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Artificial Intelligence Literacy in Academic Medicine: A Qualitative Evaluation of an Educational Session for Internal Medicine Physicians

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Research Article

Keywords: artificial intelligence, medical education, academic writing, qualitative research, internal medicine

Posted Date: February 25th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8712167/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

The aim of this study was to evaluate, using qualitative methods, the impact of a targeted brief educational session on internal medicine physicians' awareness, attitudes, and perceptions regarding artificial intelligence based academic tools.

Methods

This prospective, qualitative descriptive study was conducted with internal medicine physicians who attended a structured and interactive educational session entitled "Artificial Intelligence on the Path to Academia," delivered as part of the 4th National Congress of Internal Medicine. Following the session, individual semi structured interviews were carried out with the participants. The study design, conduct, and reporting were planned in accordance with the Consolidated Criteria for Reporting Qualitative Research checklist for qualitative research. The data were systematically analyzed using Braun and Clarke's thematic analysis approach.

Results

The analysis indicated that participants' baseline knowledge of artificial intelligence based academic tools was heterogeneous and generally limited. In the post training period, artificial intelligence was positioned more consciously and conditionally as a supportive tool within academic production processes. While an increase in intention to use was observed, sensitivities regarding ethics, reliability, and academic originality were maintained. In addition, a clear need emerged for practical, structured training with a well defined ethical framework.

Conclusions

Targeted short duration educational sessions can enhance artificial intelligence literacy in academic medicine and encourage a critical and informed approach to use, rather than uncritical acceptance of the technology.

Trial registration

Not applicable (qualitative descriptive study no clinical trial intervention).

INTRODUCTION

The rapid advancement of artificial intelligence (AI) based technologies in recent years has profoundly influenced academic research and publishing processes. In time and cognitively demanding tasks such as literature searching, academic writing, reference management, and data visualization, AI based tools have increasingly emerged as potential supports for academics [1, 2]. For internal medicine physicians with a high clinical workload, academic productivity represents an additional domain of responsibility that must be managed alongside clinical duties.

Despite growing interest in the use of AI in medical education and academic practice, physicians' attitudes toward these tools remain heterogeneous. Existing studies indicate that physicians generally perceive AI as beneficial, yet report substantial concerns regarding ethics, reliability, academic integrity, and data security [3, 4]. In particular, the widespread adoption of generative AI tools has rendered debates on academic originality and plagiarism more visible [5].

Most studies in the literature focus on medical students or broader groups of healthcare professionals, whereas research targeting residents and specialists who carry direct responsibility for academic output remains limited. Moreover, much of the existing evidence is based on quantitative surveys, and qualitative studies that examine in depth the effects of brief educational interventions on physicians' perceptions and attitudes are scarce.

In this context, qualitatively evaluating the impact of a structured educational session for internal medicine physicians on their awareness, perceptions, and attitudes toward AI based academic tools is important for developing effective, ethically grounded, and sustainable training models in academic medicine.

Accordingly, the aim of this study was to assess, using qualitative methods, the effect of a targeted educational session on internal medicine physicians' AI related literacy, attitudes, and perceptions regarding AI based academic tools.

METHODS

Study Design

This study was designed as a qualitative, descriptive, cross-sectional investigation conducted after the educational session. Semi structured one to one interviews were used to explore internal medicine physicians' perceptions, attitudes, and evaluations regarding AI based academic tools in depth. The study design and reporting were planned in line with the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist to enhance transparency and methodological rigor in qualitative research.

Study Setting and Context

The study was conducted within the context of an educational session entitled “Artificial Intelligence on the Path to Academia,” delivered as part of the program of the 4th National Congress of Internal Medicine. The session was planned and implemented by the DAHUDER Artificial Intelligence Study Group operating under the Turkish Association of Internists (DAHUDER). Accordingly, the research took place in an institutional scientific event setting organized in line with the goals of academic productivity and continuing professional development.

Participants

Physicians who were either internal medicine specialists or residents, attended the educational session, and voluntarily agreed to participate were included in the study. Participants from non–internal medicine specialties and individuals who did not consent to be interviewed were excluded. Sample size was determined based on the principle of thematic saturation commonly used in qualitative research, and data collection was discontinued when no new themes emerged.

Content of the Educational Session

The training was structured as a 60 minute session comprising two thematic modules, each consisting of a 20 minute presentation followed by a 10 minute interactive discussion; the session format is presented in Fig. 1. The first module addressed AI assisted literature searching and reference management, while the second focused on AI supported academic writing and visualization. The session was delivered using a practice-oriented approach based on example scenarios, and active participant engagement was encouraged. Potential applications of AI tools in academic production were discussed within the framework of ethical use, academic originality, and data security.

Data Collection

Data were collected through one time, individual semi structured interviews conducted with participants after completion of the educational session. When developing the interview questions, constructs commonly used to understand perceptions and attitudes toward technology use such as perceived usefulness, perceived ease of use, and behavioral intention from the Technology Acceptance Model (TAM) were considered as a conceptual background. However, the study did not aim to test a specific technology acceptance model; rather, this conceptual structure was used as a guiding framework for interpreting participants’ experiences.

During the semi structured interviews, participants’ responses were recorded in writing at the time of the interview and subsequently reviewed and organized for analysis. The interview question set was developed to capture participants’ level of knowledge regarding AI based academic tools, perceptions of use, ethical concerns, training needs, and overall evaluation of the session, and is presented in Table 1. Depending on the flow of the interview, follow up questions were asked when necessary to deepen

participants' responses. The semi-structured interviews were conducted using an interview guide that was specifically developed for this study by the study group. The interview guide and interview questions were created by the research team to align with the study objectives.

Table 1
Thematic categorization of the semi structured interview questions

Theme	Question No.	Semi-structured interview question
Knowledge and awareness of AI-based academic tools	1	What do you generally know about AI-based academic tools?
Intention and attitude toward academic use	2	What are your thoughts on using such tools in your academic work?
Perceived usefulness and application areas	3	In your opinion, at which stages of the academic process could AI tools be useful?
Ethical concerns and perceived risks	4	What aspects of using these tools concern you or make you hesitant?
Motivation for learning and self-development	5	Would you like to learn more about this field? Why?
Perceived impact on academic productivity	6	How do you think AI tools affect academic productivity?
Educational and support needs	7	What kind of support or content would be helpful for you in this area?
Overall evaluation of the educational session	8	Could you share your overall evaluation of today's session?

Interviewers and Bias Control

The semi-structured interviews were conducted by individuals who were not involved in planning or delivering the educational session, were not members of the DAHUDER Artificial Intelligence Study Group, and were independent of the researchers who provide AI related training, while having sufficient medical knowledge. Ensuring that interviewers had no direct role in the educational content was intended to reduce the risk of influencing participants' responses and to minimize researcher bias.

Data Analysis

The data were analyzed using the six-phase thematic analysis approach described by Braun and Clarke. The analytic process began with familiarization with the data, followed by coding meaningful units of text and examining relationships among codes to generate subthemes and overarching themes. The thematic structure was reviewed iteratively to ensure consistency with the dataset and internal coherence, and consensus was reached on the final themes. To protect the confidentiality of participants' statements, quotations are presented in the text using anonymized identifiers (e.g., D1, D2, D3).

Methodological Approach and Analytical Framework

In interpreting the findings, selected components of the RE-AIM framework commonly used to evaluate educational interventions were considered as contextual reference points, particularly reach, perceived effectiveness, and adoption. However, this study did not aim to systematically assess all RE-AIM dimensions, and the long-term maintenance component was outside the scope of the present work.

Ethics

Ethics approval

for this study was obtained from the Antalya Training and Research Hospital Scientific Research Ethics Committee (date: 08 May 2025; decision no.: 8/8). The study was conducted in accordance with the principles of the Declaration of Helsinki. All participants were informed about the purpose and procedures of the study, and informed consent to participate was obtained from all participants prior to data collection.

RESULTS

In this study, individual semi-structured interviews were conducted with 17 internal medicine physicians who attended the educational session delivered as part of the 4th National Congress of Internal Medicine. To ensure confidentiality, participants' statements were anonymized using identifiers D1-D17. The thematic analysis of the interview data showed that participants' views clustered around five overarching thematic domains. Five main themes and corresponding subthemes were identified. Overall, participants discussed the potential benefits of AI based academic tools while simultaneously emphasizing ethical concerns and the necessity of human oversight. These shared thematic domains are summarized in Table 2. To present the findings in a more coherent and fluent manner, the results were organized under three headings: (1) knowledge, perceptions, and awareness of AI; (2) boundaries and conditional acceptance in academic use; and (3) training needs and expectations for support.

Table 2
Thematic areas and shared participant perspectives derived from semi-structured interviews

Thematic area	Shared participant perspectives
Potential contributions of AI in academic processes	Saving time, facilitating literature search, providing support in technical aspects of academic work
General attitudes toward the use of AI	AI may be helpful, but it should not replace the researcher in academic production
Concerns and hesitations	Risk of plagiarism, loss of originality, concerns regarding academic responsibility and reliability
Conditions for use	Need for limited, conscious use under human supervision
Educational and support needs	Demand for practical, example-based training with clearly defined ethical boundaries

Knowledge, Perceptions, and Awareness of Artificial Intelligence

Participants' accounts indicated substantial heterogeneity in both their knowledge of AI based academic tools and their prior experiences with using them. Some physicians reported that their understanding of these tools was insufficient or superficial and that they had not yet used them actively in academic production. Participants in this group tended to define AI primarily through general technological developments or popular sources and stated that they continued to prefer conventional methods in academic work.

In contrast, other participants demonstrated a clearer awareness of the potential contributions of AI based tools to academic workflows. In particular, these tools were described as potentially time saving and supportive for tasks such as literature searching, reference management, academic writing, language support, and visualization. However, this awareness appeared to be largely driven by individual experimentation and personal interest rather than supported by systematic training.

Some physicians also noted that their knowledge of AI tools was derived indirectly, limited to a small number of platforms or informed by colleagues' experiences. This suggests that awareness of AI may remain at the level of name recognition and does not necessarily translate into hands on use.

Overall, participants recognized the potential contributions of AI based academic tools to scholarly productivity; however, variations in knowledge and experience meant that the boundaries of these contributions had not yet become clearly defined. Participants' assessments of potential use cases for AI in academic processes are presented in Table 3.

Table 3

Physicians' Views on Potential Use Cases of AI Tools Across Academic Processes **Note**: *n* indicates the number of participants who mentioned the code.

Subtheme	Code	n	Participants
Literature Searching and Reference Management	Literature search / access to sources	12	D1, D2, D5, D6, D7, D8, D9, D10, D11, D12, D14, D15
	Reference formatting	8	D2, D5, D6, D8, D9, D10, D11, D17
Academic Writing and Language Support	Manuscript writing / draft generation	9	D1, D3, D5, D7, D9, D10, D12, D15, D16
	Language editing / simplification	6	D5, D8, D10, D15, D16, D17
	Writing the Introduction/Discussion sections	2	D10, D17
	Conclusions / summarizing	1	D13
Data Processing and Visualization	Generating graphs, figures, and tables	6	D5, D6, D9, D10, D11, D14
	Data analysis / cleaning	4	D2, D7, D9, D11
Overall Appraisal	Could be useful at every stage	4	D1, D7, D9, D14
	Requires verification / insufficient on its own	4	D2, D3, D6, D8
	May reduce academic quality / ethical risk	2	D3, D4
Creative Processes and Idea Development	Hypothesis / idea generation	3	D7, D10, D12
	Survey / question suggestions	1	D10

Boundaries and Conditional Acceptance in Academic Use

Participants' accounts indicated that attitudes toward the use of AI based academic tools were clearly conditional and cautious. While physicians acknowledged that these tools could serve a supportive role in academic processes, they expressed various constraints and concerns related to ethics, reliability, and professional identity.

The most frequently emphasized concerns clustered around ethical and academic considerations. Participants reported that AI assisted content generation could undermine academic originality, increase the risk of plagiarism, and obscure the value of scholarly effort. Accordingly, the prevailing view was that AI should not function as an academic decision maker; rather, it should be used as an auxiliary tool under human oversight.

Reliability and accuracy of information constituted another key limiting factor. Participants noted that AI tools may generate incorrect information and provide inaccurate or fabricated references, making their standalone use in scholarly work problematic. For this reason, it was stressed that AI outputs should be subjected to manual verification and academic scrutiny.

Some physicians stated that excessive reliance on AI could, in the long term, weaken cognitive skills such as critical thinking, analysis, and writing, potentially fostering academic complacency. In addition, concerns were raised that the use of AI might transform professional identity and diminish the distinctiveness and differentiation of the academic role.

Data security and confidentiality emerged as major concerns, particularly when patient data or unpublished academic work was involved. Uncertainty regarding how data shared with AI tools are stored and the potential risks of third party access were among the factors reinforcing a cautious approach.

Overall, participants found it more acceptable to use AI based academic tools not as something to be adopted unconditionally, but as a limited supportive resource aligned with ethical principles and used under human supervision. Participants' reservations and concerns regarding AI use are summarized in Table 4.

Table 4
Physicians' Views on Reservations and Concerns Regarding the Use of AI Tools

Subtheme	Code	n	Participants
Ethical and Academic Concerns	Ethical misconduct / plagiarism risk	9	D1, D3, D4, D5, D7, D8, D9, D15, D17
	Deterioration of quality and ethical standards	5	D1, D4, D11, D12, D16
	Loss of originality	3	D7, D8, D17
Reliability and Accuracy	Incorrect information / erroneous sources	7	D2, D3, D5, D6, D8, D10, D13
	Need for reference verification and manual checking	3	D7, D10, D17
Cognitive and Mental Processes	Blunting skills and creativity	6	D5, D7, D9, D12, D15, D16
	Concerns about complacency / dependency	4	D1, D7, D12, D16
Professional and Societal Impacts	Fear of the profession being taken away	5	D1, D2, D4, D14, D15
	Reduced differentiation	2	D12, D15
	Weakened human interaction	2	D7, D16
Data Security and Privacy	Data leakage / confidentiality breaches	6	D5, D6, D7, D9, D10, D14

Note

n indicates the number of participants who mentioned the code.

Training Needs and Expectations for Support

Participants' accounts suggested that, although interest in and willingness to use AI based academic tools were high, this willingness was largely shaped by the content and delivery of the training provided. Physicians stated that structured, accessible, and practice-oriented training is needed to enable effective and safe use of these tools. In particular, hands on, scenario-based trainings were emphasized as a way to make concrete how and within what boundaries AI tools can be used in academic workflows. Participants noted that theoretical instruction alone is insufficient; trainings supported by real academic scenarios, case based examples, and step by step applications would facilitate learning. The inclusion of specialty specific examples was also highlighted as an element that would increase relevance and engagement.

The accessibility of training materials and the use of plain language were identified as important needs, especially for physicians with less familiarity with technology. Participants indicated that explanations delivered at a slower pace, free of overly technical jargon and supported by visual aids, would facilitate learning. In this context, tiered training models tailored to different levels of prior experience were preferred.

Given time constraints, online trainings and digital platforms were frequently proposed forms of support. Participants stated that content accessible live or as recordings and available for repeated viewing would make the learning process more flexible. In addition, there was a clear need for guidance on how to position AI tools within a framework of ethical use, data security, and academic responsibility. Some participants emphasized the importance of early exposure to these technologies, particularly for younger physicians and future academic candidates, and noted that AI literacy is likely to become a critical skill for long term academic productivity and competitiveness. Overall, participants agreed that training on AI based academic tools should not be limited to technical instruction but should offer a holistic approach with a clearly defined ethical and academic framework.

DISCUSSION

This qualitative study demonstrates that internal medicine physicians' perceptions and evaluations of AI based academic tools are not unidimensional; rather, they reflect a multilayered perspective shaped by perceived benefit, ethical responsibility, and academic originality. The findings indicate that participants viewed AI tools as potentially useful supports in academic production processes; however, this perceived potential did not translate into unconditional acceptance. This pattern is consistent with recent work reporting a form of cautious optimism among physicians toward AI [3, 4].

One of the key findings was the marked heterogeneity across participants in their levels of knowledge and awareness regarding AI based academic tools. This suggests that AI literacy is largely driven by individual interest, personal experience, and informal learning pathways. Prior studies across different countries and specialties have similarly shown that, in the absence of systematic and structured training, physicians tend to develop fragmented and intuitive familiarity with AI tools [2].

Participants' tendency to associate AI use primarily with technical stages such as literature searching, reference management, and language editing indicates that AI is positioned as an "assistive tool" within academic production. This aligns with arguments that generative AI cannot replace analytical thinking, scientific interpretation, or academic accountability [6, 7]. Indeed, the literature emphasizes that while AI assisted tools may facilitate academic writing processes, intellectual contribution and scientific responsibility must remain with the researcher [5].

Ethical concerns and academic integrity emerged as among the strongest and most salient themes in this study. Participants showed high awareness regarding plagiarism risk, loss of originality, and the accuracy of AI generated information. This finding suggests that ethical debates around the use of AI in academia are not merely theoretical but are also perceived as tangible concerns by physicians in

practice settings [8, 9]. Consistently, international editorial bodies and publication ethics guidance recommend that AI be used in scholarly work in a transparent, limited, and auditable manner [10, 11, 12].

Concerns regarding data security and privacy were particularly prominent in relation to sharing unpublished academic work and sensitive data with AI tools. This may be attributable to the fact that many AI based tools operate via commercial platforms and that data storage policies are not always sufficiently transparent. Regulatory and normative frameworks such as the European Commission's guidelines for trustworthy AI underscore that these concerns extend beyond individual preferences and constitute institutional and structural challenges [13].

Participants' statements about training needs further suggest that AI literacy is not solely a technical skill but a multidimensional competence that includes pedagogical and ethical components. The expressed need for hands-on, scenario-based training with clearly defined ethical boundaries indicates that AI integration should not evolve in an unplanned, ad hoc manner. This finding is consistent with scholarship advocating for the structured inclusion of AI in faculty development and continuing professional education programs [14].

At a conceptual level, the findings also align with the Technology Acceptance Model (TAM), which is frequently used to explain technology adoption. Participants' narratives suggest that, despite high perceived usefulness, perceived risks and ethical concerns may constrain intention to use [15]. Similarly, when considered through selected RE-AIM components (reach and adoption), targeted brief educational sessions appear effective in raising awareness; however, long-term maintenance and behavioral integration likely require dedicated, longitudinal evaluation [16].

In the literature, AI education has been addressed predominantly among medical students, whereas the experiences of specialist physicians in the context of academic production have been examined to a limited extent [1, 2]. By focusing on internal medicine physicians with high clinical workload and by centering academic production processes, this study contributes to addressing this gap. Moreover, the qualitative approach enabled an in depth understanding of physicians' perceptions and concerns regarding AI.

In conclusion, the findings indicate that internal medicine physicians neither fully reject nor uncritically adopt AI based academic tools. While physicians consider AI a potential support for academic work, they strongly emphasize that ethical responsibility, academic originality, and human oversight remain indispensable. These results suggest that sustainable integration of AI into academic medicine will depend on critical, ethically grounded, and structured educational approaches.

LIMITATIONS

This study has several limitations. It was conducted at a single national congress among volunteer internal medicine physicians, which may limit generalizability. Data were obtained from one-time semi-structured interviews, precluding assessment of long term changes. As a qualitative study, it did not

include a quantitative pre/post comparison or test a technology acceptance model, so causal inferences cannot be made. Finally, interviews were not audio recorded and were analyzed from written notes, which may have reduced the capture of nuanced responses.

CONCLUSION

This qualitative study suggests that a structured, targeted brief educational session increased internal medicine physicians' awareness of AI based academic tools and fostered a more informed, critical, and conditional stance toward their use. AI was viewed not as a technology to be adopted uncritically, but as a supportive resource requiring ethical safeguards and human oversight. Practice-oriented, ethically grounded training may strengthen AI literacy in academic medicine; future studies should validate these findings in larger, diverse samples with longitudinal and comparative designs.

Declarations

Ethics approval and consent to participate

Ethics approval for this study was obtained from the Antalya Training and Research Hospital Scientific Research Ethics Committee (date: 08 May 2025; decision no.: 8/8).

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contribution

GZG conceived and designed the study, coordinated data collection, and wrote the first draft of the manuscript. MÖz contributed to the study design, provided methodological guidance, and critically revised the manuscript. MÖzb performed data curation and contributed to the statistical analysis and interpretation. ZPP and ACG contributed to data acquisition and manuscript revision. SES and YŞ contributed to data acquisition, data cleaning, and manuscript revision. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

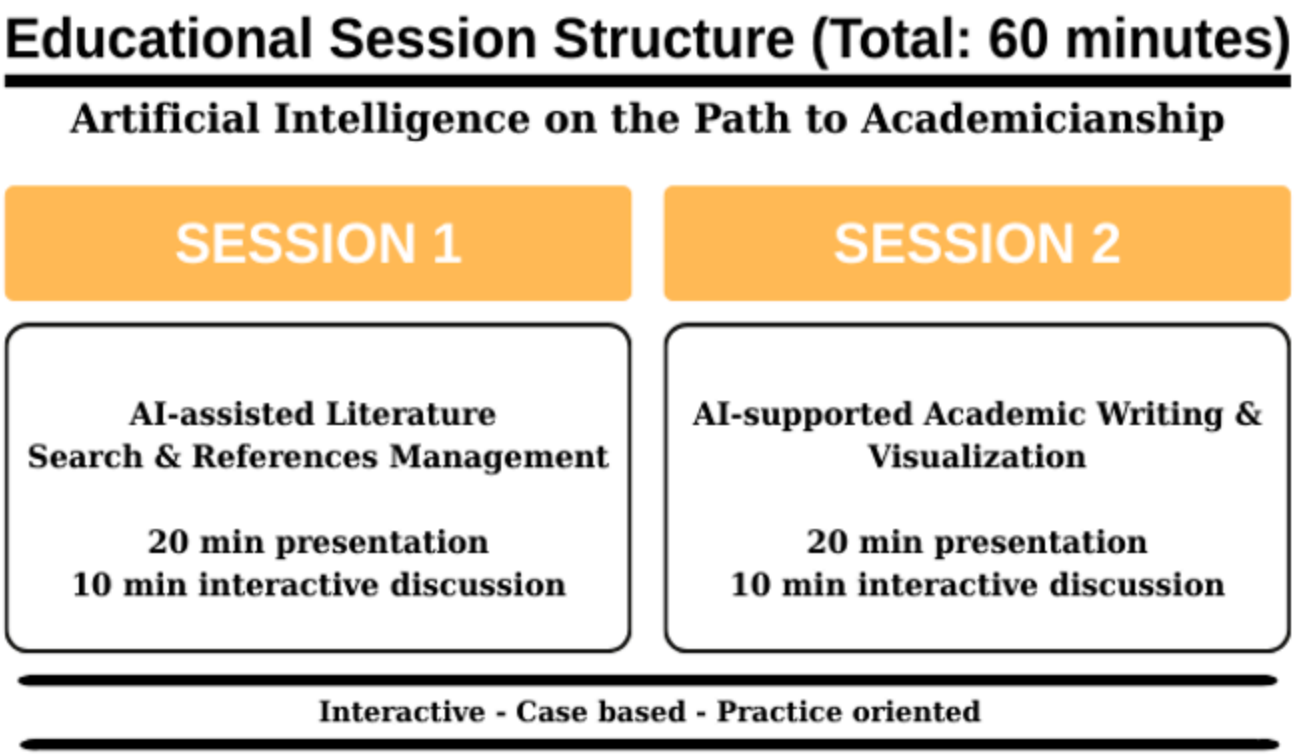


Figure 1

Structured Interactive Educational Session