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Knowledge and attitudes towards the use of artificial Intelligence for learning among health sciences students at Mildmay Institute of Health Sciences, Uganda.

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Abstract

Background:
The study aims to assess knowledge and attitudes towards the use of artificial Intelligence for learning among health sciences students at Mildmay Institute of Health Sciences, Uganda

Methodology:
A descriptive cross-sectional study was conducted. The study was carried out at Mildmay Institute of Health Sciences. All students enrolled in Diploma or certificate courses at MIHS doing health-related programs during the data collection period were eligible to be part of our study population. Targeting. Student lists were stratified into cells based on program and year.

Results:
The majority of participants were female (53.6%, n=119). Over two-fifths (44.1%, n=98) were in Year 3 or above, while Year 1 and Year 2 students accounted for 24.3% (n=54) and 30.2% (n=67), respectively. Diploma in Clinical Medicine was the most represented program (54.9%, n=122), followed by Diploma in Nursing (22.5%, n=50) and Diploma in Midwifery (12.2%, n=27). (86.0%, n=191) demonstrated adequate knowledge of AI tools for learning, scoring 3 or 4 out of 4. The mean knowledge score was 3.44 (SD=0.85). AI tools for understanding difficult topics, 86.5% (n=192) of students agreed or strongly agreed, while only 13.5% (n=30) disagreed or strongly disagreed. On confidence in using AI tools for learning, 72.1% (n=160) of students expressed agreement, though 27.9% (n=62) were neutral or unsure, suggesting some students remain hesitant in their practical engagement with AI tools. The most strongly endorsed item stated that AI tools can improve the quality of studies when used correctly; 86.5% (n=192) agreed or strongly agreed, including 70.3% (n=156) who strongly agreed.

Recommendations:
Address digital access inequities by supporting subsidized institutional AI tool subscriptions, improving internet access, and integrating AI infrastructure into national planning.

Conclusions:
These results highlight the absence of formal AI literacy education, clear institutional policies, and structured pedagogical support at MIHS.

Keywords: *Artificial intelligence in education, Health sciences students, Knowledge and attitudes, AI literacy, Digital learning tools.*
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Background
Artificial Intelligence (AI) has become an increasingly important part of healthcare systems in recent years, progressing from the initial expert systems created in the 1970s, which used Bayesian statistics and decision theory to assist the diagnosis of clinical cases, to the current applications of machine learning, which are helping with disease detection and treatment planning as well as increasing the efficiency of healthcare systems (Oladipo *et al.,* 2024). Today, the potential of AI tools in improving the quality, safety, and effectiveness of health service delivery (Rajkomar *et al.,* 2019) is well known, including improving clinical decision-making, reducing errors in diagnosis (Topol, 2019), and supporting evidence-based practice.

In high-income countries like the United Kingdom, Canada, and the United States, AI has been gradually incorporated into the practice of medicine and education in the health professions. Studies suggest that health sciences learners in these environments tend to have positive attitudes towards AI (Vasudevan *et al.,* 2025), with AI-assisted tools being

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reliable, efficient, and supportive in understanding complex concepts in medicine compared to traditional learning methods (Sami *et al.,* 2025). Such exposure enhances preparedness for AI-supported health service delivery.

Despite these advancements in the field globally, the use of AI in health professions education continues to vary widely among low- and middle-income countries. Structural challenges, including poor digital infrastructure, inadequate institutional policies, and a lack of formal training in AI, have led to a substantial lack of knowledge and utilization among health sciences students. Evidence from multi-country studies shows that while many students are aware of the use of AI tools, their knowledge is often superficial and most exposure is through informal rather than structured academic training, raising concerns about readiness for responsible use of AI in healthcare settings (Issa *et al.,* 2024).

In Africa, the integration of AI into healthcare education is at an early stage. Studies that have been done in countries like Nigeria and other developing countries show that although students in health sciences express positive attitudes toward AI, there is a lack of technical knowledge, limited hands-on experience, and little formal instruction related to the applications of AI in health service delivery (Wobo et al., 2025). Additionally, challenges such as unreliable technological infrastructure, high costs, and ethical concerns continue to limit the effective and equitable use of AI tools in training and practice (Wobo *et al.,* 2025).

In Uganda, empirical data on the literacy and use of AI in health sciences students is scarce. Available studies suggest that health professions educators demonstrate mixed perceptions and levels of engagement with AI, with a need for institutional policies, curriculum guidance, and capacity-building initiatives to support ethical and effective integration of AI in health training institutions (Mukunya *et al.,* 2025). However, little is known about the knowledge, attitudes, and actual use of AI tools by students for health-related learning and preparation for health service delivery, especially in diploma-level training institutions such as Mildmay Institute of Health Sciences.

This gap in knowledge has significant implications for student preparedness and future healthcare delivery. Without a clear understanding of how health sciences students perceive and use AI tools, institutions may produce graduates lacking adequate preparation for AI-enabled health systems. As the competencies in AI are becoming known as essential for good clinical decision-making, patient safety, and efficient delivery of health services, the assessment of student knowledge, attitudes, and use of AI becomes a very important priority for education and public health research (Mousavi Baigi *et al.,* 2023). The study aims to assess knowledge and attitudes towards the use of artificial Intelligence for learning among health sciences students at Mildmay Institute of Health Sciences, Uganda

Methodology

Study Design

A descriptive cross-sectional study was conducted. Cross-sectional designs were used to assess the distribution and relationships of key variables such as knowledge and attitudes within a defined population at a single point in time, as stated by Creswell (2020).

Study Setting

The study was carried out at MildMay Institute of Health Sciences in Lweza, Wakiso District, 12 km from Kampala. MIHS offers diploma and certificate nursing, midwifery, clinical medicine, nutrition, and public health programs.

Study Population

All students enrolled in Diploma or certificate courses at MIHS doing health-related programs during the data collection period were eligible to be part of our study population. Targeting all years and programs maximized the heterogeneity and enabled analysis across several years and disciplines. Being an enrolled MIHS student of a health-related course aged above 18 years, and providing written informed consent; Participants must have access to a smartphone, computer, or internet-enabled device capable of completing the online questionnaire.

Sample Size Determination

Krejcie and Morgan's table (1970) for determining sample size for quantitative studies, considering the estimated population of students at MildMay Institute of Health Science at 500 students. According to the table (Appendix VII), a population of 500 requires a minimum sample size of 217 respondents. Therefore, a sample size of 217 was considered appropriate for this study.

Sampling Method

Student lists were stratified into cells based on program and year. Within each cell, the participants were chosen based on computer-generated random numbers until the required number was reached. Stratification enabled us to reduce sampling bias and improve generalizability. If a selected student refused, the next randomly selected student in the same cell was invited in order to maintain and reach the sample size.

Inclusion criteria

Students aged 18 and above who would have voluntarily consented to participate in the study, Ugandan, male and female.

Exclusion criteria

Those who withdraw at the time of data collection or become sick.

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Study Variables

Dependent variables were: level of knowledge (poor/moderate/good), attitude (positive/negative), and the extent of use of AI (none/low/high).
Independent variables were: sociodemographic (age, gender, year, program), technology access (ownership of devices, internet connection, previous digital experience), institutional (exposure to AI content in the curriculum, availability of guidance, access to digital learning facilities) These variables are selected because they are variables that have been suggested in literature to influence the awareness and adoption of AI.

Data Collection Instrument

Data were collected using a self-administered structured questionnaire based on validated KAP tools used in AI education research.

Data Collection Method

Data collection was conducted over a period of four weeks. After obtaining ethical approval and institutional permission, the questionnaire link was distributed electronically to health students/ participants at diploma and certificate level at MIHS. Participants first had to consent at the beginning of the Google Form. Only those who provided consent electronically continued through to complete the form. Reminder messages were sent periodically to improve response
rate.

Data Analysis

Data analysis was performed with the help of the computer program "Statistical Package for the Social Sciences 25" (SPSS 25). Descriptive statistics (frequencies, percentages, means, standard deviations) were used to describe demographic characteristics and outcome variables.
Knowledge and attitude scores were classified. Chi-square tests were used to examine associations between independent variables and categorical outcomes (knowledge level, attitude category).

Quality Control.

Validity

Validity was ensured by designing questions based on the study objectives and literature review. A panel of experts, including the research supervisor, reviewed the instruments. Feedback refined questions for clarity, relevance, and alignment with research aims, ensuring both face and content validity.

Reliability

Reliability was assessed through a pretest among 10 students at a different school; unclear questions were adjusted, ensuring consistency and clarity of the instruments.

Ethical Considerations

The study followed the Declaration of Helsinki. Ethical approval was sought from the MIHS Research and Ethics Committee and the Uganda National Council for Science and Technology. Participation was voluntary; informed consent, after providing written and verbal information, was obtained. Anonymity was assured by using codes in place of names; no personal identifiers were collected. Data were securely stored after completion. There were no incentives; non-participation didn't affect academic standing. These measures were used to protect the rights and confidentiality of the participants. Electronic informed consent was obtained before participants accessed the questionnaire. No names or personal identifiers were collected.
Responses remained anonymous and were password-protected in the researcher's secure Google account.

Results

Socio-Demographic Characteristics of Participants

A total of 222 health sciences students participated in the study. Table 1 presents the sociodemographic characteristics of the study participants, including sex, year of study, program of enrolment, device ownership, and internet access.

Table 1: Socio-Demographic Characteristics of Participants (n=222)

Variable	Frequency (n)	Percentage (%)
Sex		
Male	103	46.4
Female	119	53.6
Year of Study		
Year 1	54	24.3
Year 2	67	30.2
Year 3 and above	98	44.1

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Continuation of Table 1: -

Program of Enrolment		
Diploma in Clinical Medicine	122	54.9
Diploma in Nursing	50	22.5
Diploma in Midwifery	27	12.2
Certificate in Nursing	8	3.6
Certificate in Medical Laboratory	7	3.2
Diploma in Public Health	5	2.3
Owns a smartphone or Computer		
Yes	214	96.4
No	8	3.6
Internet Access		
Yes, always	119	53.6
Yes, sometimes	87	39.2
No	16	7.2
Total	**222**	**100.0**

The majority of participants were female (53.6%, n=119). Over two-fifths (44.1%, n=98) were in Year 3 or above, while Year 1 and Year 2 students accounted for 24.3% (n=54) and 30.2% (n=67), respectively. Diploma in Clinical Medicine was the most represented program (54.9%, n=122), followed by Diploma in Nursing (22.5%, n=50) and Diploma in Midwifery (12.2%, n=27). Nearly all participants owned a smartphone or computer (96.4%, n=214), and the vast majority had some form of internet access, either always (53.6%, n=119) or sometimes (39.2%, n=87). Only 7.2% (n=16) reported having no internet access.

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Level of Knowledge towards AI Usage Among Health Sciences Students

Table 2 shows the percentage of Correct and Incorrect Responses per Knowledge Item (n=222)

Knowledge Item	Correct (n)	Correct (%)	Incorrect (n)	Incorrect (%)
Q6: Definition of Artificial Intelligence	181	81.5	41	18.5
Q7: Example of an AI learning tool	194	87.4	28	12.6
Q8: How AI tools help students learn	201	90.5	21	9.5
Q9: Limitations of AI tools	187	84.2	35	15.8
Overall mean score (out of 4): 3.44 (SD=0.85)				

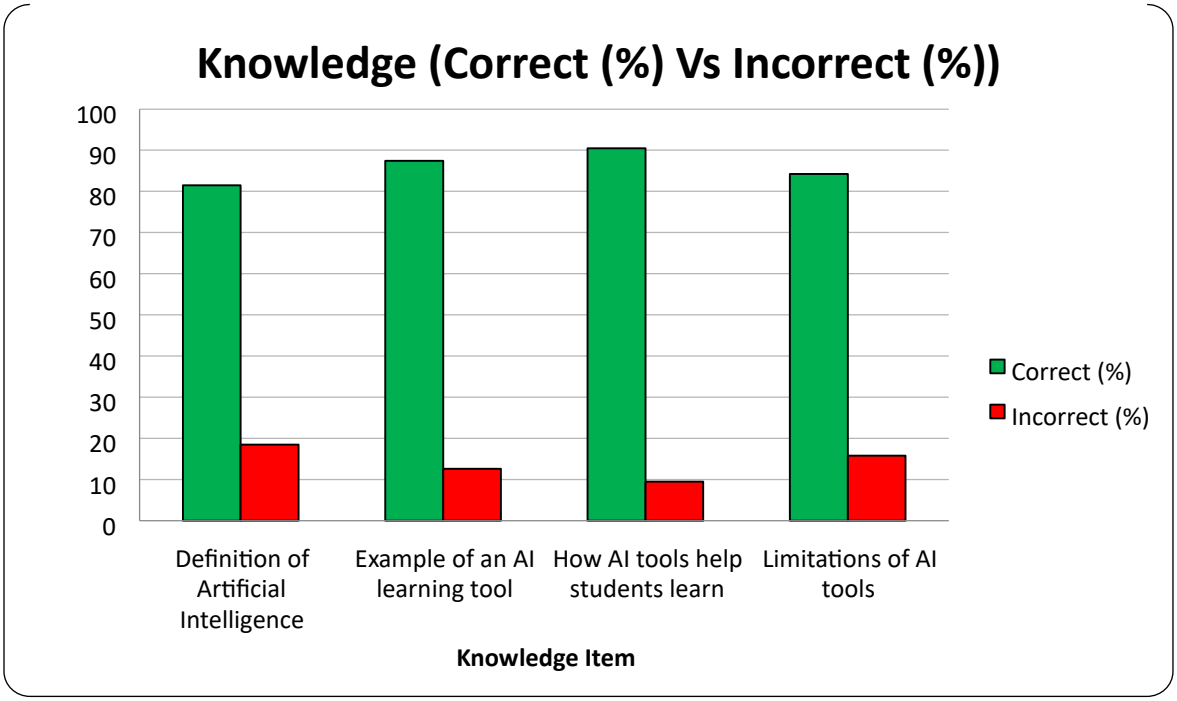


Figure 1: Percentage of correct and incorrect responses per knowledge item

As shown in Table 2 and Figure 1, 201(90.5%) students used AI tools to learn, and 194(87.4%) students identified ChatGPT as an AI learning tool, and the remaining
201(90.5%) students used AI tools to learn, and … didn't; 194(87.4%) students identified ChatGPT as an AI learning tool, and the remaining %....., Knowledge of AI limitations was correct among 84.2% (n=187), while the definition of AI was correctly identified by 81.5% (n=181) of students.

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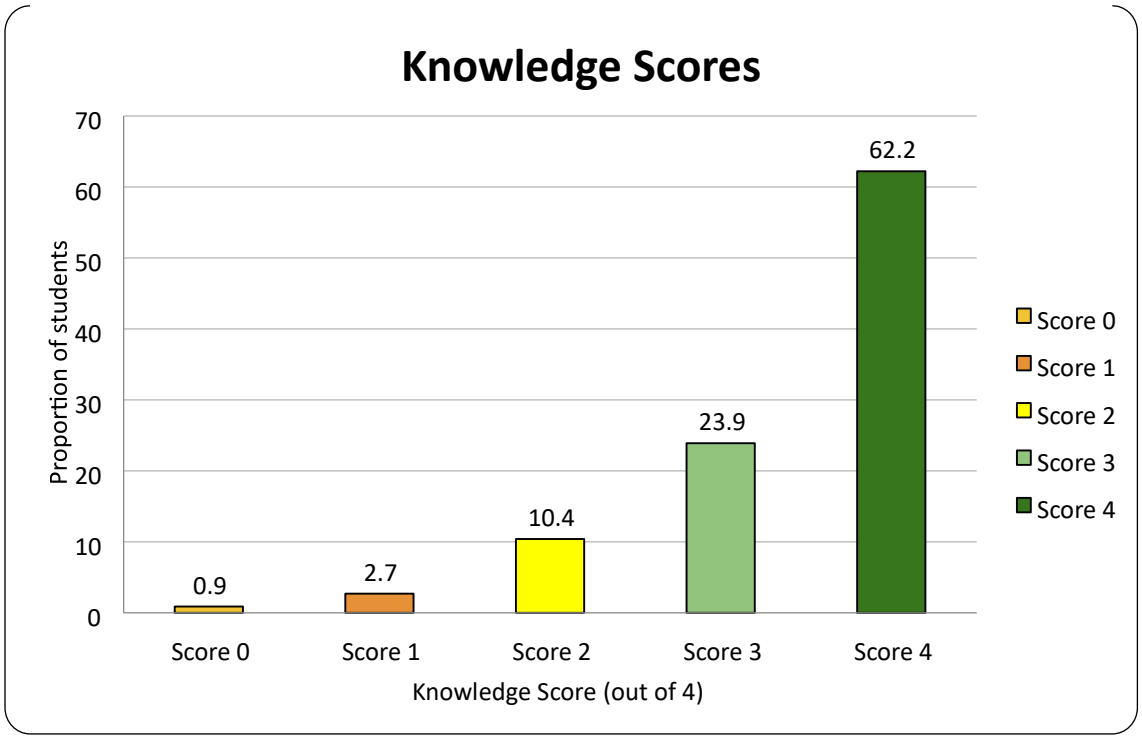
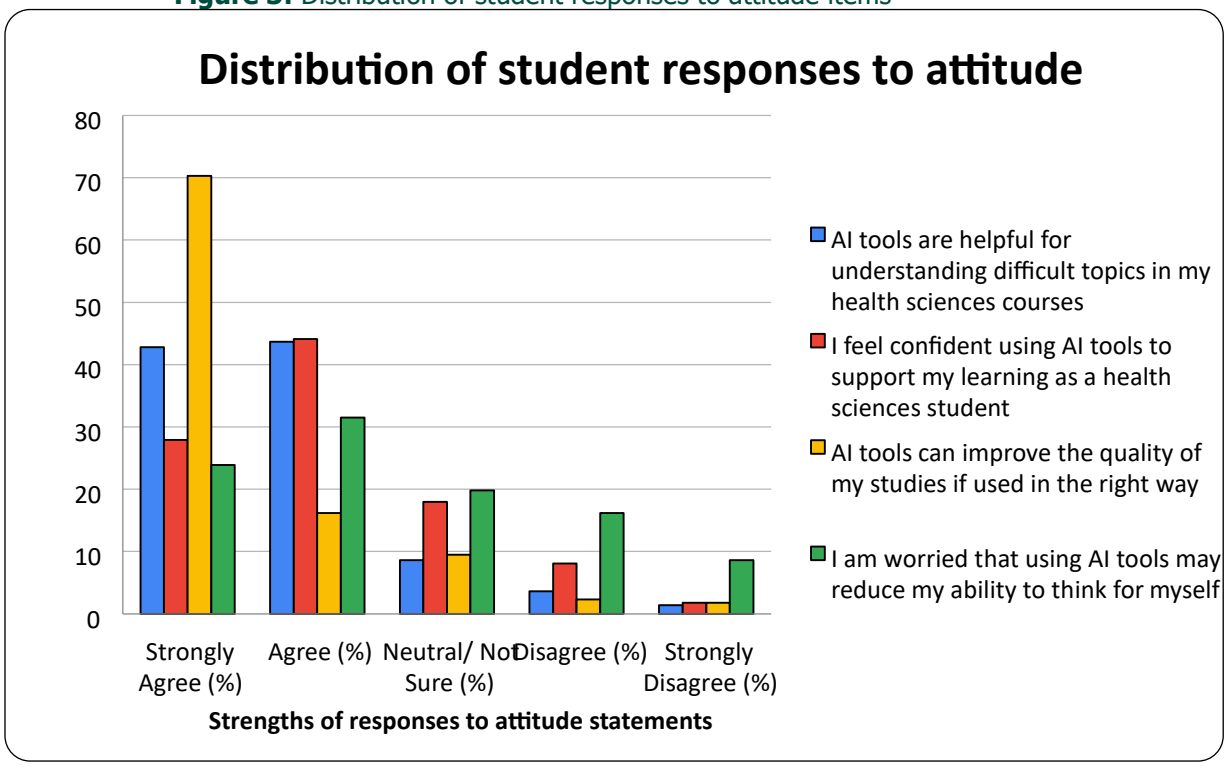


Figure 2: Distribution of knowledge scores among health sciences students at MIHS (n=222).

Figure 2 shows that the majority of students (86.0%, n=191) demonstrated adequate knowledge of AI tools for learning, scoring 3 or 4 out of 4. The mean knowledge score was 3.44 (SD=0.85). Among those with adequate knowledge, 62.2% (n=138) achieved a perfect score of 4. Only 14.0% (n=31) of students were classified as having inadequate knowledge (score below 3), with 10.4% (n=23) scoring 2, 2.7% (n=6) scoring 1, and 0.9% (n=2) scoring 0. These findings indicate that health sciences students at MIHS possess a predominantly adequate level of knowledge regarding AI tools for learning.

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Figure 3: Distribution of student responses to attitude items



As presented in Figure 3, students generally expressed positive attitudes towards AI tools for learning. Regarding the perceived helpfulness of AI tools for understanding difficult topics, 86.5% (n=192) of students agreed or strongly agreed, while only 13.5% (n=30) disagreed or strongly disagreed. On confidence in using AI tools for learning, 72.1% (n=160) of students agreed, though 27.9% (n=62) were neutral or unsure, suggesting some students remain hesitant in their practical engagement with AI tools. The most strongly endorsed item stated that AI tools can improve the quality of studies when used correctly; 86.5% (n=192) agreed or strongly agreed, including 70.3% (n=156) who strongly agreed.

The negatively worded item concerning worry that AI may reduce independent thinking yielded notably different results from the other three items. A total of 55.4% (n=123) of students agreed or strongly agreed that they hold this concern, while only 24.8% (n=55) disagreed or strongly disagreed. This divergent pattern, where the majority of students simultaneously endorse AI's helpfulness and express concern about its impact on independent thinking, reflects the multi-dimensional nature of student attitudes toward AI, consistent with the low Cronbach's alpha (0.32) recorded for the combined scale. Students appear to hold coexisting positive and cautious orientations toward AI.

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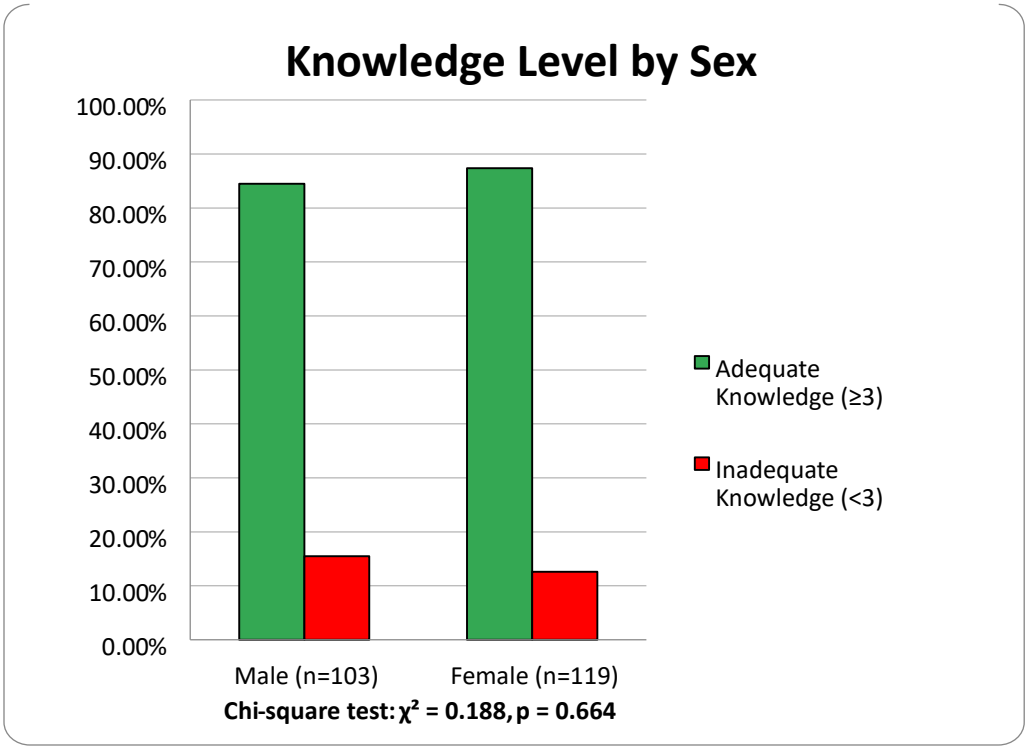
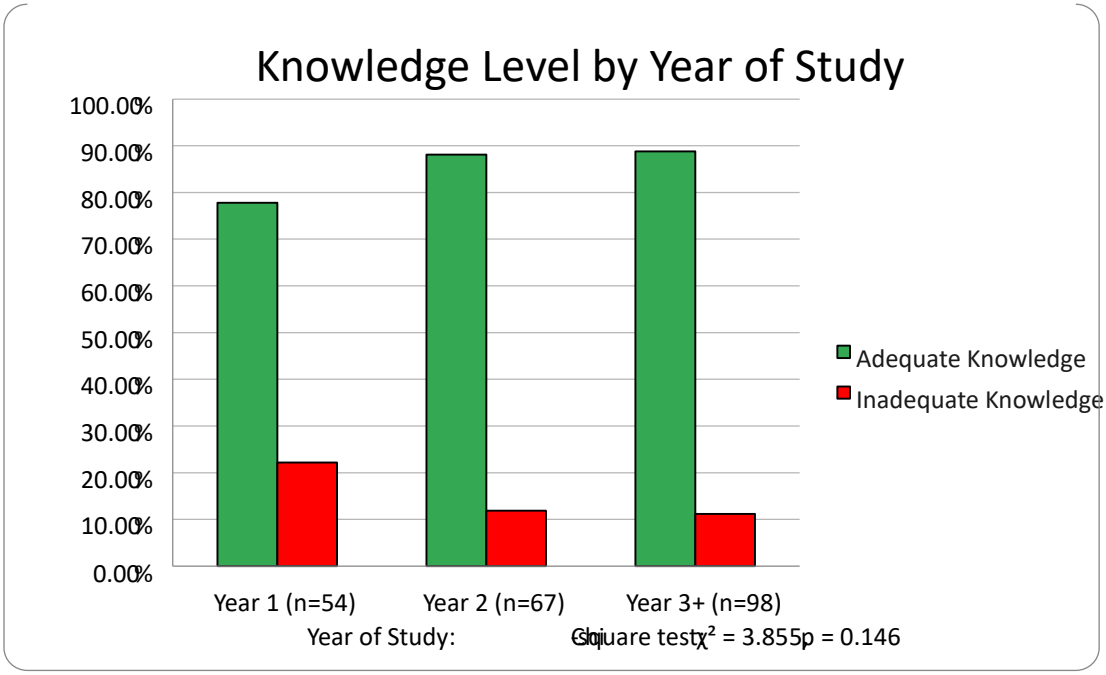


Figure 4: Knowledge level (adequate vs. inadequate) by sex with chi-square test results.

As shown in Figure 4, no statistically significant association was found between knowledge level and any of the demographic variables examined. Knowledge levels were similar across sex groups: 84.5% of male students (n=87) and 87.4% of female students (n=104) demonstrated adequate knowledge, with no significant difference (chi-square=0.188, df=1, p=0.664).



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Discussions

Level of Knowledge towards AI Usage among Health Sciences Students at MIHS

The findings of the present study revealed that the overwhelming majority of health sciences students at MIHS demonstrated adequate knowledge of AI tools for learning, with 86.0% ssscoring 3 or above out of a possible score of 4, and a mean knowledge score of 3.44 (SD=0.85). Of those with adequate knowledge, 62.2% (n=138) achieved a perfect score of 4, indicating not only adequate knowledge but a high level of familiarity with AI concepts as assessed by the instrument. Only 14.0% (n=31) were classified as having inadequate knowledge. Item-level analysis further reinforced this finding: the highest proportion of correct responses was recorded for the item on how AI tools help students learn (90.5%, n=201), followed by identification of ChatGPT as an AI tool (87.4%, n=194), knowledge of AI limitations (84.2%, n=187), and the definition of AI (81.5%, n=181).

These findings represent a notable departure from the global literature, which has consistently documented low knowledge of AI among health sciences students. The landmark multi-country cross-sectional survey conducted by Busch et al. (2024) involving 4,313 medical, dental, and veterinary students from 192 faculties across 48 countries reported critically poor median knowledge scores of only 2 out of 5, alongside a finding that 76.3% of students lacked any AI-related course in their curriculum. Similarly, a systematic review and meta-analysis by Amiri et al. (2024), pooling data from 8,491 medical, dental, and nursing students across multiple countries, established a pooled knowledge proportion of only 44%, compared to the 86.0% adequate knowledge rate observed at MIHS. This difference is substantively meaningful and warrants careful consideration of the methodological and contextual factors that may account
for it.

Knowledge scores at MIHS relate to the nature of the knowledge instrument employed. The multiple-choice questionnaire used in this study assessed basic AI literacy, including the definition of AI, identification of a common AI tool, understanding of how AI supports learning, and recognition of a key limitation. By design, these items measured foundational awareness rather than deep technical literacy, such as algorithmic concepts, machine learning mechanisms, data governance, or clinical AI applications. It is well recognized in the literature that awareness-level knowledge, often acquired through informal self-directed use of AI tools, can be sufficient to score adequately on basic knowledge instruments, even in the absence of formal AI education (Mousavi Baigi *et al.,* 2023; Ajalo *et al.,* 2025). The present results therefore suggest that MIHS students have attained a satisfactory baseline awareness of AI, not necessarily deep functional literacy. This is strongly supported by evidence from Uganda. Ajalo et al. (2025), in a cross-sectional study of medical students across public universities in Uganda, found that 93% had heard about AI tools and 75.7% had actively used them for academic tasks including assignments, tutorial preparation, and examination study. The widespread informal adoption of tools such as ChatGPT among Ugandan students is likely a major driver of the awareness-level knowledge captured in this study. The high device ownership (96.4%, n=214) and internet access (92.8% with always or sometimes access) documented among MIHS participants further support the plausibility of informal, self-directed AI tool exposure as a key source of knowledge at this institution. When nearly all students own a device and have internet access, informal engagement with AI tools is a realistic and likely pathway through which basic AI knowledge is acquired, even in the absence of structured curriculum content.

Regarding year of study, while a directional trend was observed, with adequate knowledge rates of 77.8% in Year 1 rising to 88.1% in Year 2 and 88.8% in Year 3 and above, this difference did not reach statistical significance (chi-square=3.855, df=2, p=0.146). The absence of a statistically significant association between year of study and knowledge level is consistent with the view that knowledge acquisition in this context is primarily driven by informal exposure rather than formal cumulative learning through the curriculum. If AI were formally taught within the health sciences programs at MIHS, a more pronounced and statistically significant increase in knowledge scores across years of study would have been expected, as observed in settings with structured AI curricula (Abid *et al.,* 2024). The null finding here therefore indirectly confirms the informal, curriculum-independent nature of AI knowledge acquisition at MIHS.

One plausible explanation in the MIHS context is that the uniform near-universal ownership of devices and internet access across the student population minimizes the structural gender divide in technology access that in some other settings creates sex-based knowledge disparities. Alqaissi and Qtait (2025), in a systematic review of AI knowledge, attitudes, practices, and barriers in nursing and health sciences education, reported that access to digital technology was a stronger determinant of AI knowledge than sex, which is consistent with the equalization effect potentially at work in this study population. The equitable distribution of device ownership and internet access across the MIHS student population may thus have leveled the playing field for AI knowledge acquisition, producing broadly similar outcomes across demographic subgroups.

Despite the predominantly adequate knowledge scores, the finding that 14.0% of students remain inadequately informed about AI is educationally significant in a health profession training context. These students, while a minority, may be at heightened risk of uncritical or unsafe AI use, of

misinterpreting AI-generated clinical content, or of being disadvantaged in AI-augmented health service delivery environments. Furthermore, the observed finding that even among those with adequate basic knowledge, a non-trivial proportion (10.4%, n=23) scored exactly 2 out of 4: placing them on the boundary of adequacy, suggests that the knowledge base of MIHS students remains fragile and disproportionately dependent on informal learning pathways. As Topol (2019) has argued, the integration of AI into high-performance medicine demands not surface familiarity but deep conceptual and critical literacy that enables health professionals to interrogate AI outputs, recognize error states, and communicate AI-mediated findings to patients and colleagues with accuracy and confidence. The present findings, while encouraging in terms of baseline awareness, thus point firmly toward the need for structured AI curriculum content that elevates student knowledge from awareness to competence.

From a methodological standpoint, the current study employed a cross-sectional design with a four-item binary-scored knowledge instrument. While this approach is pragmatic, widely used in KAP studies (Launiala, 2009), and appropriate for estimating the prevalence of knowledge levels within the population at a defined point in time (Creswell, 2020), it has acknowledged limitations in terms of knowledge depth and construct coverage. A more comprehensive multi-item knowledge instrument with items spanning algorithmic principles, clinical AI applications, data ethics, and AI limitations would provide a richer and more nuanced picture of AI literacy among MIHS students in future research. The researcher's informed opinion is that the 86.0% adequate knowledge finding should be understood as a baseline of awareness rather than a declaration of AI literacy competence and that it should motivate targeted investment in deepening and formalizing AI education rather than complacency about the current state of student preparedness.

Attitudes towards AI Usage among Health Sciences Students at MIHS

The second major area of inquiry concerned the attitudes of MIHS health sciences students toward AI use for learning. The findings reveal a predominantly positive attitudinal orientation, characterized by strong agreement with AI's perceived helpfulness and quality-enhancing potential, alongside a simultaneously prominent concern about the impact of AI on students' capacity for independent thinking. This dual co-occurring pattern of enthusiasm and reservation constitutes the defining attitudinal signature of the MIHS student population and represents the central finding of this objective.

On the item assessing perceived helpfulness of AI tools for understanding difficult health sciences topics, 86.5% (n=192) of students agreed or strongly agreed, with only 5.0% (n=11) disagreeing or strongly disagreeing. The most strongly endorsed item across the entire attitude scale was the statement that AI tools can improve the quality of studies when used correctly, which recorded 86.5% agreement (n=192), including 70.3% (n=156) who strongly agreed. This level of strongly positive endorsement is among the highest documented in comparable studies. Sami et al. (2025), in a cross-sectional study of 702 Pakistani medical students, found that 80.3% held a favorable attitude toward AI, with 65.7% reporting AI to be more efficient than traditional methods for grasping medical concepts. The MIHS figures of 86.5% are broadly consistent with, and in some cases exceed, these global benchmarks. Tung and Dong (2023) similarly found that 87.36% of Malaysian medical students considered AI to be a key future feature of healthcare, and 71% believed AI training would benefit their professional careers, figures closely aligned with the attitudinal orientation observed at MIHS.

The finding is also consistent with the global systematic review by El-Banna et al. (2025) of 42 studies from 2016 to 2024, which established that health sciences students worldwide hold predominantly positive perceptions of AI's educational potential, and with the systematic review by Alqaissi and Qtait (2025), which similarly found that favorable attitudes toward AI integration in nursing and health sciences education are widespread across global settings. The high positivity of MIHS student attitudes despite the absence of formal AI curriculum content resonates with Mousavi Baigi et al. (2023), whose systematic review found that while 76% of healthcare students held positive outlooks on AI, positive attitudes did not necessarily follow from formal education, often preceding it in institutions without structured AI training. This suggests that positive attitudes are organic and pre-institutional in origin at MIHS, fueled by students' own informal engagement with AI tools and that they constitute a valuable motivational resource available to educators who wish to build structured AI learning experiences.

The finding regarding confidence in using AI tools for learning presents a more qualified picture. While 72.1% (n=160) of students expressed agreement or strong agreement with confidence in AI use, 18.0% (n=40) remained neutral or unsure, and 9.9% (n=22) disagreed. This confidence gap, where the proportion confident in using AI (72.1%) is notably lower than the proportion who perceive AI as helpful or quality-improving (both 86.5%), has important implications when interpreted through the lens of the Technology Acceptance Model (TAM). Tung and Dong (2023) similarly documented that among Malaysian medical students, only 44.5% felt confident they would have sufficient AI knowledge by graduation, despite broadly positive attitudinal orientations, suggesting that the confidence gap is not unique to MIHS but reflects a global pattern in settings without formal AI education.

The most revealing attitudinal finding of the study emerged from the negatively worded item addressing concern that AI use may reduce students' capacity for independent thinking.

A majority of 55.4% (n=123) of students agreed or strongly agreed with this concern, while only 24.8% (n=55) disagreed or strongly disagreed, and 19.8% (n=44) remained neutral. This finding is especially significant in a diploma-level health training context, where the development of foundational clinical reasoning, diagnostic thinking, and patient-centered decision-making is not merely an academic goal but a direct professional safety requirement. That over half of all students are themselves concerned about the cognitive cost of AI reliance is a self-aware and educationally important finding that merits direct attention from educators and curriculum developers.

This concern is strongly corroborated by the international literature. Seneviratne et al. (2025), in a qualitative study of 38 medical students in Sri Lanka, found that while students valued AI as a time-saving content synthesis tool, they expressed deep anxieties about the erosion of critical thinking, the inaccuracy of AI outputs, and the absence of faculty-guided ethical instruction. Longoni et al. (2019) documented patterns of resistance to medical AI rooted precisely in concerns about accountability and the perceived threat to professional cognitive agency. Al-Qerem et al. (2023), in a study of health professions students in Jordan, found that skepticism regarding AI's capacity to replace human educators coexisted with positive recognition of AI's educational value, a co-occurrence closely mirroring the pattern at MIHS. Vojdani et al. (2025) further reported that among Iranian medical students, 73.7% expressed concern that AI could discredit the medical profession, and that professional anxiety frequently co-existed with positive views on AI usefulness, a pattern of psychological ambivalence consistent with the MIHS findings.

The low Cronbach's alpha of 0.32 obtained for the combined four-item attitude scale, while below the conventional threshold of 0.7 for scale reliability, is an important finding in its own right. Rather than simply indicating psychometric inadequacy, this value reflects the multidimensional nature of student attitudes toward AI, an interpretation that is empirically justifiable and theoretically grounded. Shishehgar et al. (2025), in a systematic review of health students' and academics' knowledge, perceptions, and experiences of AI, concluded that attitudinal orientations toward AI in health education are inherently multidimensional, varying across dimensions of utility, confidence, ethical concern, professional identity, and academic integrity, such that single-construct attitude scales frequently fail to capture attitudinal complexity in this domain. The finding that MIHS students simultaneously endorse AI's helpfulness and express concern about its cognitive impact is not a contradiction; it reflects the genuine tension between AI's functional utility and its potential to disrupt the cognitive development processes fundamental to health profession education. Reporting attitudes at the item level, as was done in this study, is therefore the methodologically appropriate approach for this population and is consistent with the recommendation by Shishehgar et al. (2025) that AI attitude measurement in health education research should attend to dimensional complexity rather than presupposing internal consistency.

From an African and Ugandan contextual lens, the attitudes documented at MIHS are broadly consistent with, but also extend, the limited available evidence. Wobo et al. (2025) reported that medical students in Nigeria held positive views on AI's educational and diagnostic value, while simultaneously expressing concern about ethical issues, data privacy, and the appropriateness of AI tools in resource-limited settings. In Uganda, Mukunya et al. (2025) documented that health professional educators expressed a deeply ambivalent stance toward AI: acknowledging its pedagogical potential while articulating serious concerns about examination malpractice risks, inability to afford paid AI versions, and the complete absence of institutional policy frameworks to guide AI use in health training. The student-level evidence from MIHS aligns with and extends this educator-level pattern: the absence of institutional policy and structured guidance does not suppress positive attitudinal dispositions among students, but it leaves those dispositions unmoored from the ethical frameworks, critical literacies, and supervised practice experiences necessary to translate them into responsible and beneficial behavior.

The researcher is of the informed view that the dual attitudinal profile observed at MIHS, positive but cautious, represents both an opportunity and a responsibility for the institution. The majority of students are intrinsically motivated to engage with AI as a learning tool and possess the device access and internet connectivity to do so. What they currently lack is structured guidance, ethical scaffolding, and supervised practice opportunities. Left to informal self-direction, the risk is that students develop uncritical AI dependence that undermines the clinical reasoning competencies central to safe health profession practice. Harnessed through evidence-informed curriculum integration, these same positive attitudes could become a powerful driver of AI-literate, ethically grounded, and critically capable health professionals. The urgency of this challenge is amplified by the finding that the majority of MIHS students are already using tools like ChatGPT informally; the question is no longer whether to engage with AI in health training, but how to do so responsibly, equitably, and with educational integrity.

Study Limitations

Cross-sectional design: The design is unable to establish causality or temporal change; however, the design is pragmatic for resource-limited KA studies. Self-reporting: Respondents were likely to be affected by social desirability or recall bias; anonymity and carefully worded items were used to combat this. Single-institution scope: Results may not be generalizable outside of MIHS; however, this gives critical baseline data for similar diploma-level programs in Uganda. Lack of objective usage data: AI knowledge and

use were based on self-reported frequency as opposed to verified logs; this is common in KA surveys, but future studies could include digital analytics. Online data collection may exclude students with limited internet access or poor connectivity.

Recommendations

To MildMay Institute of Health Sciences Administration

Integrate a structured AI literacy module into all diploma and certificate curricula. This should cover basic AI concepts, practical applications, ethical use, and supervised practice. Start with a pilot cohort, evaluate results, and roll out broadly. Second, develop an institutional AI use policy covering acceptable uses, disclosure requirements, assessment standards, and safeguards against misuse. Involve students, staff, and the research committee in policy development, and communicate it through orientation programs. Third: Introduce regular case-based exercises requiring students to make independent judgments before using AI tools. Provide staff with professional development on designing AI-complementary teaching that maintains critical reasoning.

To Academic Staff and Curriculum Developers

First; Engage in ongoing professional development on AI in health education. Faculty must stay ahead of student practice to guide ethical and effective AI use. MIHS leadership should facilitate access to relevant courses and learning communities. Second, redesign assessments to strengthen academic integrity. Shift focus to tasks requiring higher-order reasoning and realworld clinical application that cannot be easily completed by AI. Organize a workshop to update assessment practices and share best practices across departments.

To the Uganda Health Professions Assessment Board (UAHEB) and Ministry of Education

Establish national minimum AI literacy standards for diploma-level health graduates. Consult widely with stakeholders to define clear competency benchmarks, following global best practices. Second: Address digital access inequities by supporting subsidized institutional AI tool subscriptions, improving internet access, and integrating AI infrastructure into national planning. Launch a Digital Access for Health Training initiative focused on diploma institutions.

To Future Researchers

Use mixed-methods research to capture both quantitative and qualitative aspects of AI literacy, including student and faculty experiences. Develop and validate comprehensive AI literacy assessment tools suited for low- and middle-income health education settings. Conduct longitudinal and multi-institutional studies to measure the impact of interventions and assess the wider applicability of findings.

Conclusions

The findings clearly indicate that MIHS students possess predominantly adequate basic AI knowledge, with 86.0% meeting the established adequacy threshold and a mean score of 3.44 out of 4. Additionally, students demonstrate a generally positive orientation toward the use of AI in learning, with 86.5% agreeing that AI tools are helpful for understanding complex topics and improving study quality.

Despite these strengths, the study establishes that most knowledge is awareness-level, acquired informally rather than through structured curriculum content.

Positive attitudes are qualified by a significant confidence gap in practical AI use and ongoing concerns about the impact of AI on independent thinking.

These results highlight the absence of formal AI literacy education, clear institutional policies, and structured pedagogical support at MIHS.

The practical and academic value of these conclusions is clear: Integrating comprehensive AI literacy into the health sciences curriculum, supported by robust institutional policies and faculty development, is urgently needed. Such steps will ensure that students not only remain technologically and attitudinally prepared but are also equipped with the critical skills required for responsible and effective AI use in healthcare.

Implications to Health Profession

A majority (86.0%) of MIHS students have basic knowledge of AI but they do lacks formal training. This gap between awareness and responsible practice exposes patients to safety risks, especially in primary and district-level facilities. Curriculum reform is required to equip graduates with critical AI literacy, ensuring safe and effective AI integration in clinical practice. Over half (55.4%) of the students' express concern that AI may reduce independent thinking. If AI is used to shortcut clinical reasoning during training, essential competencies may be weakened. Educators are urged to redesign teaching methods to preserve and strengthen critical thinking and independent judgment.

Professional identity is also affected. While students generally view AI positively, concerns about cognitive independence persist. Education must frame AI as a supportive tool that enhances rather than replaces core human skills such as empathy, ethics, and communication.

At the system level, Uganda's digital health agenda depends on a workforce that is AI-literate and ethically grounded. Without adequate preparation at the diploma level, the benefits of digital health investments may not be realized. Embedding AI literacy and ethics in training is both an educational and strategic system priority.

In teaching, a flipped or inquiry-based model is recommended. Students' informal AI knowledge should be

the foundation for structured, ethical, and practical skill development. This approach will build confidence and competence in AI use. Equity concerns are highlighted by the focus of most research and policy on university-level students, while diploma-level graduates make up the majority of Uganda's frontline health workforce. This study demonstrates the need for AI literacy investment at diploma institutions like MIHS to ensure all health professionals are prepared for AI-enabled care. Principles of transparency, fairness, and human agency must guide both AI development and the training of health professionals.

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List of abbreviations
AI: Artificial Intelligence
KAP: Knowledge, Attitudes and Practices
MIHS: Mildmay Institute of Health Sciences
SD: Standard Deviation
SPSS: Statistical Package for the Social Sciences
TAM: Technology Acceptance Model
UAHEB: Uganda Allied Health Examinations Board

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Author contributions
MN: Conceptualization, Methodology, Investigation, Writing-original draft.
HN: Data curation, Formal analysis, Visualization.
FS: Formal analysis, Visualization, Writing review and editing
JFN: Supervision, Validation.
All authors: Approved the final version of the manuscript and agreed to be accountable for the work.

Data availability
Data are available upon request.

Informed consent
Written informed consent was obtained from all participants prior to their inclusion in the study. Participants were informed about the purpose of the study, procedures involved, potential risks and benefits, and their right to withdraw at any time without penalty.

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