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Original article

Artificial Intelligence in Medical Education: Knowledge, Attitudes, and Practices of AI Adoption among Teaching Staff and Medical Students at the University of Zawia

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Abstract
The integration of artificial intelligence in medical education represents a transformative opportunity, yet a comprehensive understanding of academic stakeholders' knowledge, attitudes, and practices regarding AI remains limited. This study assessed the current state of AI awareness, perceptions, and utilization among medical educators and students to inform strategic implementation frameworks. A cross-sectional survey was administered to 121 participants (25.6% students, 34.7% teaching assistants, 39.7% faculty members; 80.2% female) at a medical institution, examining self-assessed AI knowledge, ethical considerations, usage patterns, and integration preferences. Participants demonstrated moderate AI knowledge (28.1% reporting high/very high understanding, 57% medium), with the highest familiarity in translation (55.4%) and academic writing tools (49.6%), but limited awareness of data analysis applications (17%). While 93.4% believed AI enhances creativity and 74.4% supported integrating smart classrooms into curricula, significant barriers persisted: 71.1% reported no prior AI use in teaching/study (despite 64.5% using chatbots), 73.6% had never attended AI training workshops, and privacy concerns dominated ethical considerations (74.4% identifying privacy as primary concern, 58.7% citing it as a major adoption barrier). Notably, 82.6% did not consider AI a necessary component of current educational programs, reflecting cautious optimism rather than enthusiastic adoption. The findings reveal a critical gap between theoretical interest in AI and practical implementation in medical education, characterized by moderate knowledge levels, strong ethical reservations, and insufficient training opportunities. Strategic integration requires addressing privacy concerns, developing structured faculty development programs, and implementing phased adoption strategies beginning with low-risk applications to build institutional confidence before advancing to more complex AI implementations. These insights provide a roadmap for medical education institutions navigating the evolving AI landscape.
Keywords: Artificial Intelligence, Medical Education, Knowledge, Attitudes, Practices.

Introduction

Artificial intelligence (AI) is widely regarded by industry experts as the driving force behind the fourth industrial revolution—a paradigm shift transforming nearly every sector of society, from healthcare and finance to manufacturing and education [1]. Coined by Marvin Minsky, AI is defined as "the science of making machines do things that would require intelligence if done by men"—a vision that has evolved into powerful technologies capable of learning, reasoning, and decision-making [2]. While AI has already revolutionized fields such as cybersecurity, legal analytics, computer science, and dentistry [3,4], its impact on higher education is emerging as one of the most transformative and consequential developments of the 21st century.

Universities, as cornerstone institutions in shaping informed, ethical, and innovative societies, are not immune to the disruptive potential of AI [5]. In fact, they are uniquely positioned to lead the responsible integration of AI into teaching, learning, research, and administrative functions. However, to prepare students for an AI-driven labor market, AI literacy must extend beyond computer science departments and be embedded across a wide range of academic disciplines [6]. This interdisciplinary integration is essential to ensure that graduates—regardless of their field—are equipped with the critical thinking, technical awareness, and ethical understanding necessary to navigate and shape the future of work.

Nowhere is this more evident than in medical education, where AI is not only transforming clinical practice but also redefining how future healthcare professionals are trained. AI-powered tools have significantly improved diagnostic accuracy, personalized treatment plans, and patient monitoring in specialties such as oncology, cardiology, diabetes management, mental health, and radiology [7,8]. Machine learning algorithms can detect patterns in medical imaging or genetic data that may elude human observation, reducing diagnostic errors and improving patient outcomes. Yet, despite these advancements, many medical curricula remain slow to incorporate AI education, leaving students unprepared to engage with the technologies they will inevitably use in their careers.

The integration of AI into education—especially in medical and health sciences—offers more than just technological efficiency; it enables personalized, adaptive learning experiences. Intelligent tutoring

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systems, automated feedback, natural language processing, and data-driven insights allow educators to tailor instruction to individual student needs, identify knowledge gaps in real time, and enhance comprehension of complex AI-driven medical algorithms [9]. When combined with human mentorship, AI tools can amplify the educational experience, fostering deeper engagement and critical evaluation of AI's role in clinical decision-making.

Recognizing this shift, recent studies have begun to explore the Knowledge, Attitudes, and Practices (KAP) of AI among university students and faculty. A study among Spanish university students found that integrating AI tools into classroom instruction—while maintaining meaningful human interaction—can significantly enhance learning outcomes and student satisfaction [10]. Similarly, research in the United States demonstrated that AI-powered academic advising systems can help bridge gaps in educational equity, providing timely, scalable support to underrepresented or at-risk students [11]. These findings underscore AI's potential not only as a pedagogical aid but also as a tool for promoting inclusivity and accessibility in higher education.

However, global disparities in AI literacy persist. A study conducted in Lebanon revealed that while many students are aware of AI, there remains a significant gap in their understanding of fundamental AI concepts and ethical implications [1]. Parallel studies in Pakistan and Jordan echoed these concerns, highlighting a pressing need for structured AI education within university curricula [12]. These findings point to a critical disconnect: while awareness of AI is growing, practical understanding, hands-on experience, and confidence in using AI tools (software applications or systems that leverage artificial intelligence technologies) remain limited—especially in regions like the Middle East, where resources and structured AI training programs in higher education are still scarce. Moreover, there is a notable lack of comprehensive research on the implications of AI in medical education and training, particularly in low- and middle-income contexts. This knowledge gap hinders the development of evidence-based policies and curricular reforms needed to equip future healthcare providers with AI competencies. In response to these challenges, our study aims to conduct a comprehensive assessment of the knowledge, attitudes, and practices related to AI among students and staff at our university.

Methodology

This is a cross-sectional study designed to assess the knowledge, attitudes, and practices (KAP) regarding artificial intelligence (AI) among university staff and students. The cross-sectional approach is appropriate for capturing a snapshot of current perceptions and behaviors related to AI within the academic community in May 2025. Data have been collected using a structured, self-administered online questionnaire distributed to both academic and administrative staff as well as undergraduate medical students at the Faculty of Medicine, University of Zawia.

The data collection instrument is a validated, multi-section questionnaire adapted from established KAP survey frameworks in emerging technologies [13] and modified to reflect the educational context and AI-specific competencies. The questionnaire is divided into four distinct domains: First, demographics, which includes variables such as age, gender, professional role (student, academic staff, or administrative staff), academic or administrative department, level of education, and years of experience. Second knowledge, comprising multiple-choice and Likert-scale items designed to evaluate participants' understanding of fundamental AI concepts, its applications in higher education (e.g., personalized learning, automated assessment, academic advising), and awareness of its limitations and ethical implications. The third attitude, explores perceptions of AI's benefits, risks, and overall acceptability in educational settings, including concerns about data privacy, job displacement, and algorithmic bias. Fourth practice, which assesses current utilization of AI tools (e.g., ChatGPT, Grammarly, AI-powered learning platforms), willingness to adopt AI in teaching, learning, or administrative tasks, and identification of perceived barriers to implementation. Data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies, percentages, and means were used to summarize participant demographics and overall KAP scores.

Ethical considerations are central to the conduct of this study. Participation was voluntary, and informed consent was obtained electronically prior to questionnaire access. Participants were informed of the study's purpose and the confidentiality of their responses. No personally identifiable information was collected, ensuring participant anonymity.

Results

The study analyzed responses from 121 participants (students: 25.6%, teaching assistants: 34.7%, faculty members: 39.7%) to assess knowledge, attitudes, and practices regarding AI in medical education (Table 1). Females constituted 80.2% of respondents, with faculty members reporting diverse experience levels, including 13.6% with 10+ years of experience.

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Table 1: Demographic Distribution

Gender	**%**	**N**
Female	80.2	97
Male	19.8	24
Role	%	n
Student	25.6	48
Teaching Assistant	34.7	42
Faculty Members	39.7	31

Knowledge of AI

Self-assessed AI knowledge was moderate: 28.1% reported high/very high understanding, while 57% rated it as medium (Table 2). Key applications recognized included translation (55.4%) and academic writing tools (49.6%), whereas fewer participants were familiar with data analysis (17%) or video creation tools (15.7%) (Figure 1).

Table 2: Self-assessed AI knowledge levels

Knowledge of AI	**%**	**n**
Very high	4.1	5
High	10.7	13
Moderate	57	69
Low	19.8	24
Very low	8.3	10

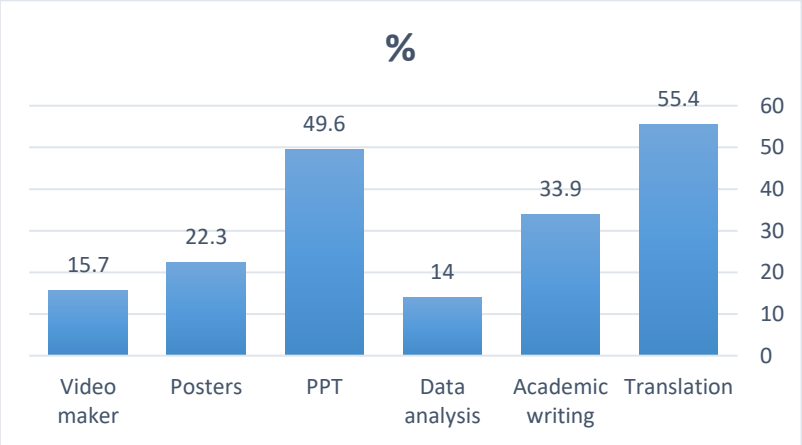

Figure 1. Familiarity with AI applications.

Attitudes Toward AI

Most respondents (93.4%) agreed that AI enhances creativity, though only 24% believed it would surpass human intelligence. Privacy emerged as the primary ethical concern (74.4%), followed by transparency (43%) and fairness (28.1%) (Figure 2). Despite enthusiasm for integrating AI into curricula (74.4% supported smart classrooms—technology-enhanced learning environments equipped with integrated digital tools and AI-enabled systems to support interactive and adaptive teaching and learning), 82.6% did not view AI as a mandatory component of current programs (Figure 3).

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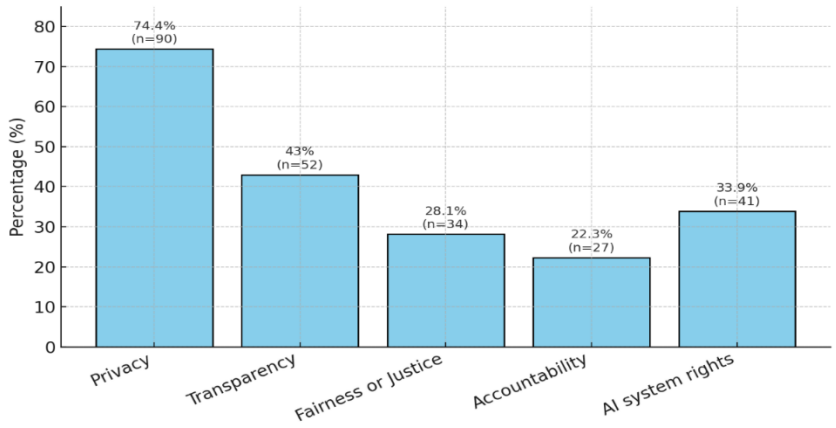

Figure 2: Ethical considerations for AI.

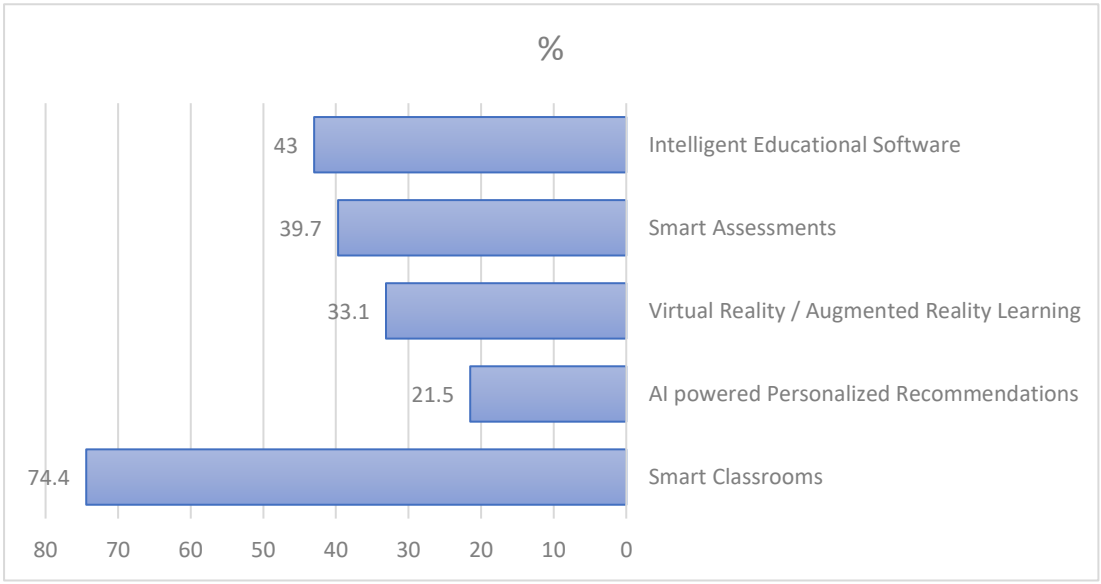

Figure 3: Perceived impact of AI on education.

Practices and Barriers

While 71.1% of respondents reported prior AI use in teaching/study, 64.5% utilized chatbots (AI-driven conversational agents designed to simulate human-like interactions through text or voice interfaces e.g., ChatGPT) (Table 3). However, frequency of use was low: 38% used AI "sometimes," and 14% "rarely/never" (Table 4). A critical barrier was a lack of training, with 73.6% having never attended AI workshops.

Table 3: AI Tool Usage

AI tools	%	n
Chat bots	64.5	78
Writing Assistants	33.9	41
Data Analysis Tools	26.4	32
Virtual Assistants	10.7	13

Table 4: Frequency of AI use in education

Frequency of using AI	%	n
Always	5.8	7
Usual	14	17
Sometimes	38	64
Often	28.9	35
Rarely/ Never	13.2	16

Ethical and Practical Concerns

Privacy (58.7%) and reduced human interaction (47.1%) were cited as major limitations to AI adoption (Figure 4). Trust in AI tools was low: 59.5% remained neutral, and only 9.1% expressed high confidence.

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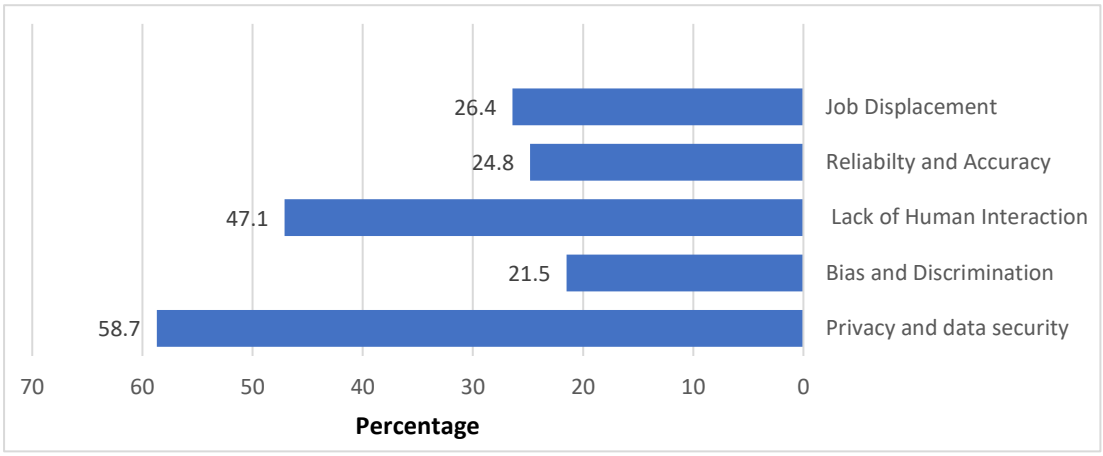

Figure 4: Ethical and practical concerns of AI.

Positive Experiences

As an open question on 'your experience about using AI in education', among 90 respondents reporting positive experiences, 66.7% highlighted AI's time-saving benefits in summarizing information, preparing presentations, and facilitating research. Language support (e.g., English learning) and creative brainstorming were also noted (Table 5).

Table 5: Key benefits of AI in education

Benefits of AI in Education	%	n
Time saving	66.7	60
Language support	20	18
Creativity enhancement	13.3	12

Discussion

This study provides critical insights into the knowledge, attitudes, and practices regarding AI in medical education among a predominantly female academic community (80.2% female participants). The findings reveal a paradoxical relationship with AI: while respondents demonstrate moderate knowledge levels and express significant interest in AI applications, practical implementation remains limited by training gaps and ethical concerns.

Our findings present both convergences and divergences when compared with international research. The moderate AI knowledge levels (with only 28.1% reporting high/very high understanding) mirror results from studies in Syria, where medical students showed similar knowledge gaps despite growing AI exposure. Translation (55.4%) and academic writing tools (49.6%) are the most recognized applications. This pattern of awareness aligns with global trends where practical, immediately applicable tools gain more traction than specialized educational AI applications [14]. The limited familiarity with data analysis (17%) and video creation tools (15.7%) suggests a surface-level engagement with AI, primarily focused on productivity rather than transformative educational applications. This finding resonates with a study in Saudi Arabia, which similarly found medical students demonstrating moderate AI awareness but limited technical proficiency, particularly in analytical applications [15].

The strong belief that AI enhances creativity (93.4%) contrasts sharply with the low confidence in AI surpassing human intelligence (24%). This nuanced perspective suggests that medical educators and students view AI as a complementary tool rather than a replacement—a finding that diverges from studies where concerns about AI replacing human roles appear more pronounced [16]. The emphasis on privacy as the primary ethical concern (74.4%) reflects growing global awareness of data security issues in healthcare AI, consistent with findings from European medical institutions where GDPR compliance has heightened privacy consciousness [17]. However, the comparatively higher acceptance of AI for educational purposes (74.4% supporting smart classrooms) exceeds findings from traditional medical education systems in many countries, where institutional resistance to technological disruption remains stronger [18].

The high usage of chatbots (64.5%) despite limited formal training (73.6% never attending AI workshops) echoes patterns observed in North American medical schools, where students independently adopt AI tools despite institutional hesitancy [19]. However, our study reveals a more pronounced gap between theoretical interest and practical implementation: while 74.4% support AI integration, 82.6% do not consider it mandatory in current curricula. This cautious optimism contrasts with more progressive stances in emerging economies like India, where medical institutions are actively incorporating AI into mandatory coursework [20].

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Notably, the emphasis on privacy concerns (58.7%) as a barrier to adoption exceeds levels reported in US studies (42%), possibly reflecting regional differences in data protection regulations and cultural attitudes toward information security [17]. The concern about reduced human interaction (47.1%) aligns with findings from UK medical schools, where educators similarly worry that AI will diminish the interpersonal aspects of medical training [21].

The time-saving benefits of AI (cited by 66.7% of positive respondents) for summarizing information and preparing presentations suggest immediate practical applications that could be leveraged in medical curricula. This aligns with global evidence that AI's greatest educational value lies in automating routine cognitive tasks, freeing educators and students to focus on higher-order thinking [22]. However, the low trust in AI tools (only 9.1% expressing high confidence) indicates that without addressing reliability concerns, full integration will remain challenging.

Our findings suggest that medical education institutions should adopt a phased approach to AI integration, beginning with applications that address immediate pain points (like translation and writing assistance) while building toward more sophisticated educational tools. This strategy mirrors successful implementations in Canadian medical schools, where starting with low-risk applications helped build institutional confidence before expanding to more complex AI integrations [23].

Limitations and Future Directions

This study has limitations. The gender imbalance (80.2% female participants) may skew results, as gender differences in technology adoption have been documented in medical education research. Additionally, the self-reported nature of knowledge assessment may introduce bias, as individuals often overestimate or underestimate their technical competencies.

Future research should investigate the effectiveness of targeted AI training programs specifically designed for medical educators, with attention to both technical skills and ethical considerations. Longitudinal studies tracking how AI adoption affects learning outcomes in medical education would provide valuable evidence for institutional decision-making. Comparative studies across different cultural contexts would also help identify universal versus context-specific patterns in AI adoption in medical education.

Conclusion

This study reveals a medical education community standing at a critical juncture with AI: recognizing its potential benefits while remaining cautious about implementation challenges. The gap between theoretical enthusiasm and practical readiness represents both a challenge and an opportunity for medical education institutions. By addressing training gaps, developing clear ethical frameworks, and starting with practical, low-risk applications, medical schools can harness AI's potential to enhance—not replace—the human elements that define quality medical education. As our findings suggest, the future of AI in medical education lies not in either uncritical adoption or complete rejection, but in thoughtful, evidence-based integration that prioritizes educational outcomes and maintains the human connection at the heart of medical training.

Conflict of interest. Nil

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