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ORIGINAL RESEARCH

Effect of Building Capacity of Health Professional Educators in Artificial Intelligence Through a Series of Workshops; a Follow-Up Study

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Background: Artificial Intelligence is rapidly transforming the education of healthcare professionals. Despite this progress, many healthcare educators lack the necessary knowledge and confidence to integrate AI effectively. Structured faculty development initiatives may address this gap by enhancing educators' capacity to incorporate AI. This study investigated participants' perceptions of a series of AI-focused capacity-building workshops conducted in Pakistan and explored the sustained effect of these workshops on educators' attitudes, confidence, and application of AI tools in educational settings.

Methods: A Prospective observational follow-up study was conducted across five workshops: AI in Research (n = 18), AI in Simulation (n = 6), AI in Gamification (n = 15), AI in Assessment (n = 23), and AI in Prompt Engineering (n = 27). Immediate post-workshop surveys measured perceived significance, satisfaction, and knowledge gains. A follow-up survey three months later evaluated sustained use, behavioral change, and institutional dissemination. The follow-up survey questionnaire included the application of workshop learning, changes in attitude, skills, and confidence, institutional support, reflection, and future directions. Quantitative data were analyzed using descriptive statistics, while qualitative responses were subjected to thematic analysis.

Results: Participants reported high satisfaction across all workshops, with over 85% rating the sessions as "Excellent" or "Satisfactory" in terms of achieving learning objectives, knowledge gain, and applicability. Follow-up data (n = 56) demonstrated sustained impact: 85% of participants reported using at least one AI tool in teaching or research, 90% expressed increased openness to AI use, and 77% shared their learning with colleagues. Commonly cited challenges included inadequate infrastructure, institutional resistance, and ethical concerns.

Conclusion: AI-focused faculty development workshops significantly enhanced educators' knowledge, skills, confidence, and motivation to incorporate AI into health professions education. The study uniquely contributes follow-up evidence on early capacity building and educators' application of AI tools after AI-focused faculty development workshops in health professions education.

Keywords: artificial intelligence, faculty development, health professions education, capacity building, technology-enhanced education, medical education, technology, AI

Introduction

Artificial intelligence (AI) is a new field of study that originated in the mid-twentieth century. It is a technology that primarily employs computer systems to imitate human thought processes.[1] A rise in the total number of publications and citations over the last two decades indicates a recent surge in the application of AI in research and development within medical education. It can be utilized in medical education through virtual inquiry systems, medical distance learning and management, and recording teaching videos in medical schools.[2]

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Medical education is a lifelong learning process that spans from undergraduate to postgraduate training and beyond, encompassing specialty training and continuing education. It also applies to various healthcare professionals, including physicians, nurses, and other allied healthcare professionals. Therefore, it is crucial to acknowledge that new knowledge must be built upon existing materials to advance the field of AI in medical education during the current period of rapidly advancing technology.[3]

There have been mixed reactions and emotions among healthcare professionals since the introduction of AI into daily practice. For some, accepting the change has been an easy process. For others, it has been a challenge, as it is human nature to resist the change in favor of maintaining the familiar and comfortable status quo. However, accepting change is vital for the successful implementation of new initiatives. In teaching and learning, curriculum development, and student assessment in health professions education are pivotal to equipping future healthcare professionals with rapid advancements.[4] By using AI, faculty can enhance the design and delivery of teaching content. Systems that are AI-based can facilitate faculty in creating personalized learning resources to meet the specific needs of individual students, ultimately fostering a more engaging and productive learning environment. The AI-driven approaches can significantly reduce faculty workload and minimize the time required to solve complex problems, review diverse curricula, and highlight connections between parameters in curriculum assessment if used efficiently. For instance, AI can evaluate the effectiveness of a curriculum and gauge medical students' overall satisfaction with their courses. Providing tailored and flexible educational materials based on student input helps students recognize and successfully address their knowledge gaps. AI can also expedite the assessment process, increase its accuracy, speed, and cost-effectiveness, while providing each student with personalized, in-depth feedback.[5] These are all essential steps for training the next generation of doctors. While there has undoubtedly been recognition of the apparent benefits that AI provides to medical education, little has been done to train educators of the health professions. Most faculty members remain unaware of AI's potential and are uncertain about how to integrate it into their teaching and learning effectively. An educator's ability to prepare students for a future in which AI will be a significant component of healthcare may be compromised if this issue is not addressed.[6]

Building capacity is crucial for health professions educators to confidently and successfully incorporate AI into medical education, as evidenced by new findings and needs. Although AI-related tools are increasingly accessible, faculty development in AI remains fragmented and largely informal. There is a paucity of empirically evaluated training programs that equip faculty with the knowledge, skills, and confidence required to use AI responsibly in educational and research contexts, highlighting a critical gap that this study aims to address. In Pakistan, the integration of AI in health professions education is still in its early stages, with variable institutional readiness and challenges related to digital infrastructure and faculty familiarity with AI tools. Conducting this study in this context provides valuable insights into the feasibility and early impact of AI-focused faculty development workshops, which can inform future initiatives nationwide.

As a result, five focused workshops were held to teach faculty members how to use AI tools in the four main areas of Health Professions Education (HPE): Prompt Engineering, Teaching & Learning, Assessment, Simulation, and Educational Scholarship.[7]

The purpose of these workshops was to help faculty members from Pakistan to learn more about how to use AI in designing, delivering, and assessing lessons. As educational technologies advance rapidly, it is crucial to prepare teachers to utilize these tools effectively, enhancing their teaching and students' outcomes.

While existing literature has largely focused on the feasibility, acceptability, and immediate outcomes of AI-based educational interventions, there remains a paucity of evidence regarding their sustained impact and influence on behavioral change among educators and learners. In particular, limited studies have examined whether initial exposure to AI-supported strategies translates into meaningful changes in assessment practices over time. Therefore, a follow-up evaluation is essential to determine the extent to which such interventions lead to lasting improvements in practice and behavior, especially in low-resource contexts such as Pakistan. Addressing this gap, the present study uniquely explores not only participants' perceptions but also the longer-term impact and self-reported behavioral changes following an AI-focused faculty development program.

Objectives

1. To explore participants' immediate perceptions related to the AI-focused capacity-building workshops in Pakistan.
2. To explore the sustained effect of the training by conducting a follow-up feedback survey post-workshop, assessing how participants integrated AI tools into their educational practices.

Methodology

Study Design and Participants

The research employed a Prospective observational follow-up study design to explore the effectiveness and perceived impact of a series of capacity-building workshops designed to help educators from the health professions learn to apply AI tools across various areas within Health Professions Education (HPE). Participants included health professions educators from different institutions who voluntarily registered for the workshops. The approach was forward-looking, focusing on educators who signed up voluntarily from various institutions. Each session brought together around five to 30 participants. Since we included everyone who attended, the study used a convenience sampling method.

Intervention

Over the course of six months, five workshops were held, all scheduled to coincide with various medical education conferences. This scheduling allowed the sessions to align well with relevant themes and simultaneously encouraged faculty participation. The workshops were designed to strengthen faculty skills in specific areas of Health Professions Education, with a focus on incorporating AI-driven tools and approaches.

The first session, "AI in Clinical Research", took place during Anesthesia Research Day to give participants a hands-on introduction to using AI tools in research. Over the course of three hours, three facilitators, each with expertise in AI and research methodology, guided faculty members through practical exercises using tools such as Scispace to navigate scientific literature, Julius AI for data analysis support, and Elicit.org to help generate research questions and gather relevant evidence. Twenty-eight educators participated, gaining practical experience of how AI can simplify and enhance the research workflow.

The second workshop, "AI in Simulation", was hosted as a pre-conference event for the 10th Surgical Conference at Aga Khan University. This five-hour session focused on helping senior surgeons explore the role of AI in surgical simulation training. A group of six faculty members participated, gaining hands-on experience with AI-powered simulators that tracked their performance, provided automated feedback, and adjusted the level of difficulty based on their progress. The session underscored how AI has the potential to make surgical training more tailored, evidence-based, and efficient, ultimately enhancing both the teaching process and the learner's experience.

The third workshop, titled "AI-Powered Gamification in Medical Education", was held at the 26th National Health Sciences Research Symposium (NHSRS) at Aga Khan University. The workshop aimed to increase engagement with and utilization of formative assessments and was attended by 18 participants from various health professions. AI-based tools, such as Socrative, an online classroom engagement tool, and Padlet, a tool that enables students to collaborate in real-time and receive feedback, were also shared. The attendees saw firsthand how these tools can facilitate active learning spaces, offer immediate feedback, and monitor student engagement.

The fourth workshop, titled "AI in Assessment", was also conducted as part of the 26th National Health Sciences Research Symposium (NHSRS) at Aga Khan University. It focused on how AI tools could be integrated to design more tailored and meaningful assessments in HPE. Thirty educators participated in this hands-on session, where they explored how tools like ChatGPT and DeepSeek can be used to create high-quality assessment materials, including multiple-choice questions, OSCE scenarios, and other exam formats. The session also featured an introduction to Quizlet, highlighting its potential for creating adaptive quizzes and interactive flashcards that cater to individual learning needs. Facilitators consistently emphasized the importance of aligning AI-powered assessment tools with clearly defined learning outcomes and established competency standards. The overarching message was clear: while AI can enhance the assessment process, it should always serve to support fairness, maintain relevance, and keep focus on the learner.

The final session, titled "Prompt Engineering: Enhancing Teaching and Learning with AI", was delivered as part of the Advanced Teaching and Learning module in the MHPE program at Aga Khan University. This workshop aimed to provide educators with a solid introduction to prompt engineering, essentially, how to design effective inputs that guide AI tools to produce useful, accurate, and context-relevant outputs. A group of 35 faculty members participated in the session, representing a diverse range of backgrounds across the health professions. During the workshop, participants learned how well-crafted prompts can enhance the utility of AI tools in everyday academic tasks, such as planning lessons, creating instructional content, crafting assessments, and providing support to students. The session included hands-on practice with practical examples, helping educators see how prompt engineering can enhance their work in meaningful ways. There was also a strong emphasis on using AI thoughtfully and ethically, with discussions around responsible integration and keeping pace with evolving global standards in digital education.

Data Collection

Participation in the surveys, both immediate and follow-up, was voluntary and anonymous. Informed written consent was obtained from all study participants before the commencement of the research, which was included along with the survey. Participants were informed that by completing the survey, either the immediate survey after the workshops or the follow-up survey, they were consenting to participate in the research. Participants were informed that the data collected would be used for research purposes and may be published in scientific outlets; however, no personally identifiable information would be disclosed.

The first survey was administered immediately after each workshop to capture participants' perceptions of relevance, usefulness, and applicability of the content. For the first three workshops, AI in Research, AI in Simulation, and AI-Powered Gamification in Medical Education, a three-point scale was used, with Excellent, Satisfactory, and Unsatisfactory ratings, comprising 9 items. For the subsequent workshops, AI in Assessments and Prompt Engineering, a six-point scale was employed: Poor, Fair, Satisfactory, Good, Very Good, Excellent, with 20 items. The use of two different survey formats was necessary because each workshop was conducted on a different platform, and each platform had its own piloted survey instrument.

Three months after the last workshop, a follow-up evaluation was conducted to assess how the knowledge and skills acquired during the workshops are being applied in real-world situations. An online survey was created in Google Forms and distributed to participants for completion. The survey was sent out to all participants of the five workshops. The survey form was piloted. The purpose of this survey was to collect information on how the participants have used the knowledge and skills they acquired in the workshops in their individual clinical or teaching settings. Both closed-ended and open-ended questions are included, covering behavior modification, integration into daily routines, obstacles encountered, and the perceived effects on students or work procedures. Details of the follow-up questionnaire are available in Supplementary Materials. Informed consent was acquired, and participation in the follow-up evaluation and the initial feedback was entirely voluntary.

Data Analysis

Descriptive statistics, including frequencies and percentages, were calculated using SPSS to summarize participant responses.

Results

AI in Research (n=18)

The survey conducted immediately after AI in research workshop received three responses: Excellent, Satisfactory, and Unsatisfactory. Regarding the AI in Research workshop, 55.6% (n = 10) of participants rated the objectives as *Excellent*, with 38.9% (n = 7) rating them as *Satisfactory*. The disclosure slide/statement was presented in the workshop in 94.4% (n = 17) of cases. Regarding understanding of the presentations, 61.1% (n=11) rated it as *Excellent* and 38.9% (n=7) as *Satisfactory*. For knowledge acquisition, 61.1% (n = 11) rated it as *Excellent*, with 27.8% (n = 5) rating it as *Satisfactory*. Time management was rated *as Excellent* by 66.7% (n = 12), and the queries responded were rated *as Excellent* by 61.1%

(n = 11). The overall assessment of the activity was rated *Excellent* by 66.7% (n=12), with 22.2% (n=4) rating it as *Satisfactory*. Regarding the impact on understanding the subject, 50.0% (n = 9) rated it as *Excellent*, and 44.4% (n = 8) as *Satisfactory*. Recommendations to peers were rated *as Excellent* by 55.6% (n=10) and *Satisfactory* by 33.3% (n=6) (Table 1).

AI in Simulation (n=06)

The evaluation reveals a positive outcome, with most participants rating the activity as Excellent in key areas, including objectives, knowledge acquisition, and overall assessment. Time management and query management were also well received. However, variations in competence improvement and understanding suggest that the activity could be further tailored to meet diverse learning needs (Table 2). Additionally, ensuring consistent disclosure slides in future sessions is recommended. The frequency for the disclosure statement is 4 for "yes" (66.7%) and 2 for "no" (33.3%).

Table 1 The Responses for the Survey Conducted After the Workshop on AI in Research (n=18), Response Rate 18/28=64%

Item/Question	Excellent	Satisfactory	Unsatisfactory	Percentage Satisfied or Rated Excellent
Objectives of the activity are defined	10 (55.6%)	7 (38.9%)	1 (5.5%)	94.5%
Overall presentations were at the participant's level of understanding	11 (61.1%)	7 (38.9%)	0	100%
Acquired new Knowledge	11 (61.1%)	5 (27.8%)	2 (11%)	89%
Time Management	12 (66.7%)	5 (27.8%)	1 (5.5%)	94.5%
Queries responded	11 (61.1%)	5 (27.8%)	2 (11%)	89%
Overall assessment of the activity	12 (66.7%)	4 (22.2%)	2 (11%)	89%
Relative to where you were before participating in this activity, please rate how well this activity has affected your ability to understand the topic/subject.	9 (50%)	8 (44.4%)	1 (5.5%)	94.5%
Based on your participation today, how will you rate this activity as a recommendation to your peers/colleagues?	10 (55.6%)	6 (33.3%)	2 (11%)	89%

Table 2 The Responses for the Survey Conducted After the Workshop on AI in Simulation (n=6), Response Rate 6/6=100%

Item/Question	Excellent	Satisfactory	Unsatisfactory	Percentage Satisfied or Rated Excellent
Objectives of the activity are defined	4	2	0	100%
Overall presentations were at the participant's level of understanding	4	2	0	100%
Acquired new knowledge	4	2	0	100%
Time management	4	2	0	100%
Queries responded	4	2	0	100%
Overall assessment of the activity	4	2	0	100%

(*Continued*)

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Table 2 (Continued).

Item/Question	Excellent	Satisfactory	Unsatisfactory	Percentage Satisfied or Rated Excellent
Relative to where you were before participating in this activity, please rate how well this activity has affected your ability to understand the topic/subject.	3	3	0	100%
Based on your participation today, how will you rate this activity as a recommendation to your peers/colleagues?	4	2	0	100%
Relative to where you were before participating in this activity, please rate how well this activity has affected your ability and competence	75–100% 3	50–75% 2	25–50% 1	83.3%

AI in Gamification (n=15)

In the evaluation of the AI in Gamification workshop, most participants (80.0%, n = 12) rated the objectives of the activity as *Excellent*, with the remaining 20.0% (n = 3) rating them as *Satisfactory*. The disclosure slide/statement was presented in 80.0% (n = 12) sessions, while 20.0% (n = 3) did not display it. Regarding the overall level of understanding, 73.3% (n = 11) of participants rated it as *Excellent*, while 26.7% (n = 4) rated it as *Satisfactory*. Similarly, knowledge acquisition was rated as *Excellent* by 73.3% (n = 11) and *Satisfactory* by 26.7% (n = 4). Time management received an *Excellent* rating from 66.7% (n = 10) of participants, with 33.3% (n = 5) rating it as *Satisfactory*.

For queries responded to, 66.7% (n = 10) rated the response as *Excellent*, and 33.3% (n = 5) rated it as *Satisfactory*. Regarding the overall assessment, 66.7% (n = 10) rated the activity as Excellent, and 33.3% (n = 5) as *Satisfactory*. A significant majority (66.7%, n = 10) felt that the activity had an *Excellent* impact on their understanding of the subject, while 33.3% (n = 5) rated it as *Satisfactory*. When asked if they would recommend the activity to their peers, 66.7% (n = 10) rated it as *Excellent*, and 33.3% (n = 5) as *Satisfactory*. Regarding the improvement in ability and competence, 53.3% (n = 8) reported a 75–100% improvement, 40.0% (n = 6) reported a 50–75% improvement, and 6.7% (n = 1) reported a 25–50% improvement. Please refer to Table 3 for all these results.

Table 3 The Responses for the Survey Conducted After the Workshop on AI-Powered Gamification in Medical Education (n=15), Response Rate 15/18=83%

Item/Question	Excellent	Satisfactory	Unsatisfactory	Percentage Satisfied or Rated Excellent
Objectives of the activity are defined	12 (80%)	3 (20%)	0	100%
Overall presentations were at the participant's level of understanding	11 (73.3%)	4 (26.7%)	0	100%
Acquired new Knowledge	11 (73.3%)	4 (26.7%)	0	100%
Time Management	10 (66.7%)	5 (33.3%)	0	100%
Queries responded	10 (66.7%)	5 (33.3%)	0	
Overall assessment of the activity	10 (66.7%)	5 (33.3%)	0	100%
Relative to where you were prior to participating in this activity, please rate how well this activity has affected your ability to understand the topic/subject.	10 (66.7%)	5 (33.3%)	0	100%

(*Continued*)

Table 3 (Continued).

Item/Question	Excellent	Satisfactory	Unsatisfactory	Percentage Satisfied or Rated Excellent
Based on your participation today, how will you rate this activity as a recommendation to your peers/colleagues?	10 (66.7%)	5 (33.3%)	0	
Relative to where you were before participating in this activity, please rate how well this activity has affected your ability and competence	75–100% 8	50–75% 6	25–50% 1	93.3%

AI in Assessment (n=23)

For the AI in Assessment workshop, 47.8% (n = 11) of participants rated their expectations as *Excellent*, with 26.1% (n = 6) rating them as *Very Good*. Regarding new knowledge gained, 56.5% (n=13) rated it as *Excellent*, and 26.1% (n=6) as *Very Good*. Participants rated the basic understanding provided by the workshop as *Excellent* (47.8%, n = 11) and *Very Good* (26.1%, n = 6). The pacing of the workshop was rated as Excellent by 52.2% (n=12), with 30.4% (n=7) rating it as *Very Good*. The usefulness of the workshop was rated as *Excellent* by 60.9% (n=14) and as very good by 30.4% (n=7). Regarding recommending this workshop to others, 60.9% (n=14) would recommend the workshop as *Excellent*, with 21.7% (n=5) rating it as *Very Good*. In terms of applying the concepts to teaching, 60.9% (n=14) felt confident in applying the concepts, and 30.4% (n=7) rated them as *Very Good*. The clarity of objectives was rated *Excellent* by 69.6% (n=16), and the relevance of topics was rated *Excellent* by 52.2% (n=12) (Table 4).

Table 4 The Responses for the Survey Conducted After the Workshop on AI in Assessments (n=23), Response Rate 23/23=100%

Item/Question and Rating	1 Poor	2 Fair	3 Satisfactory	4 Good	5 Very Good	6 Excellent
Expectations from the workshop were met	0	0	4 (17.4%)	2 (8.7%)	6 (26.1%)	11 (47.8%)
I gained new knowledge	0	0	1 (4.3%)	3 (13.0%)	6 (26.1%)	13 (56.5%)
The workshop provided me basic understanding	0	0	2 (8.7%)	4 (17.4%)	6 (26.1%)	11 (47.8%)
The workshop was well-paced	0	1 (4.3%)	1 (4.3%)	2 (8.7%)	7 (30.4%)	12 (52.2%)
I would recommend the workshop to others	0	0	2 (8.7%)	2 (8.7%)	5 (21.7%)	14 (60.9%)
The workshop was useful	0	0	1 (4.3%)	1 (4.3%)	7 (30.4%)	14 (60.9%)
I shall be able to apply the concepts in my teaching practices	0	0	0	2 (8.7%)	7 (30.4%)	14 (60.9%)
Objectives were clearly stated	0	0	2 (8.7%)	1 (4.3%)	4 (17.4%)	16 (69.6%)
Content matched the objectives	0	0	0	4 (17.4%)	5 (21.7%)	14 (60.9%)
The topics presented were relevant to my work	0	0	2 (8.7%)	4 (17.4%)	5 (21.7%)	12 (52.2%)
Sessions were structured in a logical way	0	0	2 (8.7%)	5 (21.7%)	4 (17.4%)	12 (52.2%)
Concepts were clearly explained	0	0	2 (8.7%)	4 (17.4%)	5 (21.7%)	12 (52.2%)
Opportunities for active participation were provided	0	0	0	2 (8.7%)	7 (30.4%)	14 (60.9%)

(*Continued*)

Table 4 (Continued).

Item/Question and Rating	1 Poor	2 Fair	3 Satisfactory	4 Good	5 Very Good	6 Excellent
Faculty participation during the workshop was appropriate	1 (4.3%)	0	2 (8.7%)	2 (8.7%)	6 (26.1%)	12 (52.2%)
Questions/clarifications were adequately addressed	0	0	2 (8.7%)	1 (4.3%)	8 (34.8%)	12 (52.2%)
Students were actively engaged during the group activity andamp; discussion session	0	0	2 (8.7%)	1 (4.3%)	7 (30.4%)	13 (56.5%)
Group activity during the workshop was well-planned	1 (4.3%)	0	2 (8.7%)	2 (8.7%)	4 (17.4%)	14 (60.9%)
Admin support was available throughout the workshop	0	0	2 (8.7%)		7 (30.4%)	14 (60.9%)
How well will you be able to use what you learned during the workshop?	0	Somewhat 1 (4.3%)	Mostly 7 (30.4%)	Fair amount 2 (8.7%)	Completely 7 (30.4%)	Almost 6 (26.1%)

AI in Prompt Engineering (n=27)

The AI in Prompt Engineering workshop results indicated that 44.4% (n = 12) of participants felt their expectations were met at a *very good* level, with 29.6% (n = 8) rating as *Good*. Regarding the new knowledge gained, 33.3% (n = 9) rated it as *very good* and 29.6% (n = 8) rated it as *Good*. The basic understanding of prompt engineering was rated as *Excellent* by 22.2% (n = 6) and *Very Good* by 44.4% (n = 12). Pacing was rated as *very good* by 44.4% (n = 12), and *Excellent* by 18.5% (n = 5). Regarding usefulness, 51.9% (n = 14) rated the workshop as *Very good*, and 18.5% (n = 5) rated it as *Excellent*. For recommending the workshop to others, 48.1% (n = 13) rated it as very good, and 14.8% (n = 4) rated it as *Excellent*. Application to teaching practices was rated *Excellent* by 14.8% (n=4) and *Very Good* by 51.9% (n=14). The clarity of objectives was rated as very good by 48.1% (n = 13), and the relevance of topics to work was rated as very good by 44.4% (n = 12). Please refer to Table 5.

Table 5 The Responses for the Survey Conducted After the Workshop on AI in Prompt Engineering (n=27), Response Rate 27/35=77%

Item/Question and Rating	1 Poor	2 Fair	3 Satisfactory	4 Good	5 Very Good	6 Excellent
Expectations from the workshop were met	0	2 (7.4%)	2 (7.4%)	8 (29.6%)	12 (44.4%)	3 (11.1%)
I gained new knowledge	1 (3.7%)	1 (3.7%)	1 (3.7%)	8 (29.6%)	9 (33.3%)	7 (25.9%)
The workshop provided me basic understanding	1 (3.7%)	0	2 (7.4%)	6 22.2%	12 (44.4%)	6 (22.2%)
The workshop was well-paced	1 (3.7%)	0	2 (7.4%)	7 (25.9%)	12 (44.4%)	5 (18.5%)
I would recommend the workshop to others	1 (3.7%)	0	4 (14.8%)	4 (14.8%)	13 (48,1%)	5 (18.5%)
The workshop was useful	1 (3.7%)	1 (3.7%)	1 (3.7%)	5 (18.5%)	14 (51.9%)	5 (18.5%)
I shall be able to apply the concepts in my teaching practices	0	2 (7.4%)	2 (7.4%)	5 (18.5%)	14 (51.9%)	4 (14.8%)
Objectives were clearly stated.	1 (3.7%)	2 (7.4%)	1 (3.7%)	6 (22.2%)	13 (48,1%)	4 (14.8%)
Content matched the objectives	0	1 (3.7%)	2 (7.4%)	6 (22.2%)	11 (40.7%)	7 (25.9%)

(*Continued*)

Table 5 (Continued).

Item/Question and Rating	1 Poor	2 Fair	3 Satisfactory	4 Good	5 Very Good	6 Excellent
The topics presented were relevant to my work	0	1 (3.7%)	3 (11.1%)	4 (14.8%)	12 (44.4%)	7 (25.9%)
Sessions were structured in a logical way	0	1 (3.7%)	4 (14.8%)	5 (18.5%)	12 (44.4%)	5 (18.5%)
Concepts were clearly explained	1 (3.7%)	1 (3.7%)	3 (11.1%)	5 (18.5%)	12 (44.4%)	5 (18.5%)
Opportunities for active participation were provided	0	2 (7.4%)	3 (11.1%)	6 (22.2%)	12 (44.4%)	4 (14.8%)
Faculty participation during the workshop was appropriate	0	1 (3.7%)	1 (3.7%)	4 (14.8%)	13 (48,1%)	8 (29.6%)
Questions/clarifications were adequately addressed	1 (3.7%)	2 (7.4%)	2 (7.4%)	3 (11.1%)	13 (48,1%)	6 (22.2%)
Interactive strategies were used effectively	0	0	5 (18.5%)	4 (14.8%)	14 (51.9%)	4 (14.8%)
Students were actively engaged during group activity and amp; discussion	1 (3.7%)	1 (3.7%)	3 (11.1%)	5 (18.5%)	11 (40.7%)	6 (22.2%)
Group activity during the workshop was well-planned	1 (3.7%)	1 (3.7%)	3 (11.1%)	6 (22.2%)	12 (44.4%)	4 (14.8%)
Admin support was available throughout the workshop	0	2 (7.4%)	1 (3.7%)	4 (14.8%)	12 (44.4%)	8 (29.6%)
How well will you be able to use what you learned during the workshop?		Somewhat 1 (3.7%)	Mostly 17 (63%)	Fair amount 5 (18.5%)	Completely 2 (7.4%)	Almost 2 (7.4%)

Follow-Up Survey Results

Fifty-six participants completed the follow-up survey three months after the last workshop. These respondents included educators and professionals who attended at least one AI-integrated workshop. The full survey results are available in Supplementary Materials (Appendix A, sections 1–6).

Application of Workshop Learning in Real-Life Practice

Most participants reported using the knowledge they gained from the workshop in their own settings. More than 88% of participants remembered the workshop content, and 85% had utilized at least one AI tool or technique from the sessions. Additionally, 81% reported that the workshop helped them solve a real problem in their teaching, research, or clinical work.

Seventy-five percent of respondents said they created or changed a lesson plan, assessment, or activity using AI tools. Eighty-nine percent found the examples from the workshop practical and easy to use in their own work. However, 71% faced technical or contextual challenges, including issues related to infrastructure or institutional readiness. Despite these issues, 80% found creative ways to overcome them, demonstrating adaptability and problem-solving skills through the use of AI solutions.

Changes in Attitudes, Skills, and Confidence

Following the workshop, participants exhibited noticeable changes in their attitudes and behavior. Ninety percent said they were more open to using AI tools in education or research. Similarly, 85% felt confident trying out new AI applications on their own. Participants had a very positive view of AI's impact. Ninety-two percent believed AI can make significant contributions to teaching, learning, or healthcare. Additionally, 84% reported improvements in their workflow or productivity, indicating that they continued to apply the knowledge gained from the workshop.

Knowledge Sharing and Institutional Impact

The workshops appeared to have an impact that extended beyond the participants. Seventy-seven percent shared what they learned with colleagues, and 69% led training sessions based on the workshop content. Fifty-nine percent reported that their departments or teams had started using AI tools, and 71% felt that the workshops had helped raise awareness or bring about change at their institutions.

Qualitative Reflections

Application in Practice

Analysis of open-ended responses revealed four primary ways people applied what they learned: improving teaching and learning, assessment and evaluation, administrative and professional tasks, and some reported minimal or no use. Respondents described using AI for interactive teaching, creating content, and designing assessments. For example, "I made my lecture engaging with AI tools" and "I conducted the entire term exam using AI".

Challenges in Implementation

Participants mentioned several challenges, including technical barriers such as limited internet access and high costs, as well as human and institutional barriers, including resistance and a lack of training. They also raised concerns about reliability and ethics, including data privacy and accuracy, as well as time and resource limitations. For example, one participant said, "Convincing faculty was difficult", and another noted, "Balancing time with AI was difficult".

Support and Sustained Change

Respondents emphasized the need for additional workshops, peer mentoring, and institutional support to continue making progress. Quotes like "More workshops on AI would help" and "Peer mentoring would sustain the change" show that many want ongoing professional development and opportunities to learn together.

Future Workshop Topics

Participants suggested that future sessions should cover topics such as AI in clinical education, assessment and feedback, research, academic work, ethics, and digital literacy. Many also sought to learn about new AI tools, analytics, and communities of practice, indicating an interest in more advanced and specialized AI skills. The results are available in Section 6 of Appendix A.

Discussion

The findings demonstrate that faculty-oriented, contextually designed, capacity-building workshops significantly enhanced educators' knowledge and understanding, as well as their confidence, and prepared them to integrate AI into health professions education. Consistent with earlier studies, hands-on exposure and application to real-world exercises foster meaningful engagement and sustain desired learning outcomes.[1,2]

Participants' feedback showed that workshops focus on authentic use cases, such as AI-assisted research (Scispace and Julius). This supports earlier findings of Dai and Ke (2022), who reported that simulation-based and experiential learning environments improve AI adoption among medical educators.[6] The follow-up responses suggest sustained effects and behavioral change. Many participants incorporated AI in curriculum design, formative assessments, and instructional content creation, reflecting the transformative potential of AI literacy in medical education. Like findings by Chan and Zary (2019) and Han et al (2019), practical exposure and reflection opportunities were key drivers of sustained integration and confidence in using AI for teaching and research.[2,3]

Despite the overwhelmingly positive feedback, several participants highlighted contextual challenges, such as insufficient institutional support, ethical dilemmas, and technological limitations. These barriers align with Lambert et al (2023), who noted that the successful integration of AI in healthcare education requires addressing systemic, human, and organizational factors.[4] The workshops not only built individual skills but also ignited institutional discussions and collaborative exploration with AI tools. Faculty members initiated departmental sharing and informal peer-training sessions, indicating an early stage of cultural change toward the acceptance of AI. This ripple effect underscores the value of structured faculty development programs, as highlighted by Aftab et al (2025), in embedding AI into institutional educational practices.[7]

The follow-up survey results indicate that AI-focused faculty development workshops can have a sustained impact on attitudes, behavior, and institutional outcomes. Participants not only retained and applied workshop learning but also demonstrated increased confidence, openness, and peer dissemination, which are hallmarks of effective professional learning.[8] The high rates of tool acceptance and application suggest that participants were able to translate theoretical understanding and knowledge into practical implementation, particularly in assessment strategies and instructional inventions. This finding is consistent with earlier research demonstrating that structured AI workshops enhance educators' technological self-efficacy and educational integration.[9,10]

Despite clear benefits, the persistence of technical, ethical, and institutional challenges underscores the need for structure-level enablers, including dependable infrastructure, supportive leadership, and clear ethical AI governance frameworks.[11,12] The expressed demand for ongoing mentoring and communities of practice further reinforces the idea that AI adoption is a constant learning process, not a one-time training outcome.[13,14] Institutional diffusion effects, evidenced by peer sharing and departmental uptake, indicate the beginnings of organizational learning and cultural shift toward AI integration. This aligns with innovation diffusion theory, which posits that early adopters play a pivotal role in accelerating the adoption of technology within organizations.[15] Embedding AI champions within departments and fostering cross-department collaboration can further strengthen adoption and reinforce positive cultural change. Future initiatives should consider scalable strategies that address both human and infrastructural factors to maximize the long-term impact of AI in health professions education.

In summary, these findings suggest that AI knowledge initiatives for educators are most effective when they combine hands-on experiences, ongoing mentorship, and institutional support. Future programming should focus on advanced applications, governance frameworks, and interprofessional collaboration, enabling educators to harness AI not merely as a technical tool but as a transformative partner in education and healthcare. Beyond demonstrating individual educators' engagement with AI tools, this study provides early evidence of how structured workshops can encourage a shift in teaching practices and norms within institutions. By fostering shared understanding and confidence in adoption, these interventions may contribute to gradual, positive changes in institutional culture and support the longer-term integration of innovative educational technologies.

Implications for Future Faculty Development

Given the rapid evolution of AI technologies, enduring mentorship, review courses, and communities of practice are crucial for sustaining learning momentum. Future programs could integrate longitudinal coaching and cross-disciplinary collaboration to ensure that educators remain adaptive and ethically grounded. Moreover, embedding AI literacy within the broader framework of educational leadership can accelerate systemic adoption, ensuring that AI serves as a pedagogical enhancer rather than a technological distraction.

Limitations

One significant limitation of this study is its small sample size. Although the survey received a good response rate ranging from 64% to 100% from participants immediately after the workshop, the sample size remained small for individual workshops. However, the educators are from different institutions across Pakistan, which is a significant strength of this study.

While this study was conducted with faculty from different institutions across Pakistan, the findings may apply to similar health professions education settings elsewhere. The workshop design, based on principles of AI integration, adult learning, and faculty development, can be adapted to institutions with comparable educational structures and resources. However, variations in institutional support, participant experience, and available technology may influence outcomes, and caution should be exercised when applying these results to very different contexts. Future studies in diverse educational environments could help confirm the broader applicability of this approach.

Another limitation is that the investigators had to use the survey developed by the conference/workshop organizers rather than the one they had developed for the survey/feedback immediately after the workshops. However, a follow-up survey, developed by the investigators three months after the final workshop, was conducted.

A third limitation of the current study is the absence of baseline data on participants' knowledge and attitudes before the workshops. Without a pre-workshop survey, it is not possible to objectively measure knowledge gain or changes in

openness to AI tools, which may introduce bias. Future iterations should include baseline assessments to provide a more robust evaluation of training outcomes over time.

Conclusions

The series of AI-focused capacity-building workshops effectively improved health professions educators' knowledge, confidence, and practical application of AI in teaching, learning, assessment, and research. Sustained post-workshop engagement further highlights the workshops' persistent effect on educational innovation. Continuous institutional support and iterative faculty development are vital to fully harness the transformative potential of AI in health professions education. Health professions education institutions can utilize AI-focused faculty development workshops to assist educators in integrating AI tools into their teaching and assessment in a meaningful way.

Ethics Approval

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