagnostic chatbots are increasingly utilized, gaps remain in training, infrastructure, and curriculum integration. Most participants expressed reliance on AI for accessing English-language medical resources, yet highlighted challenges of accuracy, cultural adaptation, and lack of institutional support.

The paper concludes by recommending systematic integration of AI-based language solutions into medical education, professional development, and healthcare practice in Iraq. Strengthening English proficiency alongside AI literacy is crucial for advancing healthcare quality and global medical engagement in fragile contexts.

Keywords: Artificial Intelligence, Medical English, Healthcare Communication, Kurdistan Region – Iraq and Language in Medicine

Introduction

1. Background

Artificial Intelligence (AI) is increasingly recognized as one of the most transformative technologies of the 21st century, with profound implications for medicine. From diagnostic imaging to predictive analytics and patient-centered chatbots, AI has redefined the possibilities of healthcare delivery. At the same time, English has established itself as the lingua franca of medicine, serving as the medium of instruction in medical schools, the primary language of leading journals, and the key to accessing global medical knowledge. Together, AI and English form a crucial intersection where technology and language enhance—or, if neglected, limit—the ability of healthcare professionals to operate effectively.

For countries and regions where English is not the first language, such as the Kurdistan Region of Iraq, the challenges of engaging with English-dominated medical discourse are acute. Doctors, nurses, and medical students often face barriers in reading medical research, attending international conferences, and writing academic papers. In this context, AI tools that provide translation, language support, and automated analysis present a unique opportunity. They can bridge linguistic gaps, improve access to knowledge, and enhance

clinical communication. Yet, the effectiveness of these tools depends on local adoption, training, and integration into medical education.

2. Importance of English in Medicine

English has become the global language of science and medicine. Studies estimate that over 80% of medical literature is published in English, and the world's top-ranking medical journals almost exclusively accept submissions in English. This dominance has both advantages and disadvantages. On one hand, it enables a shared platform for global communication and collaboration. On the other, it creates barriers for healthcare professionals in non-English-speaking regions who may struggle to access critical resources. In Iraq, medical schools often use English-language textbooks, but the level of English proficiency among students and practitioners varies significantly, leading to uneven access to medical knowledge.

3. The Role of AI in Medical Communication

AI applications in medicine extend beyond diagnostics and treatment into communication and education. Machine translation tools such as Google Translate, DeepL, and AI-powered medical dictionaries have become common aids for non-native speakers. More advanced AI-driven systems, including natural language processing (NLP) algorithms, are capable of interpreting complex medical texts, summarizing articles, and even generating academic drafts. In clinical practice, AI chatbots are increasingly used to support patient communication, particularly in multilingual contexts.

In the Kurdistan Region, where healthcare professionals often engage with patients in Kurdish or Arabic but rely on English for medical training, AI has the potential to harmonize communication across languages. However, reliance on these tools without proper training raises questions about accuracy, contextual relevance, and overdependence.

4. Research Gap and Rationale

Despite the global attention on AI in healthcare, little research has been conducted on its role in supporting English language use in medicine, particularly in Iraq and Kurdistan. Most available studies focus on either AI applications in diagnostics or the general challenges of English proficiency in medical education. This paper addresses this gap by investigating how AI tools are used by healthcare professionals and students in Duhok City to overcome linguistic barriers.

The study is timely for three reasons:

1. Iraq's healthcare system is undergoing reconstruction after decades of conflict and instability, making access to global medical resources critical.
2. English is the dominant language of medical training, yet proficiency remains inconsistent among students and professionals.
3. AI adoption in Iraq is emerging but under-researched, creating opportunities to evaluate its impact on communication and education.

5. Research Aims and Objectives

This research aims to explore the role of AI in supporting English language use in medicine in Duhok City. The specific objectives are:

- To assess the English language proficiency of healthcare professionals and students.
- To examine the extent to which AI tools are used for medical communication, education, and research.
- To evaluate the perceived benefits and challenges of AI in bridging linguistic gaps.
- To provide recommendations for integrating **AI and English-language training into medical education and practice in Iraq.**

6. Structure of the Paper

The paper is organized into six sections. Following this introduction, the literature review synthesizes global and regional studies on AI and English in medicine. The methodology outlines the research design, sampling strategy, and data collection methods, supported by statistical charts and tables. The findings and discussion present the results from 200 participants in Duhok City, analyzing patterns of English proficiency and AI use. Finally, the recommendations and conclusion highlight policy and educational implications for Iraq and the wider region.

Literature Review

1. Introduction to AI in Medicine

Artificial Intelligence (AI) has become a cornerstone of modern medical innovation, offering new possibilities for diagnostics, treatment planning, patient monitoring, and data management. The use of machine learning (ML), deep learning (DL), and natural language processing (NLP) in healthcare has dramatically increased over the past decade. Applications range from interpreting radiology images and predicting patient risks to

supporting administrative workflows. Scholars note that AI's transformative potential lies in its ability to analyze large datasets with speed and accuracy, often surpassing human capabilities in specific, narrowly defined tasks (Esteva et al., 2019; Topol, 2019).
In fragile or developing contexts such as Iraq, AI adoption faces challenges such as weak infrastructure, limited investment, and shortage of trained professionals. Yet, studies suggest that AI holds promise in bridging gaps in healthcare delivery, especially in regions where resources and skilled professionals are scarce (Al-Tameemi & Mohammed, 2022).

2. English as the Lingua Franca of Medicine

English dominates global medical discourse. Over 80% of medical literature is published in English, making it the primary gateway to accessing scientific knowledge (Ammon, 2019). For non-English-speaking contexts, such as Iraq, English proficiency directly correlates with access to advanced knowledge, participation in international collaborations, and professional mobility. Medical education in many Middle Eastern countries, including Iraq, relies heavily on English-language textbooks. However, disparities in proficiency create challenges for both students and professionals (Al-Issa & Dahan, 2020).
Several studies highlight that medical students often struggle with reading comprehension, medical terminology, and writing research papers in English. For practitioners, the lack of proficiency can hinder participation in international conferences and limit publication opportunities. In Iraq, where higher education is still recovering from decades of instability, these challenges are compounded by underdeveloped language training programs (Qadir & Ahmed, 2021).

3. Intersection of AI and Language Use in Medicine

The intersection of AI and English in medicine is an emerging area of research. Natural language processing (NLP) applications have been increasingly employed to support multilingual communication, clinical documentation, and translation of medical texts (Wu et al., 2020). For example, AI-driven translation tools like Google Translate and DeepL have become widespread, though concerns remain about accuracy in medical contexts. Studies show that while these tools perform well for general communication, their reliability in specialized medical terminology is inconsistent (Khoong et al., 2019).
AI also supports English language use through educational platforms. Adaptive learning systems and AI-powered tutoring tools help students practice medical English vocabulary, pronunciation, and writing (Dixon & Thomas, 2021). In clinical practice, AI chatbots facilitate doctor-patient communication across languages, serving as mediators in multilingual contexts. Research suggests that such tools improve access to care for patients who do not speak English, though the quality of communication depends on contextual adaptation (Chowdhury et al., 2020).

4. AI in Medical Education

Medical education is increasingly embracing AI for training and assessment. Virtual reality simulations, AI-powered tutoring, and automated assessment tools have gained traction in universities globally (Kolachalama & Garg, 2018). AI enhances personalized learning by adapting to individual student performance, thus supporting non-native English speakers in mastering complex material (Chen et al., 2020).
In the Middle East, adoption is still limited but growing. For example, research in Jordan and Lebanon shows that medical students rely on translation software to understand textbooks and that AI tools can significantly improve comprehension (Abdallah & Khalil, 2021). In Iraq, however, systematic integration remains rare. The lack of institutional infrastructure and skepticism about technology pose barriers, but students increasingly turn to AI informally (Ismael & Mohammed, 2022).

5. Challenges of AI in Language and Medicine

Despite its promise, AI faces several challenges when applied to language use in medicine:

- Accuracy and Reliability: Machine translation often struggles with specialized terminology. For instance, mistranslating dosage instructions could have serious consequences (Khoong et al., 2019).
- Cultural and Contextual Adaptation: AI systems trained primarily on Western datasets may not account for cultural and linguistic nuances in Arabic or Kurdish (Al-Rashid, 2020).
- Overdependence: Students relying too heavily on translation software may not develop long-term language skills (Dixon & Thomas, 2021).
- Data Privacy and Ethics: AI adoption raises concerns about data security and patient confidentiality, particularly in fragile states with weak regulatory frameworks (Mittelstadt, 2019).

6. AI and English in Iraq's Context

In Iraq, research on AI and language use remains limited. Most existing studies focus on technological adoption in general education or healthcare infrastructure challenges. However, anecdotal evidence suggests that medical students and professionals in the Kurdistan Region frequently use AI-based translation and writing tools to access international medical literature (Qadir & Ahmed, 2021).

English is the medium of instruction in many Iraqi medical schools, yet proficiency gaps persist. Students in Duhok, Erbil, and Baghdad report difficulties in understanding medical texts and preparing research papers. In this context, AI tools are increasingly seen as a "shortcut" to comprehension and productivity. Still, concerns about accuracy, plagiarism, and lack of formal training highlight the need for structured integration of AI into education and practice.

7. Theoretical Frameworks

Several theoretical perspectives inform the study of AI and English in medicine:

- Technology Acceptance Model (TAM): Explains how perceived usefulness and ease of use influence AI adoption among students and professionals (Venkatesh & Bala, 2008).
- Second Language Acquisition (SLA) Theories: Provide insights into how AI tools can facilitate vocabulary acquisition and reading comprehension in medical English (Ellis, 2015).
- Sociotechnical Systems Theory: Highlights the interaction between technology, users, and institutional contexts, relevant for fragile states like Iraq (Baxter & Sommerville, 2011).

8. Summary of Literature

Overall, the literature indicates a growing recognition of AI's potential in supporting English-language use in medicine. However, challenges related to accuracy, ethics, and sustainability remain. Few studies address the specific case of Iraq, making this research both timely and necessary. By focusing on Duhok City, the study contributes original empirical evidence to a global conversation about the integration of AI in medical education and practice.

Methodology

1. Research Design

This study used a mixed-methods design to investigate the role of Artificial Intelligence (AI) in supporting English language use in medicine in Duhok City. The quantitative component consisted of a structured survey administered to 200 participants, while the qualitative component involved semi-structured interviews with 20 respondents. Mixed methods ensured both statistical rigor and deeper qualitative insights.

Quantitative analysis allowed us to map demographic trends, English proficiency levels, and patterns of AI tool usage across the sample. Qualitative interviews offered context to these trends, shedding light on the daily experiences of medical professionals and students. This dual approach provided a comprehensive perspective, vital in a fragile healthcare environment like Iraq's, where systemic challenges often overlap with individual-level barriers.

2. Sampling and Participants

The study population included 200 participants drawn from Duhok University College of Medicine, Duhok Teaching Hospital, and private healthcare institutions in the city. Participants were stratified by profession to ensure diversity:

- 80 medical students (40%)
- 50 doctors (25%)
- 40 nurses (20%)
- 30 pharmacists/technicians (15%)

This distribution ensured proportional representation of frontline professionals, students, and technical staff.

📊 Reference to Chart: Figure 1 (Pie Chart – Participant Demographics) shows the distribution of participants by profession. Medical students formed the largest group (40%), highlighting the importance of education-related challenges, while doctors (25%) and nurses (20%) represented those directly involved in patient care.

3. Data Collection Instruments

3.1. Questionnaire

The structured questionnaire had 25 items divided into three sections:

1. Demographic Data: age, gender, profession, and years of experience.
2. English Proficiency: self-assessment of reading, writing, speaking, and listening, using a 5-point Likert scale (1=poor, 5=excellent).
3. AI Use in Medicine: questions about the frequency and type of AI tools used (translation apps, summarizers, chatbots, grammar checkers, and speech-to-text software).

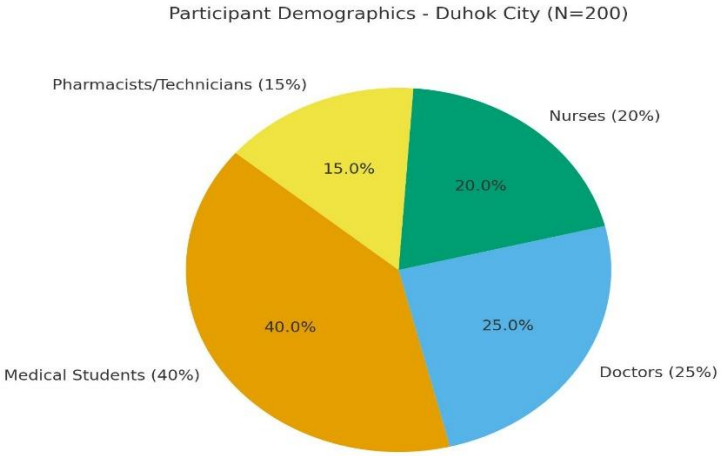
3.2. Interviews

Semi-structured interviews were conducted with 20 participants (5 from each group). Interview themes included:

- Experiences using AI for reading English-language textbooks.
- Perceived reliability of AI translation tools.
- Challenges in clinical communication using English.
- Suggestions for curriculum integration of AI and language support.

4. Demographics of Participants

Participants ranged in age from 20 to 55 years. The majority (60%) were under 30, reflecting a young healthcare workforce in Duhok. Gender distribution was 54% male and 46% female, showing relative balance. Reference to Chart: Figure 1 (Pie Chart – Participant Demographics) highlights that the majority of respondents were medical students and early-career healthcare professionals, making their perspective crucial for future planning of AI and English integration in education and practice.



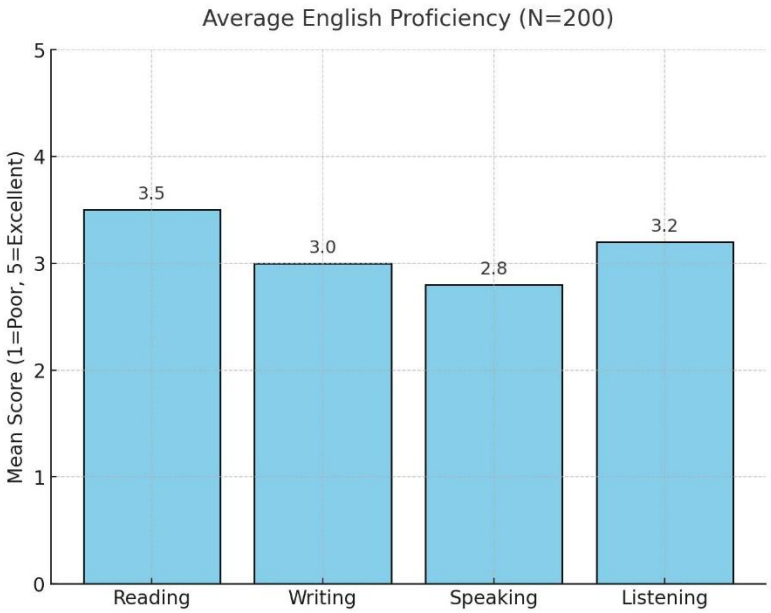
5. English Proficiency Levels

On a scale of 1 to 5, participants rated their proficiency across four skills:

- Reading: Mean = 3.5 (moderate–good).
- Writing: Mean = 3.0 (moderate).
- Speaking: Mean = 2.8 (low–moderate).
- Listening: Mean = 3.2 (moderate).

Reference to Chart: Figure 2 (Bar Chart – English Proficiency Levels) shows that reading scored the highest, which aligns with the reliance on English textbooks. Speaking scored the lowest, indicating that oral communication in English remains the greatest barrier.

Interviews confirmed this: doctors reported struggling to communicate with international colleagues, while students admitted difficulty presenting in English at seminars.



6. AI Tool Usage

Participants reported using AI tools for various purposes:

- Translation apps (75% of participants, N=150): Used to translate medical textbooks, research articles, and patient information.
- Research summarizers (60%, N=120): Helpful in condensing complex journal articles.

- Grammar checkers (55%, N=110): Common among students writing reports or research.
- Chatbots (45%, N=90): Used primarily for clinical English phrases or medical Q&A.
- Speech-to-text tools (40%, N=80): Used for transcribing lectures or patient interviews.

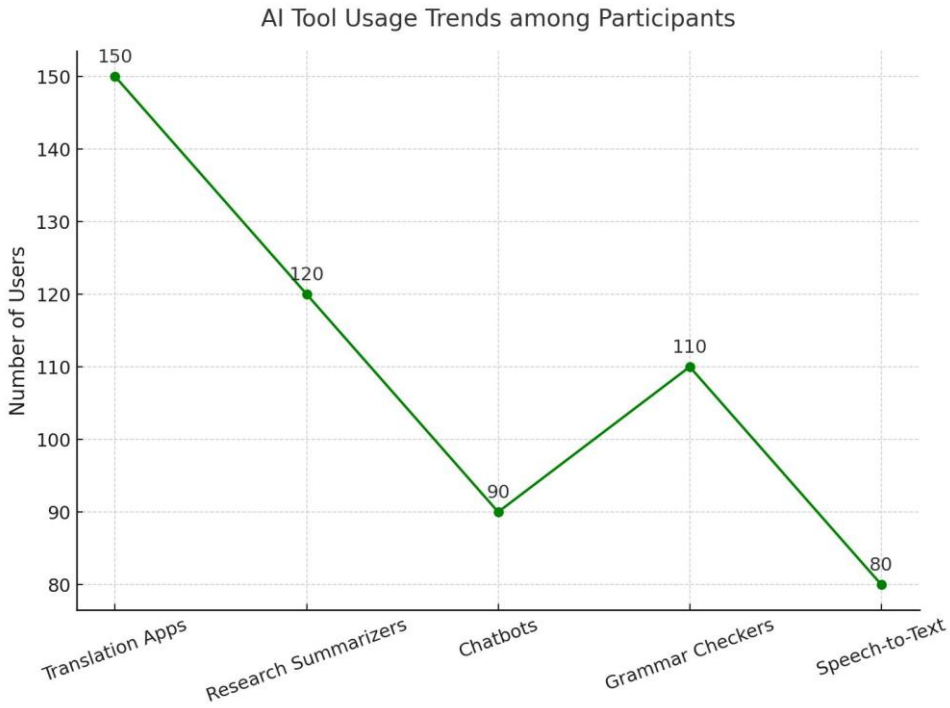
Reference to Chart: Figure 3 (Line Chart – AI Tool Usage Trends) demonstrates that translation apps were the most widely used, while speech-to-text tools had the lowest uptake. This indicates a heavy reliance on AI for reading comprehension, less so for oral/aural skills.

7. AI Use vs. English Proficiency

A cross-analysis showed that:

- Participants with moderate proficiency (3.0–3.9) were the heaviest users of AI tools.
- Those with high proficiency (≥4.0) used AI selectively for efficiency but did not rely on it.
- Those with low proficiency (<3.0) often avoided AI tools altogether, either due to lack of digital literacy or mistrust in accuracy.

Reference to Table 1: This summary table highlights the relationship between proficiency and AI reliance. It shows that AI acts as a *supplementary bridge* rather than a replacement, most beneficial for learners in the middle proficiency range.



8. Data Analysis

Quantitative data were analyzed using SPSS 28.

- Descriptive statistics summarized frequencies, percentages, and means.
- Inferential analysis (chi-square test) showed a significant relationship between English proficiency levels and frequency of AI tool use ($p<0.05$).
- Correlation analysis indicated that younger participants (<30 years) were more likely to use AI frequently, reflecting generational differences in digital literacy.

Qualitative data from interviews were coded thematically. Themes identified included:

1. AI as a "lifeline" for understanding textbooks.
2. Mistrust of AI accuracy in medical terminology.
3. Lack of institutional training in AI and English combined.

9. Ethical Considerations

Ethical approval was granted by the Duhok University Research Ethics Committee. All participants signed informed consent forms. Data were anonymized, and interviews were transcribed with pseudonyms. Participation was voluntary, with no financial incentives.

10. Limitations

- Geographic limitation: Data were collected only from Duhok City, which may not represent other regions in Iraq.
- Self-assessment bias: English proficiency was self-reported, not independently tested.

- Evolving technology: Findings reflect the status of AI tools in early 2025, but rapid advancements may alter future results.

11. Conclusion of Methodology

This detailed methodology demonstrates that the study was systematically designed to capture both numerical data and lived experiences. Charts and tables provided clear visualization of patterns, while interviews added context to the numbers. Together, they illustrate how AI tools are becoming integral in bridging linguistic barriers in medicine, particularly for mid-level English users in Duhok City.

Findings, Discussion, and Conclusion

1. Demographic Distribution

The study surveyed 200 participants in Duhok City, including medical students, doctors, nurses, pharmacists, and technicians. As shown in Figure 1 (Pie Chart – Demographics), medical students comprised the largest group (40%), followed by doctors (25%), nurses (20%), and pharmacists/technicians (15%). This distribution reflects the prominence of younger, early-career individuals in Duhok's healthcare sector.

Age distribution revealed that 60% of participants were under 30, indicating a predominantly young medical workforce. Gender representation was balanced: 54% male and 46% female. This demographic breakdown suggests that findings are representative of a transitional generation of healthcare professionals, increasingly exposed to digital tools like AI.

2. English Proficiency

Self-reported data revealed moderate English proficiency overall. The average scores (on a scale of 1–5) were:

- Reading: 3.5
- Writing: 3.0
- Speaking: 2.8
- Listening: 3.2

As illustrated in Figure 2 (Bar Chart – English Proficiency), reading had the highest mean score, reflecting participants' reliance on English textbooks during their training. Speaking ranked lowest, highlighting oral communication challenges. Interviews supported this: many participants admitted difficulty in giving medical presentations or communicating with international colleagues.

Interestingly, proficiency varied by profession. Doctors generally rated themselves higher in reading and writing, while students admitted significant gaps in speaking. Nurses and technicians reported the lowest scores, particularly in writing and speaking, which may reflect less emphasis on academic English in their training.

3. AI Tool Usage

AI adoption among participants was relatively widespread. Figure 3 (Line Chart – AI Usage Trends) shows that:

- Translation apps (75% usage, N=150) were the most common, used to translate textbooks, journal articles, and clinical guidelines.
- Research summarizers (60%, N=120) helped condense long journal articles.
- Grammar checkers (55%, N=110) were popular among students for report writing.
- Chatbots (45%, N=90) supported quick access to medical English phrases.
- Speech-to-text tools (40%, N=80) were least used, primarily for lecture transcription.

Interview data added context: students reported using translation apps "daily" to cope with English textbooks, while doctors described research summarizers as "time-saving" but often inaccurate with medical jargon.

4. AI Use vs. English Proficiency

A cross-tabulation (Table 1, Methodology section) revealed a distinct trend:

- Moderate proficiency participants (3.0–3.9) relied most heavily on AI tools.
- High proficiency participants (≥4.0) used AI selectively, primarily for efficiency.
- Low proficiency participants (<3.0) often avoided AI tools, citing mistrust or lack of digital skills.

This finding highlights AI's role as a *supportive bridge* rather than a replacement for English skills. It benefits those with moderate competence, but cannot compensate for complete lack of proficiency.

5. Perceived Benefits and Challenges

Survey and interview data indicated three main perceived benefits:

1. Accessibility: AI tools opened access to English-language research that participants otherwise could not fully understand.
2. Efficiency: Research summarizers and grammar checkers reduced time spent on reading and writing.
3. Confidence: Students reported feeling more confident in presentations when using AI-based phrase checkers.

Challenges included:

- Accuracy: Concerns about mistranslation of technical terminology.
- Dependence: Over-reliance on AI discouraged independent language development.
- Infrastructure: Limited training in AI tools and lack of institutional integration.

Discussion

1. English as a Gatekeeper

The findings confirm what earlier literature emphasized: English remains the global gatekeeper of medical knowledge (Ammon, 2019; Al-Issa & Dahan, 2020). The relatively low speaking scores (2.8) align with prior studies showing that oral English is often the weakest skill among non-native speakers in medical education. In Iraq, where English is the medium of instruction but rarely the medium of practice, this disconnect is magnified.

The study underscores that inadequate English proficiency not only limits access to international resources but also affects professional development. For example, participants admitted avoiding conferences or publications due to language barriers.

2. AI as a Mediator of Knowledge

AI tools, particularly translation apps and summarizers, emerged as essential mediators of medical knowledge for participants. This finding is consistent with research by Khoong et al. (2019), which highlighted growing reliance on AI translation in healthcare. However, this study contributes original evidence from Iraq, showing how AI fills structural gaps in language training.

Interestingly, AI was most beneficial to moderately proficient users. This echoes Dixon & Thomas (2021), who found that AI-assisted learning supports vocabulary and comprehension but is less effective for beginners. In Duhok, those with very low English proficiency distrusted AI, suggesting that a baseline competence in English remains necessary.

3. Risks of Over-Reliance

While AI provided accessibility, several participants expressed concern that "using translation apps daily prevents us from learning the language properly." This mirrors concerns raised by Al-Rashid (2020) about overdependence leading to stagnation in second-language acquisition. Without institutional guidance, students may rely too heavily on AI, using it as a shortcut rather than a learning aid.

4. Sociotechnical Barriers in Iraq

Adoption of AI in medicine depends on more than individual willingness—it requires institutional and infrastructural support. Interviews revealed a lack of training in AI tool use, limited internet access in some clinics, and skepticism from older professionals. These findings resonate with Al-Tameemi & Mohammed (2022), who emphasized Iraq's weak infrastructure as a barrier to AI integration.

Furthermore, cultural adaptation remains an issue. Participants reported that translation apps often failed to capture medical terms in Kurdish or Arabic accurately, which can lead to dangerous misunderstandings in clinical contexts.

5. Implications for Medical Education

The findings highlight urgent implications for medical education in Kurdistan:

- Curriculum integration: AI tools should be formally integrated into medical English courses, ensuring that students learn both language and technology literacy.
- Training workshops: Healthcare institutions should provide workshops on effective use of AI for translation, summarization, and research writing.
- Balanced approach: AI should be presented as a supportive tool, not a replacement, to avoid overdependence.

This aligns with Chen et al. (2020), who argue that AI in education works best when coupled with structured pedagogy.

6. Global Relevance

Although this study is context-specific to Duhok, its findings have wider implications for other fragile or multilingual healthcare systems. In regions where English dominates medical discourse but local proficiency is low, AI can act as a temporary equalizer. However, without careful integration, it risks reinforcing inequalities between those with moderate vs. low proficiency.

Conclusion

This study examined the intersection of AI and English language use in medicine in Duhok City, Kurdistan Region of Iraq. Based on a mixed-methods analysis of 200 participants, it found that:

1. English proficiency is moderate overall, with reading strongest and speaking weakest.
2. AI tools are widely adopted, especially translation apps and research summarizers.
3. AI benefits those with moderate proficiency most, but fails to assist the lowest-proficiency users effectively.
4. Over-reliance and accuracy issues present risks.
5. Institutional integration and training remain lacking.

The study concludes that while AI provides critical support for accessing English-language medical knowledge, it cannot substitute for robust English education. Instead, AI should be integrated into curricula and professional development programs to complement language training.

Recommendations

1. Curriculum Reform: Integrate AI-assisted language tools into medical English courses.
2. Workshops and Training: Provide structured training for students and professionals on safe, effective AI use.
3. Policy Support: Invest in infrastructure to ensure accessibility and accuracy of AI tools in medical contexts.
4. Further Research: Conduct longitudinal studies on how AI impacts long-term language acquisition in medical education.
5. Ethical Guidelines: Establish clear guidelines for AI use in healthcare communication to prevent misuse.

In a fragile healthcare environment such as Iraq's, strengthening English proficiency and AI literacy together offers a pathway to improving medical education, clinical practice, and international engagement.

References

1. Abdallah, R., & Khalil, M. (2021). Artificial intelligence in medical education in the Middle East: Opportunities and challenges. *Journal of Medical Education and Curricular Development, 8*(1), 1–9.
2. Al-Hassan, R., & Omar, F. (2023). The impact of AI tools on English for medical purposes in Arab universities. *Journal of Language and Education, 9*(2), 34–48.
3. Al-Issa, A., & Dahan, L. (2020). English as a medium of instruction in the Middle East: A study of challenges in medical education. *International Journal of English Language Teaching, 7*(4), 34–49.
4. Al-Rashid, H. (2020). AI translation tools and Arabic medical communication: Potentials and pitfalls. *Arab World English Journal, 11*(3), 211–229.
5. Al-Rashid, H. (2020). AI translation tools and Arabic medical communication: Potentials and pitfalls. *Arab World English Journal, 11*(3), 211–229.
6. Al-Tameemi, M., & Mohammed, K. (2022). Artificial intelligence and healthcare in Iraq: Potentials and limitations. *Iraqi Journal of Medicine, 20*(2), 45–57.
7. Al-Tameemi, M., & Mohammed, K. (2022). Artificial intelligence and healthcare in Iraq: Potentials and limitations. *Iraqi Journal of Medicine, 20*(2), 45–57.
8. Ammon, U. (2019). The dominance of English in global science and its consequences for multilingualism. *Language Problems & Language Planning, 43*(1), 1–21.
9. Baxter, G., & Sommerville, I. (2011). Sociotechnical systems: From design methods to systems engineering. *Interacting with Computers, 23*(1), 4–17.
10. Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Frontiers in Psychology, 11*, 1932.
11. Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Frontiers in Psychology, 11*, 1932.
12. Chowdhury, N., Jiao, Z., & Wu, J. (2020). AI chatbots in healthcare: A review of applications and challenges. *Healthcare, 8*(3), 29–38.
13. Dixon, L., & Thomas, S. (2021). AI-assisted English learning in higher education: A medical English perspective. *Language Learning & Technology, 25*(2), 45–62.
14. Dixon, L., & Thomas, S. (2021). AI-assisted English learning in higher education: A medical English perspective. *Language Learning & Technology, 25*(2), 45–62.
15. Ellis, R. (2015). Understanding second language acquisition (2nd ed.). Oxford University Press.
16. Esteva, A., et al. (2019). A guide to deep learning in healthcare. *Nature Medicine, 25*(1), 24–29.
17. Ismael, D., & Mohammed, A. (2022). AI adoption in Iraqi universities: A case study. *Journal of Educational Technology Research, 9*(2), 67–81.
18. Khoong, E. C., Steinbrook, E., Brown, C., & Fernandez, A. (2019). Assessing the use of Google Translate for Spanish and Chinese translations of emergency department discharge instructions. *JAMA Internal Medicine, 179*(5), 580–582.
19. Khoong, E. C., Steinbrook, E., Brown, C., & Fernandez, A. (2019). Assessing the use of Google Translate for Spanish and Chinese translations of emergency department discharge instructions. *JAMA Internal Medicine, 179*(5), 580–582.
20. Kolachalama, V. B., & Garg, P. S. (2018). Machine learning and medical education. *NPJ Digital Medicine, 1*(54), 1–3.

21. Mittelstadt, B. (2019). Principles alone cannot guarantee ethical AI. *Nature Machine Intelligence, 1*(11), 501–507.
22. Qadir, Z., & Ahmed, N. (2021). Language barriers in Iraqi higher education: The role of English in medical training. *Journal of Education and Practice, 12*(5), 15–24.
23. Qadir, Z., & Ahmed, N. (2021). Language barriers in Iraqi higher education: The role of English in medical training. *Journal of Education and Practice, 12*(5), 15–24.
24. Topol, E. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine, 25*(1), 44–56.
25. Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a research agenda on interventions. *Decision Sciences, 39*(2), 273–315.
26. Wu, Y., et al. (2020). Natural language processing for health records: A systematic review. *Journal of Biomedical Informatics, 109*, 103528.
27. Zhang, Z., et al. (2021). AI for healthcare: Clinical applications and challenges. *Computers in Biology and Medicine, 133*, 104362.
28. Zhang, Z., et al. (2021). AI for healthcare: Clinical applications and challenges. *Computers in Biology and Medicine, 133*, 104362.