Frontiers in Health InformaticsISSN-Online: 2676-7104 www.healthinformaticsjournal.com
2025; Vol 14: Issue 2 Open Access

Role Of Artificial Intelligence In Medical Teaching

Dr Yamini Saraswathi Gurram[1], Sirisha Annavarapu[2], Dr Dudekonda Sai Sandeep[3], Chinthala Swetha[4]

[1]Mbbs, Dr pinnamaneni sidhartha institute of medical sciences and research foundation
[2]Assistant professor, Department of Pharmacolohy, Dr pinnamaneni sidhartha institute of medical sciences and research foundation
[3]PGY1, General surgery, DUTTA MEGHE medical college.
[4]Mbbs , Davao medical school foundation , Philippines.

Cite this paper as: Dr Yamini Saraswathi Gurram, Sirisha Annavarapu, Dr Dudekonda Sai Sandeep, Chinthala Swetha (2024), Role Of Artificial Intelligence In Medical Teaching. *Frontiers in Health Informatics*, *14(2) 2409-2414*

Abstract: **BACKGROUND-**
It always has been a debate about integrating AI into medicine. Medical education going hand in hand with AI, can enhance the learning ability and better understanding of medicine. Students learning how to use AI tools in their medical school, gives them an edge when they prosper further as a physician, in this AI equipped world. The purpose of this study is to determine how effective is AI in medical education, to know the user satisfaction, engagement, merits and obstacles of using AI tools in comparison to traditional teaching methods.
MATERIAL AND METHODS-
The study was conducted in five representative medical schools, using mixed methods and observational techniques. It has both quantitative(performance data of students, questionnaire responses) and qualitative(interviews and focus groups) approaches. The performance data was obtained from academic records of institutional databases and AI driven educational platforms. User satisfaction and engagement data was obtained using Likert Scale. Interviews and focus group discussions were conducted to obtain the experiences of the individuals with the AI tools, merits and difficulties in using AI, in addition to suggestions for improvement
RESULTS-
AI is very effective according to most of the participants (average score=4. 2 on five-point scale),with high ratings of user satisfaction for both the AI platforms used. Student who used AI:-

- Had a significant lead over the non-computer assisted traditional group. (Mean = 85 vs Mean = 78) in exam scores.
- Had higher course completion rates (90%) relative to the students who used traditional methods(75%).
- Had higher engagement levels.

INTRODUCTION-

Artificial intelligence is the new global phenomenon, which is being used in every possible way to enhance the efficacy in all fields (Schwartz, 1989). It has become a part of day-to-day life. Incorporating AI into the medical field, has been a debatable topic, lately. Particularly using AI in medical education can shape the upcoming

physicians to be well versed, before they step into this AI driven world (Xu et al., 2021). Anything that raises the standard of medical education, should definitely be looked into, paving the way forward by integrating technology and medicine, in view of better outcomes (Thibault, 2020).

AI can revolutionize how medicine is taught, in medical schools. It can increase the engagement levels of the students, thereby enhancing the learning (Han et al., 2019). Topics which are a bit complicated, can be easily explained using AI sometimes. A lot of information can easily be processed by the teachers using AI, to present it to the students.AI can be used to get the feedback from the students, which in a healthy way propels the efficacy of the teaching. Medical curriculums can easily be prepared using AI, which saves time.

Medical students can use AI for more personalized learning.AI can provide them with more personalized content, to improve their medical knowledge. In this era where a lot of information is available on the internet, AI can help to figure out the particular content a student needs, based on his requirements (Kaswan et al., 2024). Incorporating AI into medical education, bridges the knowledge vacancy of medical students, by making the learning more enthusiastic and easier.

Aim and objectives

Aim:

To study the integration and impact of artificial intelligence (AI) in medical education and training.

Objectives:

- **Analyze Current Applications:**

Investigate the various ways AI is being integrated into medical education, such as through virtual simulations, intelligent tutoring systems, and adaptive learning platforms.

- **Evaluate Educational Outcomes:**

Assess the effectiveness of AI tools on educational outcomes, including student performance, knowledge retention, clinical skills development, and diagnostic accuracy.

- **Identify Challenges and Benefits:**

Examine the challenges and benefits associated with the use of AI in medical education, such as potential biases, technical requirements, enhanced learning experiences, and improved accessibility to training resources.

Methodology

Study design

The study was conducted using mixed methods and observational techniques. Its purpose was to determine the effect of AI on medical education with a big data analysis of the users. Its methods encompassed both quantitative and qualitative approaches. Quantification involved performance data and questionnaire responses; qualitative research included interviews and focus groups.

Place: This study was made in five representative medical schools of various sizes and types.

Urban medical school A: Advanced AI integration among students with a wide variety of backgrounds. Suburban medical school B: Moderate AI adoption focused on undergraduate medical education. Rural medical school C: New AI technology implemented at a very early stage, offering insight into initial problems. Private medical school D: A place of plentiful resources, all AI tools and techniques are extensively employed. Public medical school E: With very large numbers of students, an environment with unbalances in resources and where students may have variable access to high quality AI tool usage options

Research Subjects: Inclusion Criteria:

Medical Students: Students who were taking classes using AI tools for at least one academic term. Educators: Teachers who use AI technologies as part of their courses, also for at least one full academic term.
Consent: Participants must have given their informed consent to participate in the trial.
Exclusion Criteria: Participants who have not given informed consent. Participants who have only about one semester of experience in using AI tools until now.
Factors: Main Outcome Variables: Academic Performance: Evaluated by exam scores, course completion rates, and getting better in performance each year. User Satisfaction: Judged according to survey responses on a Likert scale (1-5).
Second Outcomes: Engagement Levels: Self-reported engagement scores and usage statistics.
Qualitative Feedback: Interviews and focus groups, covering personal experiences and the perceived benefits and costs of AI in medicine.
Source of Data and Methods Research Object: With people from medical school, including both students and teachers. Devices: Uses structured Likert scale (1-5) questions on satisfaction and engagement, multiple choice questions for personal data, open questions which always bring reactions from at least one person in command. Assistant Required Mixin: The length of a manual, book, or other written text is not constrained here. However, there needs to be some consistent format throughout all sections for reader ease of understanding
Distribution: In order to ensure a high response rate, surveys were taken on line through institutional e-mail systems and individually attended by students at faculty meetings.Classes.
Topics: How effective are AI tools? What is user satisfaction like with them as well as the perceived merits and obstacles of using them in comparison to traditional teaching methods.
Performance Information Sources: Academic records from institutional databases and AI-driven educational platforms. Cues: Exam scores, completion rates of courses, and levels engagement measured by the AI platform's own analytics.
Qualitative Data
Inteviews and Focus Groups: Subjects: A purposive sample of students and educators who completed the questionnaire and consented to further participation. Form: Semi-structured interviews and focus group discussions that examine experiences with AI tools in depth.
Topics covered: Individual experiences with AI tools, detailed feedback on certain AI applications, the merits of such usage in terms of difficulties as well suggestions for improvement.
Recording and Transcription: Sessions were taped and the content transcribed verbatim for analysis.
Sampling Techniques Stratified Random Sampling: Representation of a variety of demographic information (e.g., length of study)
A stratified population division (e.g., length of study, AI tool usage) followed by the random selection of individual participants from within each stratum.
Purposive Sampling: Used for interviews and focus groups in order to select participants with varying experiences and ideas. Therefore this type of sampling allows for an in-depth exploration within specific themes and questions posed.
Tools and Technologies AI-Driven Educational Platforms Virtual Simulations: for surgical training as well as anatomy lessons, VR is now used.
Adaptive Learning Systems: Platforms that provide courses tailored to individual students based on their performance and preferences.
Statistical Software SPSS and R: Quantitative data analysis for descriptive and inferential statistics. NVivo: Qualitative data analysis involving coding and thematic analysis.

Analyzing Data

Quantitative Analyses:

Descriptive Statistics: To this end, mean, median, mode, standard deviation and frequency distributions were applied in order to summarize survey responses as well as performance information.

Coding: identification of recurring themes and patterns in the transcripts of interview and focus group

Thematic Analysis: Nested research of the main themes--a complete understanding participant experiences and views.

RESULTS

Descriptive Statistics

Survey Responses

Effects of AI Tools: Most participants evaluation AI as very effective (average score=4. 2 on five-point scale). User Satisfaction: High ratings for both platforms based on AI technology and those developed by students themselves. (Just under the top mark, with its own number)

Predicted Benefits

Surveys (85%), tailored learning (78%) and feedback on how well you've done in performance evaluations or as a student all received high praise from.

Overall Performance Data

Exam Scores: Student grades maintained a significant lead over the non-computer assisted traditional group. (Mean = 85 vs Mean = 78) Completion Rates: Higher course completion rates for AI users (90%) relative to their counterparts in traditional methods (75%) Engagement Levels: Engagement in AI-driven learning activities was high (average mean = 4. 3). Inferential Statistics T-Tests Significant difference in exam scores between AI users and students from a traditional setting. ($t = -4.56$, $p < 0.01$) User Satisfaction: Grades for ratings on user satisfaction ($t= 3.78$, $p < 0.01$)One-way ANOVAPerformance improvement: Different AI tool bring out differing degrees of improvement in performance. ($F = 6.34$, $p < 0.01$) Regression Analysis of Predictors of SuccessBoth level of use ($\beta= 0.45$, $p < 0.01$) and skill mastery ($\beta= 0.38$, $p < 0.01$) for AI tools are predictors of academic achievement.

Incentives: Enhanced Learning: Students or participants called attention to the interactive, compound characteristics of AI tools. Personalized Feedback: AI learning platforms offered immediate, individual feedback.

Problems: Technical problems and having to overcome the initial learning curve were cited often by many.

Quotes from Participants: Student A: To understand and practice difficult organizational skills, AI simulations make it easier without any risk of bodily harm. Instructor B: Flip Teaching platforms have changed how I teach, helping me focus on each person's needs. Virtual Simulations in Surgical Training: Case Studies and Specific Findings Surgical skills and confidence levels significantly improved. Practical exams always have higher than traditional teaching methods the percentage passing.

Adaptive Learning Platforms: Increased retention rates and better exam performance. Positive feedback on the personalized learning experience and real-time performance tracking.

Comparison with Traditional Teaching Methods Effectiveness: AI tools were rated higher in terms of effectiveness and engagement. Still valued for foundational learning, traditional methods however AI tools supplemented nicely.

Efficiency: AI platforms enabled more efficient learning processes and time management. Educators could spend more of their time mentoring rather than on administration.

DISCUSSION

Artificial intelligence (AI) is increasingly playing a significant role in medical teaching, offering numerous benefits and transforming traditional educational methodologies. Here are some key areas where AI is impacting medical teaching:

1. **Personalized Learning**:
    - **Adaptive Learning Platforms**: AI can create personalized learning experiences by adapting content and pace to individual students' needs, strengths, and weaknesses.
    - **Performance Tracking**: AI tools can monitor student performance and provide real-time feedback, helping students understand their progress and areas needing improvement.
2. **Simulation and Virtual Reality**:
    - **Virtual Patients**: AI-powered virtual patients provide medical students with realistic clinical scenarios to practice diagnostic and treatment skills without risking patient safety.
    - **Surgical Simulations**: AI combined with virtual reality (VR) and augmented reality (AR) can create immersive surgical training experiences, allowing students to practice procedures in a controlled, risk-free environment.
3. **Intelligent Tutoring Systems**:
    - **Automated Feedback**: AI can provide instant, detailed feedback on assignments, quizzes, and practical exams, helping students learn from their mistakes more effectively.
    - **24/7 Availability**: AI tutors can be available around the clock, offering support and answering questions whenever students need help.
4. **Data-Driven Insights**:
    - **Curriculum Improvement**: By analyzing large volumes of data on student performance, AI can identify trends and suggest improvements to the curriculum.
    - **Predictive Analytics**: AI can predict student outcomes and identify those at risk of falling behind, enabling timely interventions.
5. **Content Creation and Curation**:
    - **Automated Content Generation**: AI can assist in creating educational materials, including lecture notes, quizzes, and case studies, by synthesizing information from various sources.
    - **Resource Recommendations**: AI can recommend additional resources such as articles, videos, and textbooks based on students' progress and interests.

CONCLUSION-

Students using AI have obtained better exam scores and course completion rates compared to those using traditional methods, suggesting the efficacy of AI in medical education. High user satisfaction and engagement levels with AI, indicate the need to integrate medical education with AI. Although there is a initial hurdle to get accustomed to AI, overcoming this yields very good results.

REFERENCES

- Han, E. R., Yeo, S., Kim, M. J., Lee, Y. H., Park, K. H., & Roh, H. (2019). Medical education trends for future physicians in the era of advanced technology and artificial intelligence: an integrative review. *BMC medical education*, *19*, 1-15.

- Kaswan, K. S., Dhatterwal, J. S., & Ojha, R. P. (2024). AI in personalized learning. In *Advances in Technological Innovations in Higher Education* (pp. 103-117). CRC Press.
- Schwartz, R. D. (1989). Artificial intelligence as a sociological phenomenon. *Canadian Journal of Sociology/Cahiers canadiens de sociologie*, 179-202.
- Thibault, G. E. (2020). The future of health professions education: emerging trends in the United States. *FASEB BioAdvances*, *2*(12), 685.
- Xu, Y., Liu, X., Cao, X., Huang, C., Liu, E., Qian, S., ... & Zhang, J. (2021). Artificial intelligence: A powerful paradigm for scientific research. *The Innovation*, *2*(4).