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# Prevalence and Perception of Artificial Intelligence Use Among Medical Students at Napata College (2026)

*A Thesis Submitted in Partial Fulfillment for The Requirements of the Bachelor of Medicine, Bachelor of Surgery MBBS*

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## Abstract

**Background** Artificial Intelligence (AI) is rapidly transforming medical education, moving from a novelty to a fundamental tool for modern medical training. While global data shows high adoption rates, there is a significant gap in research regarding AI use in regions like Sudan, where infrastructure and access differ from high-income countries.

**Objectives** This study aimed to determine the prevalence of AI use, identify the specific tools and patterns of utilization, and assess the perceptions toward AI among medical students at Napata College in 2026.

**Methodology** A descriptive cross-sectional facility-based study was conducted among undergraduate medical and health sciences students at Napata College. A sample of 262 participants was selected using simple random sampling. Data were collected via an online Google Forms questionnaire and analyzed using IBM SPSS Statistics version 26.

**Results** The prevalence of AI use was nearly universal at 92.0%, with 71.7% of students using these tools at least weekly. ChatGPT was the most popular platform (72.9%), primarily used for clarifying difficult concepts (59.5%), summarizing materials (50.8%), and exam preparation (50.0%). While 53.4% of students agreed that AI saves study time, trust in AI-generated information was low (28.7%), and 44.2% expressed concern regarding the potential reduction of critical thinking skills. Notably, 67.6% of students advocated for the formal integration of AI training into the curriculum.

**Conclusion** AI is deeply integrated into the academic routines of medical students at Napata College, despite a lack of formal guidance. There is a critical imbalance between high usage and low confidence in reliability. These findings underscore an urgent need for structured AI education to ensure that future physicians use these technologies effectively, ethically, and responsibly.

**Keywords**: Artificial Intelligence, Medical Education, ChatGPT, Sudan, Napata College, Medical Students.

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## List of Abbreviations

| NAME | ABBREVIATION |
|---|---|
| AI | Artificial Intelligence |
| MBBS | Bachelor of Medicine, Bachelor of Surgery |
| MD | Doctor of Medicine |
| SDG | Sudanese Pound (used in the budget section) |
| SPSS | Statistical Package for the Social Sciences (IBM SPSS Statistics) |
| USMLE | United States Medical Licensing Examination |

# Chapter One

# Introduction

# 1. Introduction

## 1.1 Background

Artificial intelligence (AI) has evolved beyond a theoretical concept and is now actively transforming medical education by reshaping how students access, interpret, and engage with complex information. The emergence of generative AI and large language models has provided medical students with advanced digital tools capable of delivering instant explanations, generating tailored study materials, and simulating clinical reasoning scenarios. These technologies have progressed beyond novelty and are increasingly becoming integral components of modern medical training [1].

Applications such as ChatGPT have rapidly gained widespread adoption among medical students as academic support tools. A 2026 study published in *JMIR Formative Research* reported that approximately 89% of medical students utilize ChatGPT for tasks such as simplifying complex concepts, preparing for examinations, and organizing study materials [2]. This trend is further supported by research in *BMC Medical Education*, which identifies generative AI as a commonly used supplementary resource among medical students worldwide [3][4].

Moreover, the manner in which students interact with AI tools is becoming increasingly sophisticated. Many students employ these technologies to enhance efficiency, particularly by summarizing dense academic content and obtaining rapid clarification of challenging topics [2][5]. A 2025 study highlighted that AI has been integrated into students' daily learning routines, enabling more personalized and efficient information retrieval [5]. However, the extent of AI utilization varies among students and is influenced by factors such as technological proficiency, academic level, and access to digital resources [1].

Overall, medical students demonstrate a largely positive attitude toward the integration of AI in their education. Research conducted in 2025 indicates that a majority of students consider AI to be an essential tool for both their academic development and future professional practice [3][6]. In fact, over 80% of students believe that proficiency in AI will become a critical competency in the medical field

[7]. Despite this optimism, there remains a notable lack of formal training and institutional guidance on the responsible and effective use of AI in clinical and educational contexts [2][6].

The rapid adoption of AI also raises several important concerns. These include the potential for inaccuracies in AI-generated content, risks of academic misconduct, and the possibility of overreliance on such technologies. Notably, a 2025 study found that while students generally trust AI tools, they remain cautious about issues such as misinformation and “hallucinations” [4]. In the context of medical education—where accuracy is paramount—insufficient critical evaluation of AI outputs poses a significant risk [1].

Importantly, the majority of existing research on AI use in medical education has been conducted in high-income countries. There is a substantial gap in data from low- and middle-income regions, including Sudan, where differences in infrastructure, technological access, and educational environments may significantly influence AI adoption and usage patterns. Consequently, findings from technologically advanced settings cannot be directly generalized to developing contexts.

In response to this gap, the present study focuses on Napta College in 2026. By assessing the prevalence of AI usage and exploring medical students’ perceptions of its educational role, this research aims to generate context-specific insights. These findings are intended to inform the development of strategies for the ethical and effective integration of AI into Sudanese medical education, thereby addressing a critical gap in the existing literature.

## 1.2 Problem Statement:

Tools such as ChatGPT are increasingly becoming standard components of students' academic toolkits, supporting a wide range of activities from routine coursework to complex clinical reasoning tasks. This transition toward technology-assisted learning is progressing at a pace that often exceeds the ability of traditional curricula to adapt [8,9]. Globally, AI adoption among medical students is widespread and becoming normative. A study in Uganda found that 76% of students had used AI tools and 93% were aware of them, with ChatGPT being the most used (72.2%) . AI is actively applied in assignments (55.5%), tutorial preparation (39.9%), and exam study [10]. Similar trends appear elsewhere. In Palestine, 87% of medical students reported using AI tools regularly, where AI has become central to academic and clinical support [11]. Studies across Asia also show high engagement with AI chatbots and continued future use intentions [12,13]. However, gaps remain. Despite high usage, many students lack formal training and struggle to assess the accuracy of AI-generated content [11,14]. Concerns also include data validity, plagiarism, and ethical implications [8,14

In the Sudanese context, and specifically at Napta College, there is currently a lack of locally published data regarding AI usage among medical students. Consequently, the prevalence of AI adoption and students' perceptions of its educational role remain unclear. Given the high global usage rates, alongside the associated benefits and risks, it is essential to investigate the local context. This study therefore represents a critical initial step toward informing curriculum development and ensuring that AI is integrated into medical education in a manner that is both responsible and professionally appropriate.

## 1.3 Justification:

While AI offers clear advantages such as improving learning efficiency and supporting academic performance, it also presents significant challenges, including risks of misinformation, over-reliance, and concerns related to academic integrity. Moreover, many students use AI tools without adequate training or guidance, which may affect their critical thinking and clinical decision-making skills.

Most existing studies have been conducted in developed countries, making it difficult to generalize their findings to contexts like Sudan, where access to technology and educational resources differs. In addition, there is a lack of local data regarding the prevalence of AI use and students' perceptions toward these technologies.

Therefore, this study is necessary to assess the extent of AI use and explore medical students' perceptions at Napta College. The findings will help inform curriculum development and support the safe, effective, and responsible integration of AI into medical education.

## 1.4 General Objective:

To determine the prevalence of artificial intelligence use and assess medical students' perception toward its use at Napta College in 2026.

## 1.5 Specific Objectives:

1. To determine the prevalence of artificial intelligence use among medical students at Napta College.
2. To identify the types of artificial intelligence tools used by medical students (e.g., ChatGPT and similar applications).
3. To identify the patterns and purposes of artificial intelligence use among medical students.
4. To evaluate medical students' perceptions toward the use of artificial intelligence in medical education.

## 1.6 Research Question

What is the prevalence of artificial intelligence use, and what are the patterns of use and perceptions toward its use among medical students at Napta College in 2026?

## 1.7 Research Hypotheses

There is a significant association between the use of artificial intelligence and students' demographic characteristics, academic level, and perceptions among medical students at Napta College.

# Chapter Two

# Literature review

# 2. Literature review

## Overview of Artificial Intelligence in Medical Education

At its core, Artificial Intelligence (AI) refers to computer systems designed to handle tasks that usually require a human touch—things like learning from experience, reasoning through problems, recognizing complex patterns, and making informed decisions [15]. In just the last few years, AI has shifted from a tech curiosity to a transformative force in both healthcare and medical school, fundamentally changing how medical knowledge is taught and absorbed [16]. This rapid shift is being fueled by huge leaps in machine learning, natural language processing, and big data, which are making "intelligent" educational tools a reality [15,17].

In the classroom, AI shows up in many forms: adaptive platforms that change based on a student's progress, virtual patient simulations, and smart tutoring systems. We're also seeing AI-driven language models that make learning feel more interactive and personalized [16,18]. These technologies do more than just deliver facts; they provide instant feedback, help students remember what they've learned longer, and sharpen the critical thinking skills needed for real-world clinical work [17,18].

Beyond the lecture hall, AI is already becoming a staple in specialties like radiology, pathology, and surgery. This reality highlights a growing need to weave AI training into both undergraduate and postgraduate medical programs [16,19]. Despite how important this has become, many medical schools are still playing catch-up, leaving a noticeable gap between traditional training and the high-tech requirements of modern clinics [19].

While AI can clearly make medical education more efficient and accessible, bringing it into the fold isn't as simple as flipping a switch. It requires a thoughtful look at curriculum design, making sure faculty are prepared to teach it, and addressing the ethical "gray areas" that come with automation [17,18]. Ultimately, giving medical students a solid foundation in AI isn't just an elective benefit—it's a necessity for ensuring they use these tools effectively and responsibly once they start practicing [15,16].

## Types of Artificial Intelligence Tools Used by Medical Students

The range of AI tools available to medical students today is incredibly diverse, covering everything from basic study aids to advanced clinical simulations. These technologies are becoming a staple in medical education because they make learning more efficient, offer a more personalized experience, and put a massive library of medical knowledge right at a student's fingertips [20,8].

Perhaps the most recognizable category includes conversational agents and large language models like ChatGPT and Google Gemini. Students are increasingly leaning on these for "quick-fire" explanations of tough medical concepts, summarizing long lectures, or drafting study notes. Because they provide instant answers and help with academic writing, these tools have become the go-to for self-directed study [8,21].

Then there are adaptive learning systems and "intelligent" tutoring platforms. These use machine learning to actually track a student's progress, tailoring the material to fit their specific needs. By spotting exactly where a student is struggling and providing targeted feedback, these systems help ensure that information actually sticks for the long term [20,22].

Virtual simulation tools are also making a huge impact on how students train. These platforms create realistic clinical scenarios where students can practice taking patient histories and making diagnoses without any real-world risk. It's a fantastic way to build clinical confidence and bridge the gap between what they read in a textbook and what they'll eventually do in a hospital [22,23].

Beyond general study aids, students are being introduced to AI-assisted diagnostic tools, particularly in fields like radiology and pathology. These tools help them learn how to interpret medical images and understand modern diagnostic workflows. By providing automated analysis and decision support, they help students develop the accuracy they'll need as future clinicians [23].

Finally, many students use AI to help with the heavy lifting of research and academic writing—everything from searching through literature to paraphrasing complex sections. While these tools definitely save time, they've also sparked a necessary debate about academic integrity and the risk of students becoming a bit too dependent on the technology [8,21].

Taken together, the wide variety of AI tools in use today shows just how deeply artificial intelligence is weaving itself into the fabric of medical school. Understanding these different categories is key to figuring out how often students are using them and, more importantly, how they feel about them.

## Previous Studies

Recent research paints a clear picture: medical students around the world are adopting artificial intelligence (AI) at a remarkable pace. Across various studies, the findings are consistent—usage rates are high, perceptions are generally positive, but ethical concerns are starting to surface more frequently.

In East Africa, for instance, a cross-sectional study found that over 80% of medical students have already integrated AI into their workflow. More than half of these students use ChatGPT regularly to prep for exams, clarify tough concepts, or help with academic writing. While about 70% find that AI makes their learning much more efficient, nearly 40% are beginning to worry about whether the information is always accurate or if they are becoming too dependent on the tech [1].

We see a similar trend in the Middle East, where between 75% and 85% of medical students report using AI tools—mainly for literature reviews, summarizing long texts, and research tasks. Over 60% of these students agree that AI is a huge time-saver and productivity booster. However, about half of them are also raising red flags regarding plagiarism and the potential for improper academic use [2].

Research from Saudi Arabia adds another layer to this. Even though only about 45–55% of students felt they had a solid grasp of AI concepts, more than 70% were still in favor of bringing AI into the medical curriculum. Interestingly, over 65% of participants pointed to ethical risks, specifically worrying about data privacy, algorithmic bias, and general misuse [24].

A study in Oman highlighted a significant gap in formal training. While over 80% of students were eager to learn about AI applications in healthcare and 75% believed AI would be a cornerstone of their future practice, less than half had actually received any formal education or training on the subject [25].

In North America, usage remains high, with 60–80% of students actively using AI for everything from study assistance to clinical reasoning. About 70% see it as a valuable "extra" for their education, but nearly 50% are still skeptical about how reliable and accurate these tools really are when applied to a clinical context [26].

Further global research confirms that students are generally optimistic; more than 65% agree that AI helps them understand their subjects better. However, this optimism is balanced by caution, as 55–70% of students expressed concerns about misinformation, bias, and the potential for AI to stunt the development of their own critical thinking skills [27].

One large survey found that over 70% of students frequently use AI for problem-solving and summarization. This same group emphasized that we can't just leave things as they are—about 60% called for clear institutional guidelines and regulations to govern how AI is used in schools [12].

In Asia, national data shows that over 65% of medical students have experience with AI chatbots, and nearly 80% plan to keep using them. It seems that how useful and easy a tool feels is the biggest predictor of whether a student will stick with it [28]. Other studies confirm this link, showing that the more positive a student's attitude is toward the tech, the more frequently they tend to use it [29].

Despite this widespread awareness—where roughly 60–70% of students know how AI is used in healthcare—only a small minority have actually had structured training. This reinforces the argument that medical schools need to start integrating these topics into the core curriculum [14].

When it comes to the future of the profession, over 70% of students believe AI can improve diagnostic accuracy. However, there is a bit of anxiety beneath the surface; about 40–50% worry that AI might eventually replace physicians or reduce the human connection that is so central to healthcare [30].

Finally, a broad review of higher education suggests that AI chatbots are becoming a permanent fixture. While they improve efficiency and make learning more accessible, the same issues keep coming up: concerns over academic integrity, the reliability of the information, and the long-term ethical implications of relying on an algorithm [31].

## Patterns and Purposes of Artificial Intelligence Use Among Medical Students

The way medical students use artificial intelligence (AI) generally follows a few consistent patterns centered on academic support, efficiency, and clinical learning. Recent evidence suggests that these tools are mainly used to deepen understanding, sharpen study routines, and help manage the heavy workload of medical research [8,22].

One of the most frequent uses for AI is simple concept clarification. Medical students often turn to tools like ChatGPT to break down complex topics into simpler terms or to get instant answers to specific academic questions. This represents a clear shift toward self-directed learning, where students treat AI as an accessible, interactive tutor that is available around the clock [8,32].

Another major trend is using AI to organize and summarize vast amounts of study material. Studies consistently show that students use these tools to condense long lecture notes, textbooks, and dense scientific papers into shorter, more manageable formats—especially when the pressure of exam season hits. It's a strategy driven by the sheer volume of information they have to master in a short amount of time [22,33].

AI is also becoming a staple in academic writing and research. Students use it to draft assignments, paraphrase difficult sections, brainstorm research ideas, and organize their literature reviews. Some data even shows that AI helps students structure their papers more logically and improve the overall clarity of their writing [3,34].

Beyond just paperwork, AI is increasingly helping with clinical reasoning. Students are starting to use these platforms to explore "what if" clinical scenarios, generate differential diagnoses, and practice their decision-making skills. This application is particularly exciting because it helps bridge the gap between reading about a disease in a book and actually treating a patient in a clinic [33,35].

In terms of how often they use it, student behavior varies quite a bit. Some only use AI occasionally for specific, tricky tasks, while others have integrated it into their daily academic routine. These habits are usually shaped by how tech-savvy the student is, what kind of devices they have access to, and their own personal learning style [8,32].

Exam preparation is another area where AI shines. Students rely on AI-generated summaries, quick explanations, and even practice questions to save time and study

more effectively. This reflects a growing dependence on digital assistants during high-stress periods of the academic year [32,33].

Despite these clear benefits, there are still some red flags in these usage patterns. Researchers often point to the risk of students becoming too dependent on AI, which could potentially weaken their critical thinking skills. There are also ongoing concerns about academic integrity, especially if students use AI-generated content without double-checking the facts or properly acknowledging the source [34,35].

Ultimately, the way medical students use AI shows that these tools are primarily being used to boost productivity and develop clinical skills. However, as they become more common, it's clear we need to keep a close eye on how to use them responsibly within medical education.

## Benefits, Challenges, and Risks of AI in Medical Education

Bringing artificial intelligence (AI) into medical school has opened up some incredible opportunities, but it's also brought a fair share of headaches. While the current research shows that AI is great for making studying more efficient and boosting productivity, the risks surrounding its reliability and ethical use are still a major part of the conversation [8,32].

One of the biggest perks of using AI is simply how much faster it makes the learning process. Tools like ChatGPT give students instant answers, allowing them to break down a confusing topic in seconds. This kind of "on-demand" tutoring supports self-directed learning, letting students move at their own pace—which is a lifesaver in a curriculum as demanding as medicine [8,33].

AI also makes learning feel a lot more personal. Adaptive systems can now tweak lessons based on how a student is performing, helping them spot their own weaknesses and remember information longer [32,17]. On the productivity side, AI is a massive time-saver for the "busy work" of being a student, like summarizing long chapters, organizing messy notes, or helping get a head start on research projects [33,34].

Another huge advantage is how AI supports clinical training. Simulations can walk students through patient scenarios and diagnostic puzzles in a totally safe environment. It's an effective way to bridge the gap between reading a textbook and actually making decisions in a hospital wing [17,23].

However, these benefits come with some serious red flags. The most obvious concern is accuracy. AI isn't perfect; it can produce "hallucinations" or misleading facts. If a student doesn't have the critical eye to catch those mistakes, it can lead to some pretty significant gaps in their medical knowledge [8,34].

There’s also the very real danger of over-reliance. If students start leaning on AI to do all their heavy lifting, they might stop developing the independent problem-solving skills they’ll need when they’re responsible for a patient's life. It’s a "use it or lose it" situation for critical thinking and clinical reasoning [33,23].

Then there are the ethical hurdles. Using AI for assignments opens the door to plagiarism and academic dishonesty, especially if the line between "assistance" and "cheating" isn't clearly defined [32,34]. Plus, there are ongoing worries about data privacy and the subtle biases that might be baked into the AI’s algorithms [17,23].

Finally, the lack of formal rules is a problem. Most medical schools haven't caught up with the tech yet, leaving students in a gray area where they aren't sure what is or isn't okay. Without clear institutional policies or training, the door is left wide open for misuse or inconsistent habits [32,33].

In short, while AI can definitely make medical education more efficient and personalized, we can't ignore the risks of dependency and misinformation. To really make this work, we need proper regulation, better training for students, and a curriculum that actually addresses these tools head-on.

# Chapter Three

# Methodology

## 3.Methodology

### Study Design

This is descriptive cross-sectional facility-based study.

### Study Area

The study was conducted at Napata College, Sudan. Napata College is a higher education institution that provides undergraduate programs in medicine and health sciences . The study specifically targeted students enrolled in the Faculty of Medicine and other health-related faculties within the college including Medicine, Dentistry, Pharmacy, Nursing, and Medical Laboratory.. The institution accommodates students from different academic levels, offering a suitable environment to assess the prevalence and perceptions of artificial intelligence use among medical students.

### Study Duration

The study was conducted over a period of three months, from February to April 2026.

### Study Population

The study population was included all undergraduate medical students enrolled at Napta College during the academic year 2026.

### Inclusion Criteria

- All registered medical students at Napta College during the study period
- Students who consent to participate in the study

### Exclusion Criteria

- Students who refuse to participate
- Incomplete or improperly filled questionnaires

### Sampling design:

This study employs a simple random sampling method, ensuring that every individual in the population has an equal opportunity to be selected for the smaller sample.

Random sampling strategies are considered the gold standard in research as they aim to obtain a representative sample of the population.

**Sampling Technique**

A stratified simple sampling technique was used to ensure adequate representation of students from different academic levels and faculties.

**Sample size:**

The sample size was calculated using the Yamane formula:

n = N / (1 + Ne^2)

Where:

n = required sample size

N = total population size (800)

d = margin of error (0.04)

Thus, the required sample size is 206 students

**Data collection:**

Data for this study was collected through an online questionnaire developed using Google Forms. The survey was shared electronically via social media platforms, email groups, and academic networks to ensure wide accessibility. Participation are volunteers, and respondents was informed about the anonymity and confidentiality of their responses through a consent statement at the beginning of the form. By submitting the completed form, participants consented to the use of their responses for academic and research purposes.

The questionnaire was structured into several comprehensive sections designed to evaluate the integration of Artificial Intelligence among medical and health sciences students. The initial section focused on socio-demographic and academic characteristics, capturing data on gender, academic year, and faculty affiliation. This was followed by a section assessing technical proficiency and infrastructure, which documented the students' primary study devices and self-rated "tech-savviness". A core component of the survey investigated AI usage habits, specifically looking at the frequency of use, duration of experience, and the degree of reliance on AI as a primary information source. Furthermore, the questionnaire detailed functional

applications, identifying specific tools like ChatGPT and Google Gemini, as well as the primary academic reasons for their use, such as clarifying concepts or exam preparation. The final section utilized Likert-scale statements to gauge perceptions and attitudes, exploring themes of efficiency, trust, and the potential impact of AI on critical thinking, while also querying the necessity of formal AI training within the medical curriculum.

**Data analysis plan**

The collected data were exported from Google Forms,then organised and cleaned in Microsoft Excel. Statistical analysis was performed using IBM SPSS Statistics (version 26).

The distribution of participants across academic years was analyzed using descriptive statistics. The majority of students were from clinical years, with Year 5 students representing 78 participants (29.8%), Year 4 students 74 participants (28.2%), and Year 3 students 67 participants (25.6%). The remaining 43 participants (16.4%) were from preclinical years (Year 1 and Year 2).

Inferential Statistics:

To test the research hypothesis regarding associations between variables, the Pearson Chi-square ($\chi^2$) test for independence was employed. This test was specifically used to determine the significance of the association between:

Academic Level (Pre-clinical vs. Clinical) and Frequency of AI Use (Regular vs. Infrequent).

Gender and Primary Reasons for AI integration in medical studies.

A p-value of less than 0.05 ($p < 0.05$) was considered the threshold for statistical significance, indicating a 95% confidence level that the observed associations were not due to random chance."

**Dependent Variables**

Prevalence of AI use, Use of AI tools (Yes/No), Frequency of use (daily, weekly, occasionally),

Perception toward AI use

Perceived usefulness, Trust in AI outputs, Attitude toward AI in medical education, Willingness to use AI in the future

**Independent Variables**

1. Sociodemographic Variables

Age, Gender and Academic year

2. Academic & Technology-Related Variables

Access to internet, Type of device used (phone, laptop, tablet), Previous exposure to AI tools and Level of digital literacy

3. AI Use Characteristics

Types of AI tools used (e.g., ChatGPT) ,Purpose of use (study, research, clinical learning) and Duration of use

## Ethical Considerations

Ethical approval for this research was obtained from the relevant institutional authority at Napata College prior to the commencement of data collection. Participation in the study was entirely voluntary, and all medical and health sciences students were provided with a clear explanation of the research objectives and the specific focus on AI integration before engaging with the study materials.

Informed consent was obtained electronically from all 262 participants at the beginning of the survey process. Only those students who provided explicit digital consent were permitted to proceed to the sections regarding their academic year, faculty, and technical proficiency. Participants were assured that their responses—including their self-rated "tech-savviness" and specific AI usage habits—would remain strictly anonymous and confidential. No personally identifiable information was collected during the study, and all data, such as the specific AI tools used and perceptions of AI integration, were used solely for academic and research purposes. The collected information was stored securely and was accessible only to the research team. Furthermore, participants were informed of their right to withdraw from the survey at any stage without any penalty or consequences.

# Chapter Four

# Results

# 4. Results

The study population at Napata College in 2026 exhibits a nearly equal gender distribution, with female students comprising 50.4% and male students representing 49.6% of the 262 participants (Figure 1). The analysis revealed a significant gender-based difference in the application of AI tools ($p = 0.02$). While the overall prevalence of use is high across both genders, the preference for conceptual clarification among female students suggests a focus on deep learning and comprehension. In contrast, the higher reliance on AI for summarization among male students may indicate a focus on efficiency and time management. This finding suggests that intervention strategies or training programs for AI integration should account for these differing student needs and learning styles( Table 4)

Academic representation is heavily concentrated in the clinical stages of education; Year 5 students form the largest single cohort at 29.8%, followed by Year 4 at 28.2% and Year 3 at 25.6% (Figure 2).A key finding of this study is the significant correlation between academic seniority and the frequency of AI adoption ($p = 0.0017$). This suggests that as students transition from basic sciences to clinical rotations, the demand for rapid information synthesis and clarification of complex clinical cases increases. ( Table 5) .

From a faculty perspective, the Faculty of Medicine represents the majority of the sample at 61.5% (Figure 3). The remaining student body is distributed across Medical Laboratory (12.2%), Nursing (10.3%), and the Faculties of Dentistry and Pharmacy, which each account for 8.0% of the respondents.

Learning habits among these students are characterized by a high prevalence of mobile-first strategies, as 64.5% identify the smartphone as their primary device for studying (Figure 4). Laptops or desktops are utilized by 19.5%, while tablets are the primary choice for 16.0% of the population. Regarding technical proficiency, more than half of the students (53.1%) rate their technical proficiency as intermediate (Figure 5). Approximately one-quarter (26.3%) consider themselves beginners, while 20.6% report possessing advanced technical skills.

Artificial Intelligence adoption is nearly universal within the college, with 92.0% of students having utilized AI for their academic studies (Table 1). The frequency of this engagement is high, with 71.7% of respondents using AI at least weekly, including 36.6% who use it daily. Experience with these tools is well-established, with 36.6% of

students having used them for 6–12 months and 35.9% for over a year. Notably, 39.7% of students have reached a level of reliance where they view AI as a primary source of information.

In terms of specific platforms, ChatGPT is the most popular tool, utilized by 72.9% of the students, followed by Google Gemini at 46.6% (Table 2). Other tools in use include adaptive learning platforms (20.2%) and AI diagnostic tools (16.0%). The primary academic drivers for this technology use are the clarification of difficult medical concepts (59.5%), summarizing lecture materials (50.8%), and preparing for examinations (50.0%). Additionally, 33.6% of students employ AI to assist with academic writing.

While students recognize the practical benefits of AI, their attitudes remain nuanced (Table 3). A majority (53.4%) agree that AI saves time in studying, and 45.0% believe it makes learning more efficient. However, significant caution persists regarding the reliability of these tools; only 28.7% of students report high trust in AI-generated information. Furthermore, 44.2% of respondents express concern that AI usage may lead to a reduction in critical thinking skills. Despite these divided views on reliability and cognitive impact, there is a strong consensus regarding the future of medical education, with 67.6% of students advocating for the formal integration of AI training into the medical curriculum.

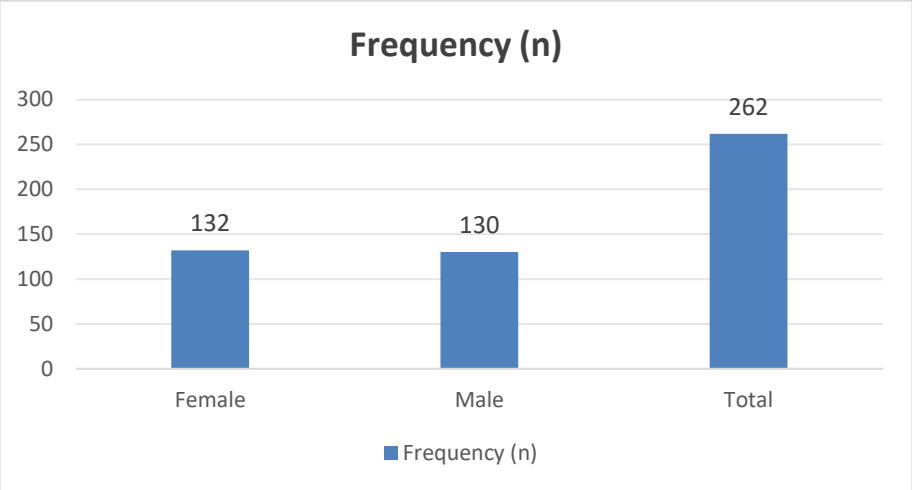



**Figure 1: Gender Distribution of Medical and Health Sciences Students by at Napata College, 2026 (n=262)**

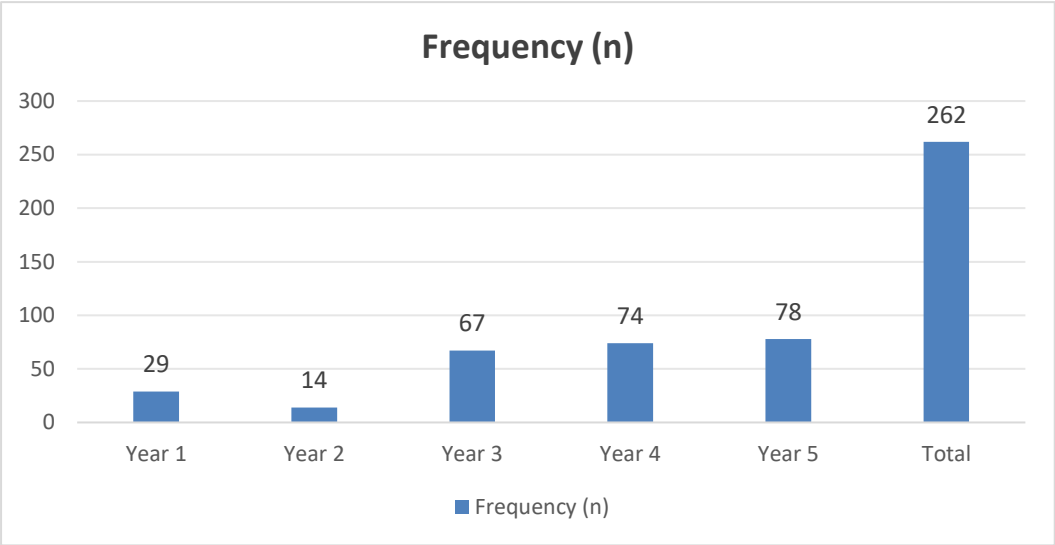



**Figure 2: Distribution of Medical and Health Sciences Students by Academic Year at Napata College, 2026 (n=262)**

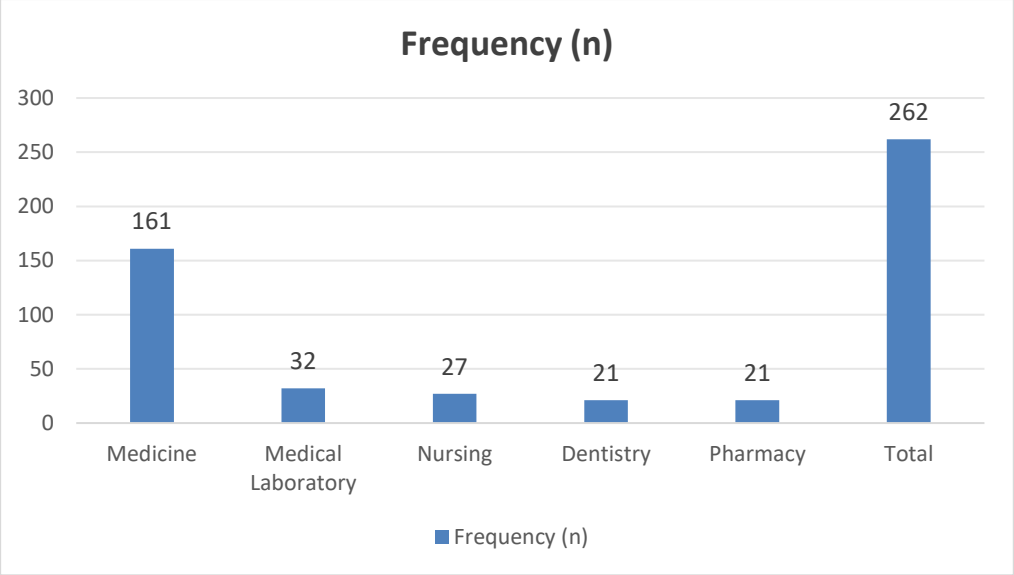



**Figure 3: Distribution of Medical and Health Sciences Students by Faculty at Napata College, 2026 (n=262)**

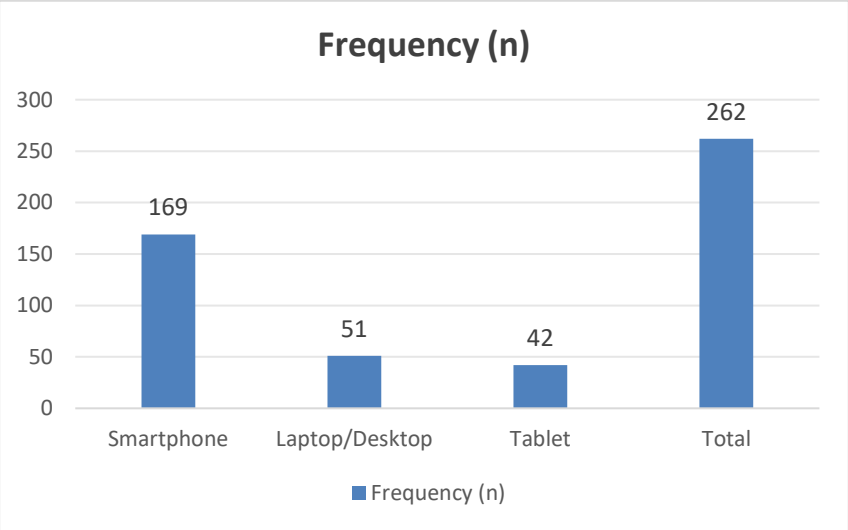



**Figure 4: Primary Device Used for Studying by Medical and Health Sciences Students at Napata College, 2026 (n=262)**

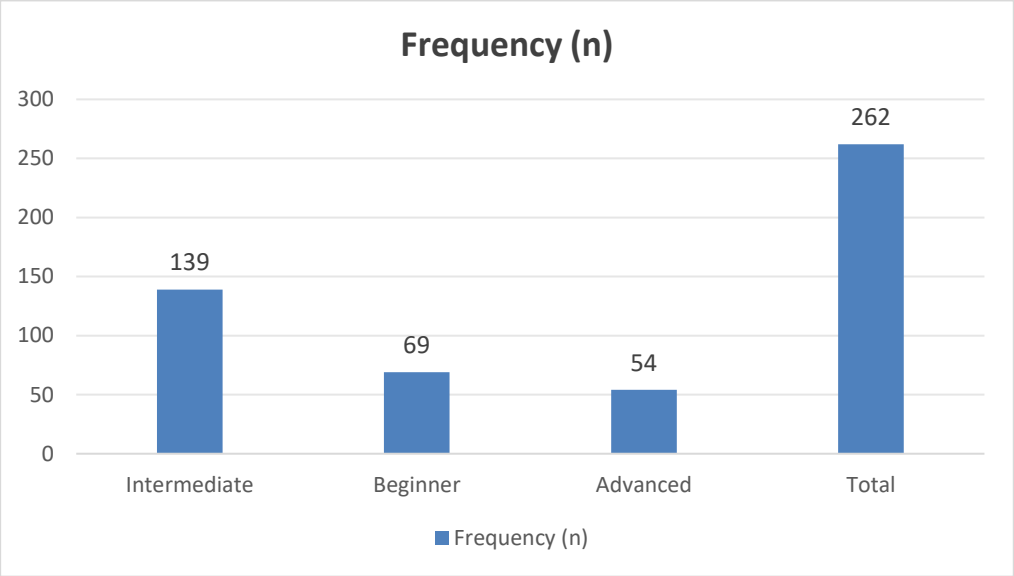



**Figure 5: Self-Rated "Tech-Savviness" Among Medical and Health Sciences Students at Napata College, 2026 (n=262)**

## Table 1: AI Usage Habits and Reliance Among Medical and Health Sciences Students at Napata College, 2026 (n=262)

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Used AI for Studies | Yes | 241 | 92 |
| | No | 21 | 8 |
| Frequency of Use | Daily | 96 | 36.6 |
| | Weekly | 92 | 35.1 |
| | Monthly / Rarely | 74 | 28.2 |
| Experience Duration | 6–12 months | 96 | 36.6 |
| | More than 1 year | 94 | 35.9 |
| | Less than 6 months | 72 | 27.5 |
| Primary Source Reliance | Yes | 104 | 39.7 |
| | Sometimes | 102 | 38.9 |
| | No | 56 | 21.4 |

## Table 2: Specific AI Tools and Functional Reasons for Usage Among Students at Napata College, 2026 (n=262)

| Variable | Category | Frequency (n)* | Percentage (%)* |
|---|---|---|---|
| AI Tools Used | ChatGPT | 191 | 72.9 |
| | Google Gemini | 122 | 46.6 |
| | Adaptive Learning Platforms | 53 | 20.2 |
| | AI Diagnostic Tools | 42 | 16 |
| Primary Reasons | Clarifying Concepts | 156 | 59.5 |
| | Summarizing Lectures | 133 | 50.8 |
| | Exam Preparation | 131 | 50 |
| | Academic Writing | 88 | 33.6 |

*Multiple response options allowed; frequencies and percentages do not sum to total N.

## Table 3: Perceptions and Attitudes Toward AI Integration in Medical Education at Napata College, 2026 (n=262)

| Perception Statement (Likert 1-5) | Disagree (1–2) | Neutral (3) | Agree (4–5) |
|---|---|---|---|
| AI saves time in studying | 58 (22.2%) | 64 (24.4%) | 140 (53.4%) |
| AI makes learning more efficient | 65 (24.8%) | 79 (30.2%) | 118 (45.0%) |
| AI is a "must-have" for my future career | 68 (26.0%) | 79 (30.2%) | 115 (43.9%) |
| I trust the information from AI tools | 89 (34.0%) | 98 (37.4%) | 75 (28.7%) |
| AI may reduce critical thinking skills | 64 (24.4%) | 82 (31.3%) | 116 (44.2%) |
| Integration | Yes | No | Undecided |
| Should AI be in the curriculum? | 177 (67.6%) | 50 (19.1%) | 35 (13.4%) |

## Table 4: Association Between Academic Year and Frequency of AI Usage Among Medical and Health Sciences Students at Napata College, 2026 (n=262)

| Gender | Clarifying Concepts (n) | Academic Writing/Summarizing (n) | Total | Chi-Square (χ2) | p-value |
|---|---|---|---|---|---|
| **Female** | 82 (62.1%) | 50 (37.9%) | 132 | 5.42 | *0.02 |
| **Male** | 64 (49.2%) | 66 (50.8%) | 130 | | |
| **Total** | **146** | **116** | **262** | | |
| *Significant at p < 0.05 | | | | | |

## Table 5: Association Between Academic level and Primary Reason for AI Usage Among Medical and Health Sciences Students at Napata College, 2026 (n=262)

| Academic Level | Regular Use (Daily/Weekly) | Infrequent Use (Monthly/Rarely) | Total | Chi-Square ($\chi 2$) | p-value |
|---|---|---|---|---|---|
| **Pre-clinical (Y1-Y2)** | 22 (51.2%) | 21 (48.8%) | 43 (100%) | **9.814** | **0.0017*** |
| **Clinical (Y3-Y5)** | 166 (75.8%) | 53 (24.2%) | 219 (100%) | | |
| **Total** | **188** | **74** | **262** | | |
| **Statistically significant at $p < 0.05$* | | | | | |

# Chapter Five

# Discussion

# Discussion

This study aimed to determine the prevalence, patterns, and perceptions of artificial intelligence (AI) use among medical students at Napta College in 2026. The findings clearly demonstrate a very high level of AI adoption, widespread academic utilization, and generally positive but cautious attitudes toward its role in medical education.

The prevalence of AI use in this study was remarkably high, with 92.0% of students reporting prior use of AI tools. This indicates near-universal adoption within the study population and exceeds findings from similar studies conducted in Uganda (76%) and Palestine (87%) [10,11], as well as global estimates ranging between 60% and 80% [26]. This difference may be explained by the rapid expansion and accessibility of generative AI tools such as ChatGPT, which have become widely available and easy to use in recent years [2,8]. In addition, the dominance of smartphone use among students in this study likely facilitated frequent and convenient access to AI platforms, contributing to the higher prevalence. These findings confirm that AI is no longer a supplementary resource but has become an integral component of modern medical learning, consistent with global trends [3,12].

Regarding patterns and purposes of use, the study found that students primarily utilize AI for clarifying difficult medical concepts, summarizing study materials, preparing for examinations, and assisting with academic writing. These findings are consistent with previous literature, which identifies concept explanation, summarization, and academic support as the most common uses of AI among medical students [8,22,33]. The prominence of concept clarification suggests that students are increasingly relying on AI as an interactive, on-demand tutor that supports self-directed learning [32]. Similarly, the use of AI for summarization reflects the heavy academic workload faced by medical students, where condensing large volumes of information becomes essential. The use of AI in academic writing and research also aligns with global findings, although it raises concerns regarding academic integrity and the potential for misuse [32,34].

The frequency of AI use further highlights its integration into students' daily academic routines. In this study, 71.7% of students reported using AI at least weekly,

including 36.6% who use it daily. This pattern is consistent with international studies demonstrating that AI has become embedded in continuous learning practices rather than being used occasionally [12,28]. Such frequent usage indicates a shift toward technology-driven learning environments, where AI serves as a constant academic support tool.

In terms of specific tools, ChatGPT was the most widely used platform, followed by Google Gemini. This finding is in line with multiple studies that identify ChatGPT as the dominant AI tool among medical students due to its accessibility, versatility, and ability to provide instant, conversational responses [2,21]. In contrast, the relatively lower use of adaptive learning systems and AI diagnostic tools suggests limited exposure to more specialized AI applications. This may reflect infrastructural limitations or a lack of formal integration of advanced AI technologies into the curriculum, an issue that has been highlighted in developing educational contexts [19].

The perceptions of students toward AI were generally positive but demonstrated important reservations. More than half of the students agreed that AI saves time, and nearly half believed it improves learning efficiency. These findings are consistent with global research showing that students perceive AI as a valuable tool for enhancing productivity and facilitating learning [3,27]. However, trust in AI-generated information was relatively low, with only 28.7% expressing high confidence in its reliability. This aligns with concerns reported in the literature regarding inaccuracies and “hallucinations” in AI outputs [4,8,34]. In medical education, where accuracy is critical, such concerns are particularly significant.

Moreover, a considerable proportion of students expressed concern that AI use may negatively impact their critical thinking skills. This finding reflects similar concerns in previous studies, which warn that over-reliance on AI may reduce independent problem-solving abilities and clinical reasoning skills [33,35]. This highlights a critical challenge in integrating AI into medical education: while it enhances efficiency, it may simultaneously pose risks to cognitive skill development if not used appropriately.

A key finding of this study is the strong support for formal integration of AI into the medical curriculum, with 67.6% of students advocating for structured training. This is consistent with studies conducted in Oman and Saudi Arabia, where students expressed a strong desire for formal AI education despite limited prior exposure [24,25]. The coexistence of high usage and limited formal training identified in this study reflects a global gap, where students are adopting AI independently without adequate guidance [14]. This lack of structured education increases the risk of misuse, misinterpretation of information, and ethical concerns, including plagiarism and data reliability issues.

The findings of this study have important implications for medical education. First, they confirm that AI is already deeply embedded in students' learning practices, regardless of institutional policies. Second, they highlight a significant gap between usage and training, which must be addressed to ensure safe and effective use. Third, they emphasize the need for balanced integration of AI into curricula, combining technical skills with training in critical appraisal, ethical considerations, and clinical reasoning. Finally, the study underscores the importance of developing context-specific strategies, particularly in Sudan, where limited local data has previously hindered evidence-based educational planning.

When compared with existing literature, the findings of this study are largely consistent with global trends, including high prevalence of use, common academic applications, positive perceptions regarding efficiency, and concerns related to reliability and ethical use [4,8,10,22,34]. However, this study contributes uniquely by providing local data from Sudan, addressing a significant gap in the literature and offering insights relevant to similar low-resource settings.

Despite its strengths, this study has several limitations. As a cross-sectional study, it cannot establish causal relationships. The use of self-reported data may introduce response bias, and the study's confinement to a single institution limits the generalizability of the findings. Additionally, the higher representation of clinical-year students may have influenced the results, as senior students may have different usage patterns compared to junior students.

In conclusion, this study demonstrates that AI use among medical students at Napta College is highly prevalent and deeply integrated into academic activities. While students recognize its benefits in improving efficiency and learning, significant concerns remain regarding reliability, ethical use, and potential impacts on critical thinking. These findings strongly support the urgent need for structured AI education within the medical curriculum to ensure that future physicians can use these tools effectively, critically, and responsibly.

# Conclusion

This study demonstrated that the use of artificial intelligence (AI) among medical students at Napta College is highly prevalent, with the vast majority of students actively incorporating AI tools into their academic activities. AI has become an essential component of modern learning, primarily utilized for clarifying complex medical concepts, summarizing study materials, preparing for examinations, and assisting with academic writing. The frequency of use further reflects its deep integration into daily study routines.

Despite the clear benefits reported by students, particularly in improving efficiency and saving time, important concerns remain. Trust in AI-generated information is relatively low, and a considerable proportion of students expressed worries about the potential negative impact on critical thinking and the risks of over-reliance. These findings highlight a critical imbalance between widespread use and limited confidence in the reliability of these tools.

Moreover, the study revealed a significant gap in formal training, as students are adopting AI independently without adequate guidance on its appropriate and ethical use. This is reflected in the strong support for integrating AI education into the medical curriculum, indicating a clear demand for structured learning in this area.

# Recommendations

Based on the findings of this study, several recommendations can be proposed to ensure the effective, safe, and responsible use of artificial intelligence (AI) in medical education at Napta College and similar settings.

Recommendation for Students

Students should receive formal training on AI's workings, limitations, and ethical use; learn to critically verify AI outputs using evidence-based sources; avoid over-reliance on AI to preserve independent reasoning and clinical skills; and follow clear institutional guidelines on academic integrity and appropriate AI use.

Recommendations for the University

· Integrate AI literacy into the medical curriculum.

· Establish clear policies on AI ethics, plagiarism, and acceptable use.

· Provide faculty development programs on AI in education.

· Improve access to advanced AI tools (e.g., for simulations and diagnostics).

· Conduct further research (multi-center, longitudinal) on AI's long-term impact on learning and competence.

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## Index:

Introduction: This survey aims to determine the prevalence, patterns, and perceptions .of Artificial Intelligence (AI) use among medical students at Napta College

**Consent**

,Dear participant

This study aims to assess the use of artificial intelligence (AI) and students' perceptions toward its use in medical education. Your participation is voluntary and anonymous. All information will be kept confidential and used for academic purposes .only

?Do you agree to participate

Yes

No

**Section 1: Demographic Information**

.This section provides context for usage patterns based on the student's background

Academic Year: (e.g., Year 1, Year 2, etc.) *

Gender: [ ] Male [ ] Female *

Primary device used for studying: [ ] Smartphone [ ] Laptop/Desktop [ ] Tablet *

?"How would you rate your general "tech-savviness *

Beginner [ ] Intermediate [ ] Advanced [ ] *

**Section 2: Prevalence of AI Use**

Have you ever used Artificial Intelligence tools (e.g., ChatGPT, Gemini, etc.) for * ?your medical studies

Yes [ ] *

No (If No, please skip to Section 5) [ ] *

?How often do you use AI tools for academic purposes *

Daily [ ] *

Weekly [ ] *

Monthly [ ] *

Rarely (only for specific difficult tasks) [ ] *

?How long have you been using AI tools *

Less than 6 months

months 12–6

More than 1 year

?On average, how much time do you spend using AI tools per day*

Less than 30 minutes

minutes 60–30

hours 2–1

More than 2 hours

?Do you rely on AI tools as your primary source of information *

Yes

No

Sometimes

**Section 3: Types of AI Tools Used**

:Which of the following AI tools do you use? (Select all that apply) *

ChatGPT [ ] *

Google Gemini (formerly Bard) [ ] *

Adaptive Learning Platforms (e.g., smart tutoring systems) [ ] *

Virtual Clinical Simulations [ ] *

AI-assisted diagnostic tools (Radiology/Pathology simulators) [ ] *

_____ :Other [ ] *

**Section 4: Patterns and Purposes of Use**

:What are your primary reasons for using AI in your studies? (Select all that apply) *

Clarifying difficult medical concepts [ ] *

Summarizing long lectures or dense textbooks [ ] *

Preparing for exams (generating practice questions/summaries) [ ] *

Assisting with academic writing or research assignments [ ] *

Practicing clinical reasoning and "what if" scenarios [ ] *

Translating or paraphrasing medical literature [ ] *

?Do you use AI to help generate differential diagnoses for clinical cases *

Always [ ] Often [ ] Sometimes [ ] Never [ ] *

**Section 5: Perceptions Toward AI in Medical Education**

:Please indicate your level of agreement with the following statements

(Strongly Disagree, 5 = Strongly Agree = 1)

| Statement | 1 | 2 | 3 | 4 | 5 |

AI makes my learning process more efficient and saves time

.AI proficiency is a "must-have" skill for my future career

.AI helps me understand medical concepts better

.AI improves my academic performance

.AI saves time in studying

.AI is reliable for medical information

.I trust the information provided by AI tools

.I worry that using AI might make me too dependent and stunt my critical thinking

.Using AI for assignments raises concerns about academic integrity/plagiarism

.I feel I have received enough formal training on how to use AI responsibly

.I am anxious that AI might one day replace certain roles of a physician

Do you believe Nap *ata College should integrate formal AI training into the medical ?curriculum

Yes [ ] No [ ] Undecided [ ] *