International Journal of Basic Science and Technology
April, Volume 11, Number 2, Pages 67 - 73 http://www.ijbst.fuotuoke.edu.ng /67
https://doi.org/10.5281/zenodo.15183613 ISSN 2488-8648

Artificial Intelligence in Medical Education; Evaluating the Medical Students Perspective

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Article Information

Article # 100254
Received: 26th Jan. 2025
Revision:18th March. 2025
2nd Revision: 1st April. 2025
Acceptance 6th April 2025
Available online:
14th April, 2025.

Key Words
Artificial Intelligence,
Medical education,
Medical students,
Machine learning

Abstract

Artificial Intelligence (AI) is a technological advancement that enables machines to perceive, analyze, and perform tasks at a high level of intelligence. This study aims to evaluate the perspective of medical students on the role of artificial intelligence in medical education. A cross-sectional descriptive study design was adopted using pretested structured and open-ended self-administered questionnaires which were distributed to medical students at the University of Port Harcourt and PAMO University of Medical Sciences using Google forms. A total of 311 completed questionnaires were retrieved, collated, and entered into SPSS version 22.0 for analysis. The results were presented in frequency tables and charts. Males and females constitute 164 (52.77%) and 147 (47.27%) respectively with a mean age (±SD) of 23.33±3.11 years. Students in basic medical sciences classes were 43.09%, while those in basic clinical and clinical sciences classes were 21.22% and 35.69% respectively. The majority agree that AI will improve learning (n=272;87.46%), while others think it will decrease mentorship (n=89; 28.62%), and will reduce the teaching staff in the near future (n= 21; 6.75%). Approximately ninety per cent of the respondents opined that there are no practical applications of AI in their university and most of the learning environments are not IT compliant. Poor power supply and lack of adequate IT training will prevent their aligning with the new reality of AI. The introduction of AI in medical education will improve learning. However, there is the fear of a reduction in mentorship and teaching staff in the future.

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Introduction

Education involves the impaction of knowledge, skills and abilities as well as the ability of the teacher to evaluate the student's ability to reproduce the knowledge which is deemed to have been transferred (1, 2). Artificial Intelligence (AI) is a technological advancement that enables machines to sense, analyze and function at a high intelligence level (3). It is a branch of science that deals with inventions of intelligent machines to perform tasks such as decision making, visual perception and others which are meant to be performed by humans (3). The efficacy and functionality of Artificial intelligence cannot be over-emphasized, as it is employed in various facets of life including education, health care, and astronomy (3-9).

Artificial intelligence (AI) is applied in education, whereby tutorials are delivered on individual basis through supervised regular intervals.

The inclusion of AI technologies in education encourages case-based learning for students and trainees where AI-curated teaching files delivery assist students' performance review (10). The incorporation of AI technologies in medical education would bring about magnificent productivity and efficacy across all facets of medicine (5-10). The use of AI in education enables flipped learning, this learning style is personalized for trainees or students, it enables the review of clinical cases and drafting of patient reports under tutor's supervision, flipped learning has also assisted scholars learn from their comfort zone and their convenient time (10-11). AI helps educationists in the delivery of teaching content, feedback as well as appropriate supervision of the teaching process (12-14).

AI will provide digital platforms for the learning and testing of students. It was also mentioned that AI can translate teachings and lecturer's presentations into different languages for the students understanding (15). This has immensely benefited students with hearing and visual impairments and lecturers who may not be able to attend lectures due to ill health. AI could help to enhance personalizing learning sessions

https://doi.org/10.5281/zenodo.15183613 ISSN 2488-8648

to individuals and help the interaction of the students (12-14).

Notwithstanding, the significance of AI in education, there are still negative influences of AI in education; professional dependency of educationists on technological advancement over self-improvement and development (15), which could result in improper training of students.

Medical education is the training undertaken by a suitable individual towards being a medical practitioner. The training differs from country to country across the world and diverse methodologies of teaching are been employed in medical education (16-18). Medical education started in 1948 as a college branch of the University of London, in the University College Hospital, Ibadan (18-19). Thereafter, more generations of medical colleges have evolved, whereby the newer medical schools are adopting the curriculum of the older ones with little or no modification (17). Even when there were changes and modifications introduced into the medical education curriculum globally there was no significant effect on Nigerian medical schools (17). The introduction of teacher training in educational methods for medical educators to improve teaching has not been fully captured in the curriculum (16-18).

Medical education in Nigeria is regulated by the National Universities Commission and the Medical and Dental Council of Nigeria. These regulatory bodies set the standards for the training with varying degrees of compliance by the training Universities.

Notwithstanding, there are challenges such as inadequate funding, infrastructural decay, poor planning, and erosion of some core values (19). In the face of all these challenges, questions may arise as to the influence of artificial intelligence and global technological advancement in the Nigerian medical education system. Teaching and learning processes are long-term activities whereby the performance of both the teacher and student are evaluated based on the institutional criteria or the regulatory body's criteria. Therefore, this study aims to evaluate the perspective of medical students on the role of artificial intelligence in medical education.

Materials and Methods

***Design and setting*:** A cross-sectional descriptive study design was adopted using pretested structured and open-ended self-administered questionnaires which were distributed to medical students.

Participants and sampling: Medical students at the University of Port Harcourt and PAMO University of Medical Sciences which are public and private medical institutions respectively.

***Tools/Instruments*:** The instrument of data collection was a well-structured questionnaire made up of various sections namely participant's demographic data, knowledge of artificial intelligence and the use of artificial intelligence in their institution. There was a hard copy and an online version of the questionnaire which was constructed using a Google questionnaire (docs.google.com/forms). The questionnaire was validated by pretesting the questionnaire's reliability among some students and by expert reviews.

The questionnaire was distributed to the participants and the completed questionnaires were retrieved from the participants immediately while the online version was distributed via emails and social media platforms (WhatsApp).

***Data collection method*:** A total of 311 completed questionnaires were retrieved, collated, and entered into a spreadsheet for analysis.

***Data analysis*:** Statistical Package for the Social Sciences (SPSS) software, IBM, Chicago, New York, USA, version 22.30" statistical software. Descriptive statistics was used to analyse the data and the results were presented as percentages, frequency, tables, and figures.

Results

The age distribution of respondents showed that the composite mean age (±SD) of respondents was 23.33±3.11years, with the majority of the respondents falling within the age group 21-25 years which constituted 42.44% (n=132) (table 1). As shown in figure 1, concerning the gender distribution of participants; males and females constitute 164 (52.77%) and 147 (47.27%) respectively.

Students in basic medical sciences classes were 43.09%, while those in basic clinical and clinical sciences classes were 21.22% and 35.69% respectively (figure 2).

Concerning the sources of knowledge about AI, the internet, Social media and information from fellow students were the most common sources accounting for 90.35 %(n=281), 86.50% (n=269) and 82.32% (n=256) respectively. Meanwhile, AI is barely heard in the University newsletter accounting for 0.64% (n=20) as illustrated in Figure 3.

According to Figure 4, 87.46% (n=272) opined that AI will improve medical education while

9.00% (n=28) thought it would not positively influence medical education. Participant's perception of AI on medical education showed that AI will improve medical education by 87.46% (n=272), decrease mentorship by 28.62% (n=89), and will eliminate the teaching staff 6.75% (n=21).

https://doi.org/10.5281/zenodo.15183613 ISSN 2488-8648

Concerning the practical applications of AI in the university showered that 89.71% (n=279) of participants noted that there is no practical application of AI in their universities while 9.97% (n=31) don't know whether there are applications of AI in there university as shown in figure 5. Participant's opined that most of the classrooms and learning environment are not purpose-built and not IT compliant (90.68%), lack adequate power supply (87.46%), Some of the lectures are not IT compliant (57.56%) and effect on the cost of training (71.38%) were observed as Challenges for the implementation of AI in the training of medical students (table 3).

Discussion

The age distribution of respondents showed that the composite mean age) of respondents was 23.33 years, with the majority of the respondents falling within the age group 21- 25 years.

There were more male respondents than females suggesting that there were more male medical students than females. This was contrary to the findings by McKinstry., 2008 (20). In their study (20) to ascertain whether there 'are there too many female medical graduates' the study documented that there are more female medical graduates compared to males. The variance in both studies could be attributed to the fact that the index study did not ascertain the actual class population for gender but rather documented only those that voluntarily decided to participate in the study.

The study showed that the majority of the respondents were those in basic medical sciences followed by those in clinical sciences. The commonest source of knowledge about AI among the students was the internet, followed by Social media, and fellow students. The study showed that AI was barely mentioned in the university newsletter.

The perception of AI in medical education ranges from the opinion that it will improve medical education to a counter opinion of negative influence on medical education. A vast majority of the respondents opine that with will improve medical education (87.46%) while only 9.00% was of thought that it will not positively influence medical education. Others believed that it would decrease mentorship and will eliminate the teaching staff. The finding was similar to that documented by Sangapu., 2008 (1-2). According to their documentation (2) concerning Artificial Intelligence in Education -From a Teacher and a Student Perspective showered that AI will provide digital platforms for the learning and testing of students. It was also mentioned that AI can translate teachings and lecturer's presentations into different languages for the student's understanding. This has immensely benefited students with hearing and visual impairments and students who may not be able to attend lectures due to ill health. AI could help to enhance personalizing learning sessions for individuals and help the interaction of the students. Other studies have also shown that AI will improve student's productivity. According to Microsoft Education Blog, McNeill (2018) wrote about "Artificial Intelligence in Classroom", it was documented that many smart applications are designed to assist the teacher in teaching and the student to effectively learn.

Half of the students perceived that AI would be useful while others felt that it could be both helpful and harmful while some perceived it to be potentially harmful. Notwithstanding the percentage of respondents that thought it would be useful is far higher in the index study compared to that documented by Sangapu., 2008 (2).

The index study shows that the majority of the participants have not had any practical applications of AI in the university (89.71%). Participants opined that most of the classrooms and learning environments are not purpose-built and the teaching environment is not IT compliant with challenges of power supply whereas some of the lectures are not IT compliant in their perception. This perception of a poor AI-compliant learning environment was also documented in the presentation by Lindner et al, (21) where they documented the lack of adequate AI teaching tools and materials in the teaching environment. Although their study was focused on the teachers, the lack of adequate materials and tolls in the use of AI were documented.

Conclusion

The study concludes that there are more males than females in the medical college. The commonest source of knowledge about AI was the internet, followed by Social media and fellow students. The study showed that AI was barely mentioned on the university newsletter and they have not had any practical applications of AI.

The perception of AI in medical education ranges from the opinion that it will improve medical education to a counter opinion of negative influence; however, the study shows that AI will improve medical education. Some opine that it will decrease mentorship and will eliminate the teaching staff.

The study also concludes that most of the classrooms and learning environments were not purpose-built and IT compliant. The study recommends the need for continual restructuring of medical education based on technological evolution and in conformity with international best practices by incorporating AI-

https://doi.org/10.5281/zenodo.15183613 ISSN 2488-8648

based tools into medical curricula. The study also recommends the improvement of IT infrastructure and power supply to support AI adoption. For effective use of AI technology in medical education, medical trainers, and trainees ought to be knowledgeable on the applications and techniques of AI systems. Notwithstanding the findings, a multicentre study is suggested for further information concerning AI in our environment.

The study was subject to some fundamental limitations, such as deliberate refusal of prospective students to participate due to their academic engagements such as lectures, preparations for examinations, class assessments and end-of-posting assessments.

Acknowledgement: The authors acknowledge all those who voluntarily participated in the study.

Ethical considerations: Institutional ethical approval was obtained before the commencement of the study. Informed consent was also obtained in the course of the study.

Artificial intelligence utilization for article writing: No Artificial intelligence utilization in the course of the writing.

Conflict of interest: There is no financial and non-financial competing interest No conflict of interest is associated with the study

Author contributions: All the authors were involved in the study. They were all involved in the conceptualization of the study, data collation, analysis and review of the study as well as in the writing, and proofreading of this study.

Supporting resources: No funding from any source is associated with this study.

Data availability statement: Not applicable

Table 1. Showing the age distribution of respondents

Age	Frequency	Percentage	Mean Age
≤ 20	68	21.87%	19.46±0.80
21- 25	132	42.44%	22.40±1.34
26-30	102	32.80%	26.44±0.85
31-35	9	2.89%	30.89±0.33
Total	311	100	23.33±3.11

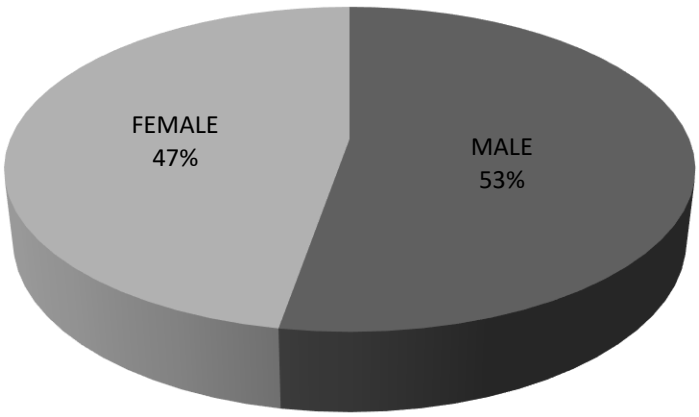

Figure 1. Gender distribution of participants

https://doi.org/10.5281/zenodo.15183613 ISSN 2488-8648

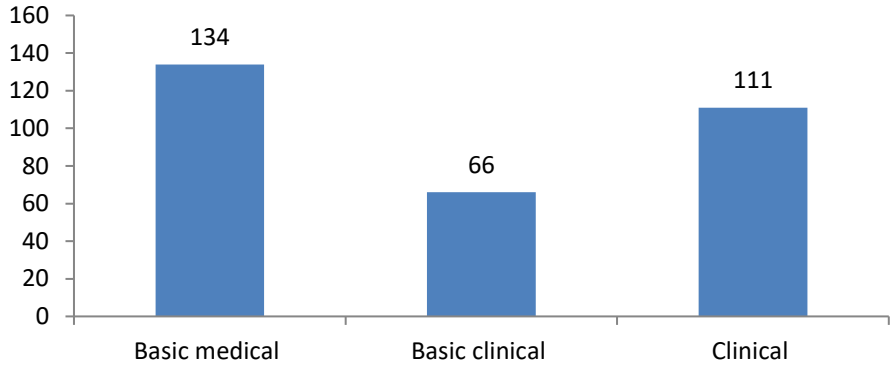

Figure 2. Classification of the students based on class

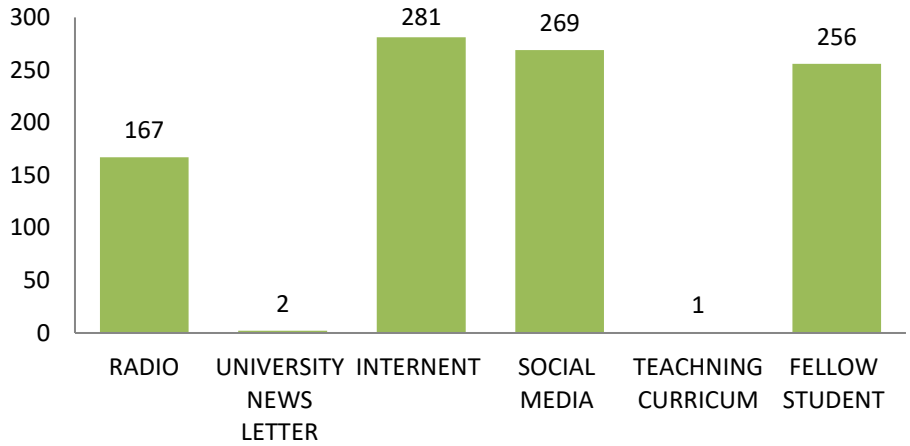

Figure 3. Source(s) of knowledge of AI

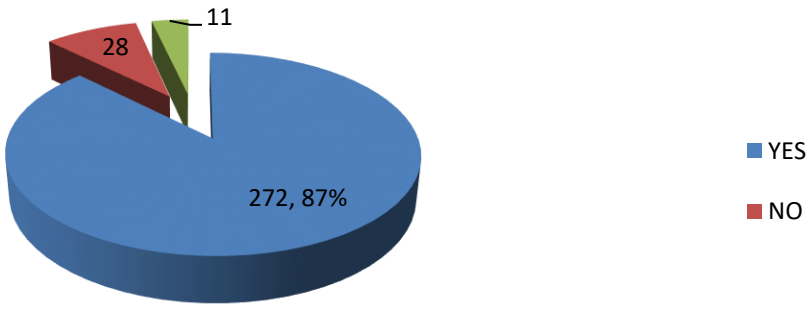

Figure 4. Showing whether AI will improve medical education or not

https://doi.org/10.5281/zenodo.15183613 ISSN 2488-8648

Table 2. Participants perception about AI

Student's perception of AI	Frequency	Percentage
Improve Learning	272	87.46
Decrease mentorship	89	28.62%
Increase Student lecturer relationship	71	22.83%
Decrease Student lecturer relationship	179	57.56%
Improve mentorship	187	60.12%
Will eliminate the teaching staff	21	6.75%

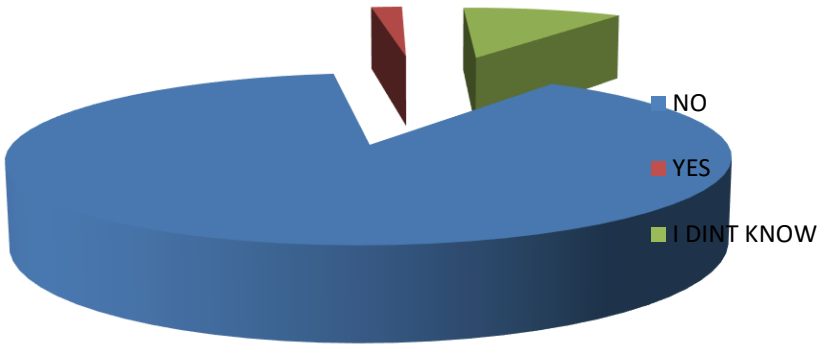

Figure 5. Practical applications of AI in your university

Table 3. Participants anticipated Challenges concerning the implementation of AI in the medical training.

Variable	Frequency	Percentage
Class rooms and learning not IT compliant	282	90.68%
Lack of adequate Power supply	272	87.46%
Lectures not IT compliant	179	57.56%
Effect on cost of training	222	71.38%

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