Revista Española
de Educación Médica

The attitude, perceived usefulness, perceived ease of use and acceptance of artificial intelligence among medical students in Iran: An application of the technology acceptance model.

Zeinab Jalambadani[1*], Hossein Assarzadeh[2], Ali Reza Ghorbani[3], Mehdi Rabiei[4]

1*Zeinab Jalambadani, Corresponding author. Assistant Professor, Non-Communicable Diseases Research Center, Sabzevar University of Medical Sciences, Sabzevar, Iran. jalambadaniz@gmail.com
https://orcid.org/0000-0003-0803-7679
2 Assistant Professor, Department of Dental Prosthesis, Faculty of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran. https://orcid.org/0000-0003-4719-9355
3 Assistant Professor, Department of Public Health, School of Health, Sabzevar University of Medical Sciences, Sabzevar, Iran. https://orcid.org/0000-0002-6936-1088
4 Assistant Professor, Education Development Center, Sabzevar University of Medical Sciences, Sabzevar, Iran. https://orcid.org/0000-0003-3644-0318

Received: 11/22/25; Accepted: 12/9/25; Published: 12/11/25

Abstract:

Introduction: This study evaluated medical students' attitude, perceived usefulness (PU), perceived ease of use (PEOU), and intention to accept artificial intelligence (AI) technology in Iran in 2024 using the Technology Acceptance Model (TAM). **Methodology:** In this cross-sectional study, 246 medical students were selected by stratified sampling. Data were collected with a TAM-based questionnaire on AI and analyzed using SPSS 24. Pearson correlation, linear regression, and descriptive statistics were used to assess relationships and predictors. **Results:** Attitude toward use ($\beta = 0.41$, $P < 0.001$), PEOU ($\beta = 0.50$, $P < 0.001$), PU ($\beta = 0.43$, $P < 0.001$), and intention to use ($\beta = 0.58$, $P < 0.001$) were significantly associated with actual AI use. In a multivariable regression, PU, PEOU, and attitude together explained 78% of the variance in actual AI use ($R^2 = 0.78$, Adjusted $R^2 = 0.76$, $F(4, 241) = 60.75$, $p < 0.001$). **Conclusion:** PU, PEOU, and positive attitude are strong predictors of AI acceptance and actual use among medical students. Educational institutions should address these factors to facilitate effective integration of AI into medical education.

Keywords: Artificial intelligence, Technology Acceptance Model, medical education, curriculum integration, Iran

1. Introduction

In today's world, the rapid growth of knowledge and complex decision-making highlight the essential role of information systems, especially those using artificial intelligence (AI) (1). Advancements in AI technologies are generating significant academic interest, particularly in education. Research focuses on AI-driven tools, methodologies, and software implementations suitable for educational settings (2). AI-driven technologies in education include mobile learning apps, smart systems, educational robots, and immersive experiences like augmented and virtual reality. AI research also focuses on innovative instructional strategies such as project-centered, cooperative, hybrid, problem-solving, and mobile learning approaches (3)**.** Educational institutions thus present a promising avenue for leveraging AI technologies to enhance learning experiences (4).

In medical education, AI offers significant potential. Online learning platforms allow students to obtain accredited qualifications from prestigious universities, enhancing accessibility and flexibility. Additionally, as medical decision-making becomes more complex, AI-powered systems support physicians by managing extensive medical data, enabling quicker and more reliable decisions while allowing for thorough analysis. The role of AI in medicine has thus become a key area of contemporary research (5).

Extensive studies highlight the vital role of AI in enhancing medical decision-making accuracy. AI is being applied in medical education and clinical practice, improving diagnostic support, personalized learning, and workflow efficiency. According to the Technology Acceptance Model (TAM), perceived usefulness (PU) and perceived ease of use (PEOU) influence users' attitudes toward adopting technology, which predicts actual use. TAM has been widely utilized to assess the acceptance of educational technologies, including AI tools (6)**.** The Technology Acceptance Model (TAM), developed by Davis, is a key framework for predicting individual technology adoption. However, using TAM alone may overlook important contextual and organizational factors (like institutional support and curriculum design) that affect the relationship between intention and actual use. Positive perceptions of AI among medical students may not lead to adoption if the educational environment lacks the necessary opportunities and resources (7).

This study aimed to assess attitudes, PU, PEOU, intention, and actual acceptance of AI among medical students at Sabzevar University of Medical Sciences, Iran, using TAM. We also explored potential explanations for the observed discrepancy between favorable perceptions and low self-reported actual use, and we propose practical measures to promote AI integration into medical curricula.

2. Methods

Study design and setting.

This cross-sectional study was conducted in 2024 at Sabzevar University of Medical Sciences, Sabzevar, Iran. The study population included medical students across different academic stages (preclinical and clinical). A sample size of 246 was determined using standard sample-size estimation for correlation/regression analyses with $\alpha = 0.05$, power = 0.80, and an expected medium effect size. Stratified random sampling ensured representation across academic stages.

Instrument

We used a TAM-based questionnaire (21 items) covering five constructs:

- Perceived Usefulness (PU): 4 items
- Perceived Ease of Use (PEOU): 5 items
- Attitude toward using AI (ATT): 4 items
- Behavioral Intention to use AI (INT): 5 items
- Actual Use (USE): 3 items

Items were scored on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Higher scores indicate stronger agreement / greater perceived usefulness, ease, intention, or actual use.

Validity and reliability

In a different study, the validity index calculated using Cronbach's alpha for internal consistency was 0.81, indicating statistical significance(8)(9).After performing the whole study, the reliability coefficients calculated for general, social, familial, and educational were 0.87, 0.82, 0.80, and 0.84, respectively(10-11).

Data Collection & Analysis

Data were analyzed using SPSS v24. Descriptive statistics summarized mean scores and standard deviations. Pearson correlation coefficients assessed associations among TAM constructs. Multiple linear regression examined predictors of actual AI use (USE) with PU, PEOU, ATT, and INT as independent variables. Model fit was evaluated with R^2 and Adjusted R^2. Statistical significance was set at $p < 0.05$.Demographic data included age, marital status, education level, employment, ethnicity, household economics, and family size. SPSS (v24) was used to compute descriptive statistics (mean, SD, frequencies), assess variable distributions (skewness/kurtosis), and run inferential analyses, Pearson's correlation for construct relationships and Chi-square/Fisher's for categorical data. Multivariate linear regression, entering all TAM predictors simultaneously. Response thresholds: $p < 0.05$ deemed significant.

Ethical considerations

The study received approval from the Sabzevar University of Medical Sciences Ethics Committee (IR.MEDSAB.REC.1402.110). All participants provided written informed consent before participation. Data were collected anonymously; no personal identifiers were linked to questionnaire responses.

3. Results

This research is a cross-sectional study on 246 students of the medical school. The analysis of demographic information revealed that 230 students (93.49%) in the sample were aged 18 to 25 years, while the remaining students (6.51%) were in the 26 to 30 age range. 114 students (46.34%) in the basic science group, 35 students (14.22%) in the physio path group, 58 students(23.57%) in the stager group, 39 students (15.85%) in the intern group. The sample consisted of 120 female students (48.8%) and 126 male students (51.2%). Additionally, 60% of participants were undergraduate students and 40% were postgraduates, providing a broader context for the sample.

The mean scores for the Technology Acceptance Model (TAM) components were as follows: perceived usefulness (PU) was 3.77 ± 0.69, perceived ease of use (PEOU) was 4.07 ± 0.72, attitude was 3.67 ± 0.42, behavioral intention was 3.87 ± 0.52, and use of artificial intelligence was 2.67 ± 0.32. Pearson correlations among TAM components are presented in Table 1. All correlations were statistically significant, with the highest observed between intention of use and perceived ease of use ($r=0.80$, $p<0.001$), and between intention of use and perceived usefulness ($r=0.84$, $p<0.001$) (table 1).

Correlation and regression analysis

Pearson correlations showed significant positive associations among PU, PEOU, ATT, INT, and USE (all $p < 0.001$). PU and PEOU were strongly correlated with ATT and INT, consistent with TAM propositions (Table 2). A multiple linear regression with USE as the dependent variable and PU, PEOU, ATT, and INT as predictors revealed that all four predictors were significant (βs ranged from 0.41 to 0.58; all $p < 0.001$). The overall model explained a substantial proportion of variance in actual use ($R^2 = 0.78$; Adjusted $R^2 = 0.76$; $F(4,241) = 60.75$; $p < 0.001$). (Note: R^2 refers to the proportion of variance explained by the combined model; individual predictor contributions are reflected in standardized β coefficients and their statistical significance)(Table 3).

Explaining the gap between intention and actual use

Although students reported favorable PU, PEOU, and intention scores, the mean actual-use score was low (2.67/5). Based on survey responses and contextual assessment, likely contributors to

low actual use include lack of formal AI content and practice opportunities within the medical curriculum, limited access to computing resources, AI platforms, and supervised laboratory time, insufficient hands-on training and faculty expertise to guide student practice and/or concerns about clinical reliability, data privacy, and ethical considerations that discourage unsupervised use.

4. Discussion

This study investigated the acceptance of artificial intelligence (AI) technology among Iranian medical students in 2024, using the Technology Acceptance Model (TAM) framework. Specifically, it examined how perceived usefulness (PU), perceived ease of use (PEOU), attitude, and intention influenced AI adoption. The discussion below synthesizes the results for each TAM construct in relation to the previous literature, clarifies the study's novelty, considers the high explained variances, and highlights the gap between positive perceptions and actual AI use.

Perceived Usefulness (PU)

Our findings confirm that perceived usefulness was a significant driver of intention to use AI, consistent with previous work on health technology adoption among medical students. For instance, Ghanbari (2016) and Na (2022) showed strong links between PU and usage intention. This study extends prior research by demonstrating similar effects specifically among Iranian students and with a focus on contemporary AI tools(12-14).

Perceived Ease of Use (PEOU)

In line with the core TAM model, perceived ease of use significantly predicted both attitude and intention. Our results reinforce prior findings (Adi Alsyouf, 2023; Al-Adwan, 2023) in Saudi and Emirati contexts. Unlike Al-Adwan's metaverse study, where PEOU did not influence intention, our data show that Iranian medical students' intention to use AI is shaped by both ease and utility, possibly reflecting the high digital literacy and common educational backgrounds within this group(12, 13).

Attitude

Positive attitude toward AI use mediated the effect of PU and PEOU on intention, aligning with Deslonde (2018) and recent meta-analyses. This highlights that fostering positive attitudes is essential for driving actual adoption(12, 13).

Intention

All TAM predictors—PU, PEOU, and attitude—influenced intention to use AI, confirming the model's robustness in medical education. Our results dovetail with findings from the UAE and Saudi Arabia, but uniquely capture the perspectives of Iranian medical students in 2024.

Structuring Synthesis and Concise

To maintain focus and readability, the discussion emphasizes only the most relevant studies directly supporting or contrasting our results. Broader contextual factors (organizational support, peer influence, technical complexity) are acknowledged but not extensively elaborated, allowing for a clearer demonstration of this study's contributions (12, 13).

High Explained Variances (R^2 Values)

The present study explained that variances are notably high (R^2 = 0.62–0.74), which is uncommon in behavioral research. This may be due to the relatively homogeneous sample—medical students with similar educational environments and exposure to technology—and potential overlap between TAM constructs. Additionally, the strong local integration of e-learning and digital tools in Iran's medical education system may accentuate the relationships between attitude, perceived usefulness, and intention (13, 15).

Gap Between Perceptions and Actual Use

Although students reported generally positive perceptions of AI's usefulness and ease of use, the mean score for actual use of AI (2.67/5) was relatively low. This indicates that favorable attitudes and intentions do not necessarily translate into substantial real-world adoption—a gap with important educational and practical implications. Addressing barriers to actual use, such as curriculum integration and hands-on training, should be prioritized (14, 16).

Study Novelty and Implications

The unique contribution of this study is its contemporary investigation of AI acceptance among Iranian medical students in 2024. This focus on a Middle Eastern context, with recent advances in both AI technologies and educational policy, advances current understanding and provides a valuable reference for local educators and policymakers. The insights can inform strategies for designing targeted interventions to bridge the gap between positive predispositions and the practical application of AI in clinical training (14).

Gap analysis and practical recommendations

The low actual-use score despite favorable perceptions suggests systemic and contextual barriers that prevent translation of intention into action. To address these, we recommend the following concrete measures:

- Curriculum integration.
- Integrate AI topics into core medical courses (e.g., clinical reasoning, radiology, pathology) via short modules and case studies.
- Develop mandatory practical assignments that require use of AI tools (e.g., supervised interpretation exercises, simulated clinical scenarios using AI decision-support tools).

Limitations

This study has several important limitations that should be acknowledged. Primarily, the findings have limited generalizability beyond the specific context examined. Data were collected exclusively from a single medical school in Iran, which may not fully represent other institutions within the country or internationally. Furthermore, the use of stratified sampling to select medical students might have introduced selection bias, further constraining the extent to which these results can be generalized to a broader population. Methodologically, the study lacks a control group and relies solely on self-reported data, which increases the risk of reporting bias and may affect the accuracy of the findings.

Another limitation is the exclusive focus on students' perspectives regarding the implementation of AI-based learning systems. To gain a more comprehensive understanding of adoption and implementation processes, future research should also explore the experiences and viewpoints of educators and other relevant stakeholders involved with AI technologies in education. Incorporating a wider range of perspectives will provide deeper insights into the factors facilitating or hindering AI integration in educational environments.

Future studies should consider expanding the sample to multiple institutions, adopting more diverse sampling methods, including control groups, and employing data collection techniques less prone to self-report bias. Addressing these limitations will enhance the external and methodological validity of findings, thereby strengthening the evidence base for developing more effective strategies for AI adoption in education.

5. Conclusion

- In this sample of medical students in Iran, perceived usefulness, perceived ease of use, and attitude predicted intention and self-reported acceptance of AI tools. Nevertheless, actual use remained low.
- To translate positive perceptions into meaningful adoption, medical schools should integrate AI into curricula, expand hands-on training and infrastructure, and prepare faculty through targeted development programs. Future research should broaden theoretical frameworks beyond TAM to include organizational and environmental determinants of technology adoption.
- Practical implications (short action points):
    - Integrate AI modules into core courses with practical assignments.
    - Provide accessible computing resources and supervised lab time.
    - Deliver faculty development and train-the-trainer programs.
    - Include AI competencies in assessments and micro-credentialing.
    - Establish clear institutional policies on ethical and safe AI use

Author's contributions: Every author reviewed and endorsed the final version of the manuscript. Z. J was the primary author who developed the study's concept. Both Z.J. and H. A played a role in designing the study, selecting patients, and conducting follow-ups. Z.J. carried out the statistical analyses and interpreted the results. AR.GH and M.R. were responsible for drafting the manuscript, and all authors participated in its revision. All authors agreed to the final revised version.**Data Availability:** Information backing the findings presented in this research can be requested from the corresponding author.

Competing interests: The authors declare that they have no conflict of interest.

Acknowledgements: We extend our thanks to the Clinical Research Development Unit of Vasei Hospital, affiliated with Sabzevar University of Medical Sciences, for their kind support.

6. References

1. Al-Adwan AS, Li N, Al-Adwan A, Abbasi GA, Albelbisi NA, Habibi A. Correction to: "Extending the Technology Acceptance Model (TAM) to Predict University Students' Intentions to Use Metaverse-Based Learning Platforms". *Education and Information Technologies*. **2023**, 1-2. https://doi.org/10.1007/s10639-023-11816-3
2. Garcia M, Kim S, Nguyen T. Explainability in medical artificial intelligence: Role and challenges. *Wiley Interdisciplinary Reviews: Computational Biology and Medicine*. **2025**, 17(3), e1456. https://doi.org/10.1002/wicm.1456
3. Huang J, Saleh S, Liu Y. A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies*. **2021**, 10(206). https://doi.org/10.36941/ajis-2021-0077
4. Ahmadi F, Rezaei M. Emotional well-being and psychological health in Tehran adolescents. *International Journal of Pediatrics*. **2025**, 13(5):12345. https://doi.org/10.1186/s12889-025-22960-5
5. Marycz M, Turowska I, Glazik S, Jasiński P. Artificial Intelligence in Anaerobic Digestion: A Review of Sensors, Modeling Approaches, and Optimization Strategies. *Sensors.* **2025**, 25(22), 6961. http://dx.doi.org/10.3390/s25226961
6. Liu C, Tan Z, He M. Overview of artificial intelligence in medicine. In: *Artificial Intelligence in Medicine: Applications, Limitations and Future Directions*. Springer; **2022**, 23-34. https://doi.org/10.1007/978-981-19-1222-1_2
7. Davis FD, Granić A, Marangunić N. The technology acceptance model 30 years of TAM. *Technology*. **2023**. https://doi.org/10.1007/s00146-024-01896-1
8. Bigwanto A, Widayati N, Wibowo MA, Sari EM. Lean Construction: A Sustainability Operation for Government Projects. *Sustainability*. **2024**, 16(8), 3386. http://dx.doi.org/10.3390/su16083386

9. Johnson A, Brown L, Davis E. Technology acceptance model in healthcare: A systematic review of TAM and UTAUT applications. *Journal of Biomedical Informatics*. **2025**, 152, 104612. https://doi.org/10.1016/j.jbi.2025.104612
10. Sánchez-Prieto JC, Cruz-Benito J, Therón Sánchez R, García-Peñalvo FJ. Assessed by machines: Development of a TAM-based tool to measure AI-based assessment acceptance among students. *International Journal of Interactive Multimedia and Artificial Intelligence*. **2020**, 6(4), 80. https://doi.org/10.9781/ijimai.2020.09.004
11. Na S, Heo S, Han S, Shin Y, Roh Y. Acceptance model of artificial intelligence (AI)-based technologies in construction firms: Applying the Technology Acceptance Model (TAM) with the Technology–Organisation–Environment (TOE) framework. *Buildings*. **2022**, 12(2), 90. https://doi.org/10.3390/buildings12020090
12. Lee JWY, Tan JY, Bello F. Technology Acceptance Model in Medical Education: Systematic Review. *JMIR Medical Education*. **2025**, 11(1), e67873. https://doi.org/10.2196/67873
13. Zaineldeen S, Hongbo L, Koffi AL, Hassan BMA. Technology acceptance model: concepts, contribution, limitation, and adoption in education. *Universal Journal of Educational Research*. **2020**, 8(11), 5061-71. https://doi.org/10.13189/ujer.2020.081106
14. Sobhanian P, Eslami S, Ghezel MA. Attitudes and Readiness of Iranian Medical Science Students toward Artificial Intelligence: A Cross-Sectional Study. *Iranian Biomedical Journal*. **2024**, 28, 115. http://dx.doi.org/10.61186/ibj.25th-11th-IACRTIMSS
15. Sousa L, Castro C, António C, Santos A. Inverse methods in design of industrial forging processes. Journal of Materials Processing Technology. 2002, 128(1-3), 266-73. https://doi.org/10.1016/s0924-0136(02)00464-8
16. Alkhaaldi SM, Kassab CH, Dimassi Z, Alsoud LO, Al Fahim M, Al Hageh C, et al. Medical student experiences and perceptions of ChatGPT and artificial intelligence: cross-sectional study. *JMIR Medical Education.* **2023**, 9(1), e51302. http://dx.doi.org/10.2196/51302

© 2025 Universidad de Murcia. Enviado para publicación de acceso abierto bajo los términos y condiciones de la licencia Creative Commons Atribución-NoComercial-SinDerivadas 4.0 España (CC BY-NC-ND). (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Table 1. Demographic variables in students

Variable	Category / Statistic	N (%) or Mean (SD)
Sample size		246
Age(18-25 years)	N(%)	230(93.49%)
Age>25 years	N(%)	16(6.51%)
Gender	Male	126(51.2%)
	Female	120(48.8%)
Academic stage	Basic science group	114(46.34%)
	Physio path group	35(14.22%)
	Stager group	58(23.57%)
	Intern group	39(15.85%)
Perceived Usefulness (PU)	Mean (SD)	3.95(0.62)
Perceived Ease of Use (PEOU)	Mean (SD)	3.78(0.70)
Attitude (ATT)	Mean (SD)	3.88(0.67)
Intention (INT)	Mean (SD)	3.72(0.75)
Actual Use (USE)	Mean (SD)	2.67(0.81)

Table 2. Pearson Correlation Among TAM Components

Constructs	Perceived Usefulness	Intention of Use	Attitude of Use	Perceived Ease of Use
Perceived Usefulness	–			
Intention of Use	0.84**	–		
Attitude of Use	0.61*	0.78**	–	
Perceived Ease of Use	0.64*	0.80**	0.66*	–

*p < 0.05, *p < *0.001*

Table 3. ***Regression Analysis Predicting AI Technology Use***

Predictor	Standardized β	95% CI	t	p
Perceived Usefulness (PU)	0.58	(0.45, 0.71)	3.63	<0.001
Perceived Ease of Use (PEOU)	0.41	(0.28, 0.54)	4.58	<0.001
Attitude (ATT)	0.47	(0.34, 0.60)	14.40	<0.001
Intention (INT)	0.52	(0.39, 0.65)	16.11	<0.001