Original Article

Perception, Knowledge and Institutional Readiness for Artificial Intelligence among Basic Science Teaching Faculty of Public and Private Medical Colleges of Faisalabad

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Abstract

Background: Artificial intelligence (AI) has potential to reshape education, particularly in basic sciences, by introducing more efficient teaching methods.

Objective: To assess perception, knowledge and institutional readiness of AI among teaching faculty of basic sciences. Secondary objective was to assess level of AI expertise among basic science educators and identify knowledge gaps.

Methods: This was descriptive, cross-sectional study conducted among 68 basic science faculty members, selected through convenient sampling. With 90% confidence level and 10% margin of error, an online survey was distributed, gathering data on participants' demographics, AI knowledge, attitudes toward AI, and level of institutional support for AI integration. Technology Acceptance Model was applied to assess faculty perceptions. This study was conducted at medical colleges of Faisalabad from July 2024 to November 2024. Data was analyzed using SPSS version 27.

Results: Out of 68 participants, 57.4% were male and 42.6% were female. 69.1, % people had neutral to highly positive attitude towards using AI.41.2% said they had good understanding of AI, but only 1.5% had formal AI training.75% were open to using AI in their teaching. 42.8% of people felt they didn't know much about AI. The people observed ethical issues with AI use (66.2%) and privacy concerns (61.8%). 80.4% of people said they would use AI, 47.1% people said they had no support from institutions to implement AI. while only 36.5% unsupported people also wished to use AI. 64.7% people were interested to get more hand on training on AI.

Conclusion: This study reveals that teaching faculty has interest in using AI, but they don't have enough resources and institutional support. If proper training is provided AI can change the landscape of medical teaching.

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Introduction

The educational field is incredibly shifting with respect to use of Artificial Intelligence (AI) as it facilitates personalized instruction, data-driven enquiry and enhancement of pedagogy practice.[1] In

the field of basic sciences such as anatomy, physiology, biochemistry, and related subjects already have to offer using AI, the former includes everything such as virtualized labs to predictive modeling that predicts student success.[2]

Despite this transfiguration potential, the successful integration of AI into the academic environment depends on the readiness of teaching staff that serves as a main gate-opener to technology adoption.[3] However, the existing research works single out significant gaps in faculty preparation, ethical discomfort, and administrative support to decelerate the smooth integration of AI.[4]

Faculty adoption is subjected to unique challenges because of the discipline-specific context of the basic sciences requiring dependence on experiential experimentation and strict foundation of theory.[5] Even though AI is supposed to make the interpretation of complex data easier and routine processes automatic, the tendency of educators to incorporate such tools is underrepresented.[6] However, past research has shown that those instructors who receive formal training in AI implement the technology more easily, but this training is limited and fewer than 5 % of practitioners receive formal training.[7]

In parallel to such obstacles is the presence of ethical tensions: the privacy concerns and algorithmic bias, and the possibility of dehumanization of education, which increase the hesitation on scholar part.[8] Further, challenges increase due to institutional barriers to the development of appropriate infrastructure and lack of policy frameworks.[9]

In this study, the Technology Acceptance Model is used. This model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably:

Perceived usefulness (PU), Perceived ease-of-use (PEOU)

In this research, this model is used in order to evaluate the convergent connection between faculty knowledge, acceptance, and institutional readiness towards AI Namely, it rates:

- Self-reported AI skill in comparison to that reported training.
- Seeing the benefits to the deference to ethics.
- The institutional support catalytic effect.

Through the incorporation of these factors, the research will aim at providing the policymakers and academic leaders with actionable knowledge that can be used to bridge the adoption gap in basic sciences.[10]

Methods

This study was a descriptive cross-sectional study which was conducted for 5 months from July 2024 to November 2024 following ethical approval from Faisalbad Medical University (ERB No.48.ERC/FMU/2024-25/51). The study popul-ation consisted of teaching faculty of basic sciences of different medical colleges of Faisalabad who showed willingness to participate. While students, non-medical teachers and teaching faculty from clinical side were excluded. The sample size was 68 , suitable for exploratory studies in homogeneous populations. Though small, the sample aligns with similar studies on AI acceptance in education.[11] Convenience sampling technique was used to recruit 68 faculty members from basic science disciplines (e.g., anatomy, physiology, biochemistry) from various medical colleges of Faisalabad. Data was collected using google forms based questionnaire that was given to teachers after taking their informed consent. Questionnaire contained demographic information & research questions. Respondents were assured that their personal information and all the feedback provided will remain anonymous at all stages of the study. Data was analyzed by using Statistical Package for the Social Sciences (SPSS) version 27.

Results

Sixty-eight (68) participants completed the questionnaires, (N = 39; 57.4) were males and female were (N = 29; 42.6%). The respondents were mostly in junior academic rank, demonstrators (16.2%) and assistant professor (14.8%) rank dominated. In terms of teaching experience, 30.9% of participants had less than five years of experience, while 29.4% had between five and ten years, indicating a relatively even mix of early- and mid-career faculty. (Table 1)A notable 57.4% of respondents held a master's degree, reflecting a highly educated sample.(Table 1)

When asked about their understanding of AI, most

participants rated their knowledge as fair or good, with 41.2% choosing each of these options. Only a small percentage of respondents considered themselves highly proficient in AI, which is likely linked to the fact that almost all participants (98.5%) had not received formal training in the field. Many respondents also indicated they were somewhat (44.1%) or very familiar (29.4%) with AI concepts.(Table 2)

The frequency with which AI tools were used varied across respondents, with half of them reporting that they only used AI tools occasionally. However, the general sentiment towards AI's potential in the basic sciences was largely positive: 64.7% held a somewhat positive view, and 67.6% agreed that AI could improve data analysis and research quality. That said, this optimism was balanced by concerns,(Figure 1) particularly around ethical issues (66.2%) and data privacy (61.8%), with nearly half of participants (48.5%) expressing reservations about fully adopting AI.

There was also indication that institutional support simply seemed to be a key to how willing the faculty seemed to be for the integration of AI.(Table 2) Most respondents noted that their institutions could better support them in the integration process. In more detail, 35.3% respondents were not sure as to whether the resources were sufficient and 47.1% of them believed that there was not enough support when implementing practical AI. However, there were difficulties in understanding and using materials made available, participants expressed the interest in having more workshops or hands on

training sessions in expanding more knowledge on artificial intelligence with 64.7% of the participants.

The respondents also pointed toward the importance of having established rules and regulations on AI application. In this case, a majority (60.3%) expressed their opinion that comprehensiveness of regulations and policies is necessary and sufficient. Also, many of the respondents pointed to the ability of researchers to be held for responsibility in the case of misuse of AI and 61.8% of the respondents agreed with the institutions to offer ethical directions. As with conflict of interest, there was fairly high agreement about external audits of research activities to ensure ethical compliance, with 63.2% supporting these measures.

There was a great desire or readiness among faculty to embrace artificial intelligence. (Figure 2)The majorities, 69.1% of the participants, had a neutral to highly positive attitude towards the use of AI in their academic work, while 17.6 % strongly agreed. Despite this, 61.8% of participants indicated that they had some concern they perceive in AI technology meaning that even though there is interest in the technology among the faculty members, the participants are cautious thus the fear of the consequences experienced. As to the ethical issues, the participant pointed to their relevance for AI adoption, 66.2% of the participants identified ethical concerns as important to be addressed.

Table 1: *Demographic Characteristics of Participants (n=68)*

Variable	Frequency	Percentage%
Gender		
Male	39	57.4
Female	29	42.6
Teaching Experience		
<5 years	21	30.9
5-10 years	20	29.4
11-20 years	20	29.4
>20 Years	7	10.3

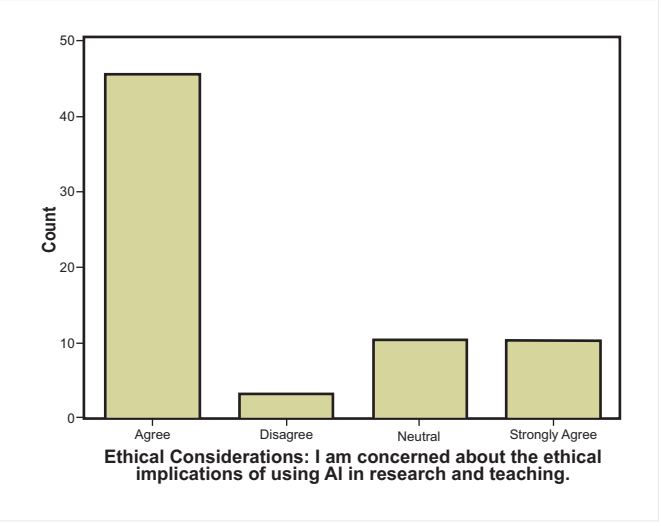

Figure 1: *Bar chart showing the perception of Ethical considerations of AI among faculty*

Table 2: *Perception of Basic Sciencs Faculty related to various aspects of AI.*

Factors/Variables	Likert scale responses N(%)				
	Extremely Familiar	Moderately Familiar	Not Familiar	Slightly Familiar	Very Familiar
Perceptions about AI Knowledge among Faculty	1(1.5)	30(44.1)	3(4.4)	14(20.6)	20(29.4)
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Training programmes at Institute	13(19.1)	36(52.9)	15(22.1)	3(4.4)	1(1.5)
Institutions should provide clear guidelines for the ethical use of AI.	-	42(61.8)	7(10.3)	19(27.9)	-
Institution provides adequate support and resources for integrating AI into research and teaching.	2(2.9)	21(30.9)	12(17.6)	24(35.3)	9(13.2)
Readiness for adoption of AI by Faculty.	12(17.6)	47(69.1)	8(11.8)	1(1.5)	-
Need for additional support to overcome challenges related to AI integration	10(14.7)	51(75)	5(7.4)	2(2.9)	-

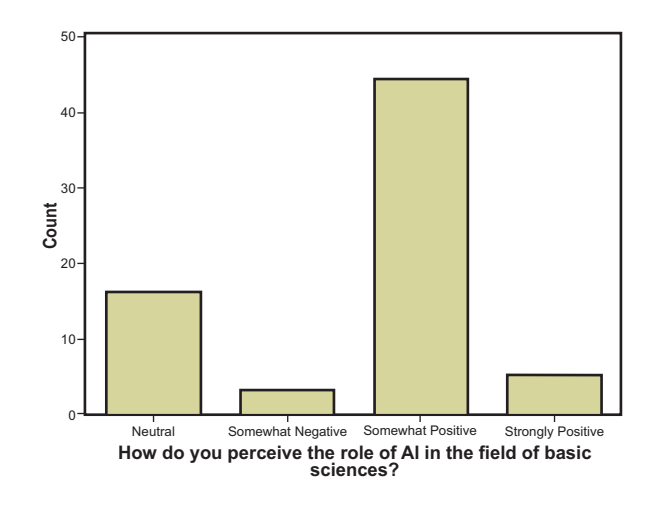

Figure 2: *Bar chart showing the ethical concerns while using AI*

Discussion

The findings of this study reveal critical insights into the acceptance, knowledge, and institutional readiness for AI adoption among basic science faculty. The results align with, and in some cases challenge, existing literature on technology integration in higher education. Below, we discuss the key findings in relation to prior research and their implications for AI implementation in academic settings.

A striking finding was the discrepancy between faculty's self-rated AI knowledge (82.4% fair/good) and formal training (1.5%). This mirrors studies by Sánchez-Priet.[12] Who found that educators often overestimate their technological competence due to limited exposure to structured training. The "illusion of knowledge" phenomenon—where individuals believe they understand a concept better than they do may explain this gap.[13] Without formal training, faculty may lack the depth of understanding required to effectively integrate AI into pedagogy and research. This underscores the urgent need for mandatory AI literacy programs in professional development curricula.

Despite recognizing AI's benefits (82.3%), faculty expressed significant ethical reservations (66.2%), particularly regarding data privacy and algorithmic bias. These concerns align with UNESCOs warnings about AI's potential to perpetuate inequalities in education.[14] Similar apprehensions were noted in medical education, where AI adoption was hindered by fears of depersonalized learning and unreliable outputs.[15] The strong demand for AI guidelines (60.3%) suggests institutions must develop ethical frameworks similar to the EU's Ethics Guidelines for

Trustworthy AI to address transparency and accountability.[16]

Only 33.8% of faculty reported adequate institutional support, with even fewer (29.4%) receiving practical implementation assistance. This contrasts with Lees research, who found that 50% of faculty in well-resourced institutions felt supported in AI adoption.[17] The lack of infrastructure and policy frameworks in our study reflects broader challenges in low- and middle-income academic settings.[18] Without institutional backing, even motivated faculty struggle to adopt AI tools, reinforcing the "readiness-support gap" identified in technology acceptance models.[19]

The most promising finding was faculty's strong willingness to adopt AI (86.7%) and interest in training (82.4%). This aligns with the Technology Acceptance Model (TAM), where perceived usefulness drives adoption intentions.[20] However, as Crompton noted, willingness alone is insufficient without structured training.[21] Our results suggest that targeted workshops focused on discipline-specific AI applications could bridge the gap between enthusiasm and competency.

While gender did not significantly influence AI acceptance contrary to studies on pre-service teachers teaching experience played a subtle role.[22] Early-career faculty (<5 years: 30.9%) were more open to AI, possibly due to greater exposure to digital tools during their training. This echoes findings by Wang et al., who observed that younger educators adapt faster to technological innovations.[23] Institutions should leverage this trend by mentoring senior faculty through peer-led AI training initiatives.

In conclusion, although one can observe certain interest to AI in the basic sciences. Findings reveal that there are still many factors that prevent its further spread. It appears that university faculty members are also seeking more and institutionalized practice-based tutorials as well as more clearly stated ethical guidelines for implementing AI in teaching and research. Meeting these needs will be essential for improved adoption of AI and its appropriate use on campuses.

This study used convenience sampling and had a small sample size, limiting the generalizability of findings. Additionally, reliance on self-reported data may have introduced bias in participants' responses.

Conclusion

This study explored the perception, knowledge, and institutional readiness for AI integration among basic science faculty in medical colleges of Faisalabad. The findings indicate that while faculty members generally hold a positive attitude toward AI and acknowledge its potential benefits, most lack formal training and express concerns related to ethical implications and limited institutional support. These results highlight a clear interest in AI adoption, but also point to readiness gaps that need to be addressed through targeted training and clearer institutional policies.

Given the descriptive nature and small sample size of this study, the findings are exploratory and context-specific. Future research with larger, more diverse samples and analytical methods is recommended to better understand the factors influencing AI adoption and to evaluate the effectiveness of interventions aimed at improving faculty preparedness.

Medical colleges should offer structured AI training programs for basic science faculty. Institutions need to develop clear ethical guidelines for responsible AI use. Infrastructure and technical support must be strengthened to aid implementation. Faculty concerns should be addressed through regular workshops and mentorship. Future studies with larger, diverse samples are recommended to validate and expand these findings.

Ethical Approval: The Ethical Review Committee, Faisalabad Medical University, Faisalabad has approved this study vide letter No. 48/ERC/FMU/2024-25/516.

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Authors' Contribution:

MB: Conception and design, or acquisition of data, or analysis & interpretation of data. Drafting the article or revising it critically for important intellectual content.

HK: Analysis & interpretation of data

SK: Analysis & interpretation of data

NH: Drafting the article or revising it critically for important intellectual content

UH: Analysis & interpretation of data

MA: Drafting the article or revising it critically for important intellectual content, final approval

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