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Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda

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ABSTRACT

This study investigates the opportunities, challenges, pedagogical implications, perceptions, and attitudes associated with integrating Artificial Intelligence (AI) into university teaching within selected Ugandan universities. Addressing the objectives to identify perceptions, analyze attitudes, assess opportunities, determine challenges, and establish pedagogical implications of AI in enhancing university teaching, the research employed a mixed-methods approach. Data was gathered from administrators, faculty, and students through questionnaires and interviews. The study population consisted of 42,500 students, 20 Deans, 50 Heads of Department, and 750 Lecturers, totaling 43,323 individuals from selected universities in Uganda. A sample size of 1,952 participants was selected, including 1,437 students using stratified random sampling, 19 Deans and 44 Heads of Department using purposive sampling, and 452 Lecturers using simple random sampling. Data collection tools included questionnaires assessing perceptions and attitudes towards AI, opportunities for AI in teaching, challenges to AI implementation, and questions related to pedagogical impacts, along with semi-structured interviews to provide deeper insights. The research design incorporates descriptive statistics and thematic analysis. General results indicate a widespread positive perception and attitude towards AI's potential to enhance teaching, with the recognition of numerous opportunities embedded in its application, while acknowledging significant hurdles relating to resources, training, ethical considerations, potential misuse, and the need for robust data security. The study concludes that strategic investment in infrastructure, comprehensive and targeted training programs for both educators and students, the establishment of clear ethical guidelines and supportive policies, and the fostering of a collaborative environment are essential for successfully harnessing AI's transformative power. Key recommendations include prioritizing funding for AI initiatives, developing tailored and department-specific training programs, establishing robust data security protocols, fostering open communication to address ethical concerns, and reimagining the role of educators to effectively leverage AI in student-centered learning environments.

DEDICATION

I dedicate this thesis to my beloved parents, (Late) Prince Hasan Jjuuko, and Hajjat Fatina Namiiro, who took the task of taking me to school; and to my beloved children, My brothers and sisters and lovely wife Nina Nakaweesa for their moral support.

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LIST OF ABBREVIATIONS

AI:	Artificial Intelligence
AIEd:	Artificial Intelligence in Education
ALPs:	Adaptive Learning Platforms
ANI:	Artificial Narrow Intelligence
AGI:	Artificial General Intelligence
ASI:	Artificial Superintelligence
IRB:	Institutional Review Board
LMS:	Learning Management Systems
NCTQ:	National Council on Teacher Quality
ML:	Machine Learning

CHAPTER 1:

INTRODUCTION

1.0 Introduction

The information revolution has massively changed how teaching is practiced and managed these days; it is very well derived in how it has made higher education much more accessible for students. According to Sabando, 2022, technology has integrated into higher education to blur some geographical barriers that allow students to access the best institutions and highly rated educators across the globe. It has also led to the development of the adaptive learning platforms that Artificial Intelligence powers as it personalizes educational content to meet individual student needs, thus making learning more dynamic and accessible for students. This study focused mainly on enhancing university teaching through artificial intelligence, explicitly examining opportunities, challenges, and pedagogical implications among selected Universities in Uganda.

1.1 Background of the study

University teaching encompasses the different activities aimed at imparting the knowledge and skills of the student. It involves imparting information and inculcating a more profound understanding through critical thinking and problem-solving ability, amongst others. In other words, it is also a multifaceted process of inculcating skills, presenting a theoretical framework, and encouraging critical analysis of different perspectives on the subject under consideration (Shi, 2011). Traditionally, university teaching has been associated with a transmission model. Namely, professors are giving knowledge, and students are merely passive receivers. However, modern approaches to university teaching have emphasized that such should be a more dynamic and interactive teaching environment beyond mere information sharing. Effective university teaching requires an appreciation of the complexity of the instructional process, integrating factors before, during, and after teaching sessions and rejecting a simplistic "technique" approach to teaching improvement. Some interrelated variables in the university teaching and learning models shape the educational experience: learning outcomes, instructional processes, course content, teacher and student characteristics, and the learning context. The models give a framework for educators to enhance teaching practices and improve student learning outcomes. Finally, it empowers teachers in their continuous effort to improve their teaching.

It should also be noted that university teaching is such a dynamic process that mere information transfer is taken beyond to create an environment of learning, critical thinking, and relating the students with abilities and understanding to excel properly in academics and professional fields.

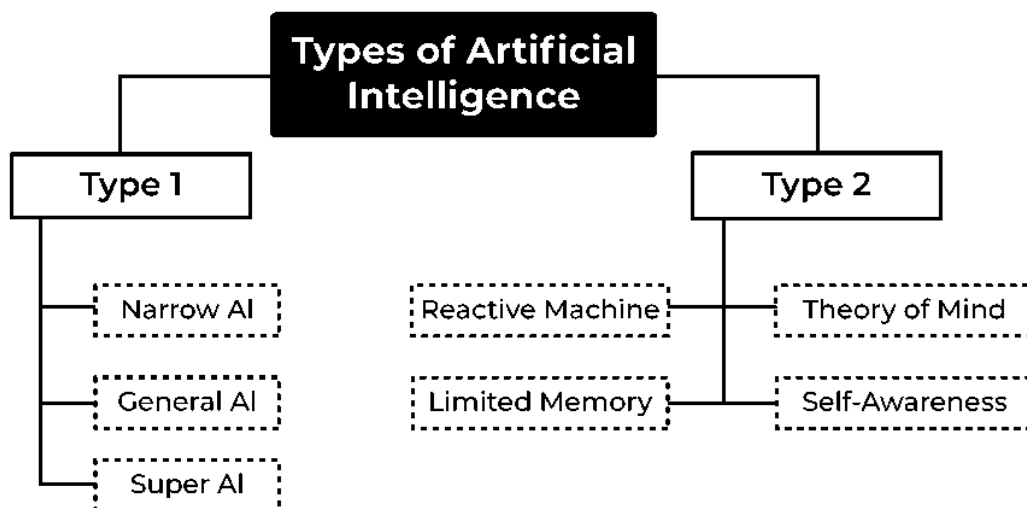
Various modes of teaching methods are adopted in universities, ranging from lectures, seminars, tutorials, practical and laboratory sessions, individually and group supervised project work, problem-based learning, self-study, and many others. The tutorials entail a group of about 15 students and a tutor for 50 minutes, during which the students discuss themes about the subject and complete exercises. These, along with other learning techniques, include seminars, practical sessions, and project work, through which students can have broad learning experiences to make learning comprehensive. The choice of method may be based on various factors such as learning outcomes intended to be achieved, student needs, and the learning environment.

Any teaching method is only effective if it aims at realizing specific learning outcomes. When choosing a teaching method, the instructor should consider factors such as the class size and the nature of the course. For instance, if the learning outcome is solving a complex math equation in an upper-level math course with 20 students, then a guided instruction method is chosen. In this approach, the instructor models and scaffolds learning, allowing students to question, practice applying skills, and clarify. This way, by matching the applied teaching method with the sought-after learning outcomes and considering the peculiar characteristics of the course and students, universities can opt for a method best suited to support effective learning and improving university teaching. Enhancing university teaching improves things such as the quality of instruction and students' learning experience at the university level.

Most award-winning teachers are exemplars on this issue; they share their beliefs and practices about enhancing teaching effectiveness. These include the development of effective assessment strategies for evaluating student learning and providing constructive feedback; techniques to engage and inspire students and foster their interest and participation in the learning process; planning well-structured and meaningful courses that align learning objectives with divergent student needs to be taken into consideration, and the centering of teaching on a model of good practice that moves beyond the traditional models of teaching before jumping into some of these student-centered innovative approaches. Drawing views from research and experiences of renowned educators, enhanced university teaching aims at creating a dynamic and enriching

educational environment that maximizes students' learning outcomes and promotes academic excellence. Artificial intelligence is a sub-branch in computer science that deals with creating machines or computer systems capable of performing tasks seemingly perceptible to human intellectual capabilities. It empowers computers to mimic human capabilities in problem-solving and intelligence to enable them to learn from their data, recognize the patterns therein, and accordingly execute their pre-defined goals. The central concept related to AI includes developing intelligent software and systems that can perceive, learn, and behave to attain maximum success. AI is an umbrella term for different technologies, including machine learning and natural language processing, which allow machines to feel the human tongue, learn by example, and make predictions. Machine Learning, a subset of AI, enables systems to learn and improve from experience automatically. Bottomless Learning deals with data processing using artificial neural networks to enhance learning capabilities. AI's ultimate goals are to develop machines that can work intelligently and independently, solve complex problems, and make deductions logically. AI systems aim to replicate human behaviors, efficiently automate tasks, and drive data-driven decisions across versatile industries such as healthcare, finance, manufacturing, and education.

Figure one: Types of Artificial Intelligence



Artificial intelligence can be categorized as Artificial Narrow Intelligence (ANI), an AI system designed to perform specific, narrow tasks and cannot independently learn and perform general tasks like humans. Examples include chatbots, recommendation engines, and Deep Blue chess computers. Artificial General Intelligence (AGI): This is an AI designed to learn, think, and perform at similar levels to humans, with the ability to apply intelligence to any general task. Artificial Superintelligence (ASI); surpasses human-level intelligence and capabilities across all domains; it can self-improve and potentially become uncontrollable by humans. Reactive Machines: AI systems can only respond to immediate stimuli without memory or the ability to learn from past exposure. Limited Memory: AI systems that can store data from past experiences but later use it to learn and improve over time, such as deep learning and reinforcement learning models.

Artificial intelligence in university teaching

The institutions of learning deploy AI tools to facilitate administrative procedures such as transport, IT, maintenance, scheduling, and budgeting. It analyzes student recruitment, admission, and retention data to determine the at-risk students and offer early intervention measures. On a practical level, it is seen that AI-powered virtual campus tours are introduced, and virtual teaching assistants and adaptive learning platforms are being implemented that let students have access to personalized learning experiences all 24 hours a day, seven days a week. Moreover, AI can generate content, resolve accessibility issues, write code, and detect plagiarism for faculty.

These AI tools can be used to build models in colleges and universities, recommend relevant research articles, and prepare manuscripts used in publication. This information is beneficial for the faculties to make better decisions related to lesson planning, assessment, and professional development. The AI-powered chatbots and virtual assistants can also be used to engage students' queries about financial aid, advising, and career opportunities, thus providing support beyond regular hours.

Involvement of AI in Higher Education:

More inclusion, access, and support to students and faculty should be provided in case universities make poor decisions regarding resource distribution, which could hamper students' potential. However, universities also need to become aware of the various ethical, legal, and data privacy challenges surrounding the use of AI. Apart from this, AI is also used in universities through systems such as AI-powered learning Management Systems that track the data of student learning to tailor content and feedback to improve in certain areas; Virtual assistants, otherwise called AI-powered virtual Learning Assistants, that guide students through complex concepts and answer questions, thus enhancing the learning process and boosting student confidence; AI also grades essays, known as AI-Powered Student Engagement & Assessment Tools, that provides immediate feedback, allows frequently engaging students through polls created by AI so, therefore, enhancing the learning experience and making the workload for teachers light; AI translation tools, otherwise called AI-Powered Language Translation, aids students from different language backgrounds communicate and understand lectures. AI-Powered Learning Analytics also uses it to analyze student data to predict performance and personalize learning plans, improving student engagement and academic outcomes. AI offers opportunities for personalized learning, curriculum development, and content creation; automated feedback in university teaching differs from opportunities in all dynamics of university teaching.

In the context of Ugandan universities, there is a growing recognition of the need for effective teaching methodologies that appreciate the complexity of the instructional process. This includes integrating factors before, during, and after teaching sessions and moving away from simplistic techniques to improve teaching. Current educational models in Uganda highlight interrelated variables such as learning outcomes, instructional processes, course content, teacher and student characteristics, and the learning context, all of which shape the educational experience.

In recent years, Ugandan universities have begun to embrace these modern pedagogical approaches, particularly by integrating Artificial Intelligence (AI) into their teaching practices. The Uganda Communications Commission has initiated efforts to facilitate AI integration in educational institutions, recognizing its potential for technological and social change. Leading universities like Makerere University and Mbarara University of Science and Technology are

at the forefront of this transformation, offering innovative programs in AI and related fields. By 2025, Uganda's tech education landscape has seen a remarkable increase in STEM focus by 35% since 2020, alongside the establishment of over 1,000 new computer labs nationwide. A youthful population fuels this growth, with 75% of Ugandans being under 30, which creates a strong demand for tech education that combines theoretical knowledge with practical experience. A recent study among medical students revealed that 93% had heard of AI tools, with 75.7% having used them for academic purposes such as completing assignments and preparing for exams. Despite these advancements, there remains a significant need for improved AI literacy across all educational levels to ensure students are equipped with the skills necessary for the digital age. These developments underscore the importance of enhancing university teaching through AI integration while addressing the unique challenges and opportunities in Ugandan higher education.

The need to study "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda" is underscored by AI integration's multifaceted challenges and opportunities in the educational landscape. As Ugandan universities grapple with the massification phenomenon, where student enrollment has surged beyond the capacity of academic resources and faculty, the resulting large class sizes, often exceeding 100 to 300 students, overwhelm teaching workloads and hinder effective pedagogy (Eryenyu et al., 2024). While faculty members acknowledge the potential of AI to alleviate some of these burdens, their acceptance remains limited to non-interactive tasks, indicating a significant gap between AI's capabilities and its practical adoption (Eryenyu et al., 2024). Moreover, ethical concerns such as data privacy and algorithmic bias pose substantial barriers to responsible AI integration (Kahiigi, 2024), while a persistent digital divide restricts equitable access to AI tools among students and staff (Zaman, 2023). Past studies have highlighted that unregulated AI use can compromise academic integrity and diminish critical thinking skills among students (Carmody et al., 2021; Zhai et al., 2022). Therefore, structured training programs aimed at enhancing AI literacy among educators and students are essential for ensuring the effective utilization of these technologies while fostering critical analytical skills (Al-Zahrani, 2024). This study provided valuable insights into how Ugandan universities can navigate the complexities of AI integration, enabling them to harness its potential benefits while addressing the inherent challenges.

1.2 Problem Statement

Integrating Artificial Intelligence (AI) in higher education offers significant opportunities and challenges for enhancing university teaching methodologies and student learning outcomes. The current situation regarding AI usage in Ugandan universities is rapidly evolving, with significant advancements and initiatives to integrate AI into higher education. Recent statements from Vice President Jessica Alupo highlight the government's commitment to leveraging AI for educational transformation, emphasizing its role in enhancing teaching methodologies and student learning outcomes. The Uganda Communications Commission is working on an agenda to facilitate effective AI integration in educational institutions, recognizing its potential for technological and social change. Universities are at the forefront of this transformation, offering cutting-edge programs in AI and related fields (Uganda Communications Commission, 2025). In 2025, Uganda's tech education landscape has seen a remarkable increase in STEM focus by 35% since 2020, alongside the establishment of over 1,000 new computer labs nationwide. A youthful population drives this growth, with 75% of Ugandans being under 30, which creates a strong demand for innovative tech education combining theoretical knowledge and practical experience. A recent study among medical students revealed that 93% had heard of AI tools, with 75.7% having used them for academic purposes such as completing assignments and preparing for exams (Alupo, 2025; UCC, 2025). This widespread adoption reflects a growing trend towards incorporating AI into the educational experience; however, there is still a need for improved AI literacy across all levels of education to ensure that students are equipped with the necessary skills for the digital age. Furthermore, calls have been made to establish a dedicated Ministry of Artificial Intelligence in Uganda to enhance national commitment to AI development and ensure that the country does not lag globally. Research indicates that 86% of higher education students already use AI in their studies, with 54% utilizing AI tools at least weekly; however, 58% feel they lack sufficient AI knowledge and skills (Chu et al., 2022). Moreover, universities deploying AI tools see an improvement in graduation rates by 12%, showcasing the positive impact of AI on educational outcomes (Taneri, 2020). Despite these promising statistics, there remains a notable research-practice gap, as existing studies often lack external validity and fail to explain the varying effectiveness of teaching methods in different contexts. Effective university teaching should prioritize student teamwork, cooperation, active participation, social interaction, and peer-to-peer learning objectives that can be supported through technologies like interactive whiteboards

and educational apps (Ouyang et al., 2022). This study aims to inform readers about enhancing university teaching through AI integration by examining the opportunities, challenges, and pedagogical implications using a case study of selected universities in Uganda.

1.3 Aim of the study

This doctoral research focused on Selected Universities in Uganda to address how adopting AI can transform university teaching practices.

1.3.1 Specific objectives

1. To Identify the perceptions of faculty members, administrators, and students regarding the enhancement of university teachers through AI among selected Universities in Uganda.
2. To analyze the attitudes of faculty members, administrators, and students toward enhancing university teachers through AI among selected Universities in Uganda.
3. To assess the opportunities embedded in enhancing university teachers through AI at selected Universities in Uganda.
4. To determine the challenges faced in enhancing university teachers through AI in selected Ugandan universities.
5. To establish the Pedagogical Implications of enhancing university teachers through AI s, elected Universities in Uganda

1.4 Researcher Questions

1. What are the perceptions of faculty members, administrators, and students among selected Universities in Uganda regarding the integration of AI in enhancing university teaching?
2. How do attitudes towards AI differ among faculty members, administrators, and students among selected Universities in Uganda when it comes to enhancing teaching practices?
3. What opportunities do faculty members, administrators, and students identify in implementing AI to enhance teaching at selected Universities in Uganda?
4. What challenges do faculty members, administrators, and students face in adopting AI to enhance teaching at selected Universities in Uganda?
5. What are the pedagogical implications of integrating AI into teaching practices among selected Universities in Uganda as perceived by faculty members, administrators, and students?

1.5 Significance of the study

Exploring how artificial intelligence (AI) can enhance university teaching is a significant topic in higher education. This study examined and addressed the perceptions, attitudes, opportunities, challenges, and implications of AI in university teaching.

The findings from the study on enhancing university teaching through Artificial Intelligence (AI) among selected Universities in Uganda offer valuable insights into the perceptions, attitudes, opportunities, challenges, and pedagogical implications associated with AI integration in education. Here is how these findings can be interpreted and applied:

Positive Perceptions and Attitudes Toward AI: The study reveals a generally positive perception of AI's role in education, with participants showing favorable attitudes toward its potential benefits. This suggests that faculty, administrators, and students are ready to embrace AI technologies in teaching practices. Institutions can leverage this positive sentiment to foster an environment conducive to AI adoption, encouraging stakeholders to engage with AI tools actively.

Identified Opportunities for Enhancement: The average mean score indicating favorable attitudes towards opportunities (9.70) highlights the potential for AI to enhance learning experiences and administrative efficiencies. Educational leaders can focus on integrating AI tools that personalize learning, improve student engagement, and streamline administrative tasks. Universities can enhance educational outcomes and operational efficiency by aligning AI initiatives with these identified opportunities.

Challenges to Address: Despite the positive perceptions, the study also identifies challenges (mean score of 10.01) that must be addressed for successful AI implementation. Concerns related to technical expertise among faculty, resource limitations, and ethical implications such as privacy and bias must be tackled through comprehensive training programs and institutional support. Addressing these challenges will create a sustainable framework for AI integration in higher education.

Need for Further Exploration of Pedagogical Implications: The lower mean score (9.24) concerning pedagogical implications indicates that while there is enthusiasm for AI, significant concerns remain about its impact on teaching methodologies. This finding underscores the

necessity for ongoing research into how AI can effectively integrate into pedagogical practices without compromising educational integrity or teacher autonomy. Institutions should prioritize professional development focusing on innovative teaching strategies incorporating AI.

Recommendations for Professional Development: The study emphasizes the importance of targeted professional development and training to maximize the benefits of AI in educational settings. Universities should develop programs that educate faculty about AI tools and foster an understanding of ethical considerations and best practices in their use. This will empower educators to utilize AI effectively while addressing concerns related to its integration.

Future Research Directions: The findings suggest a need for further research into specific areas, such as AI's long-term effects on student learning outcomes, the evolving role of educators in an AI-enhanced environment, and strategies for mitigating ethical concerns associated with AI use in education. Future studies could explore diverse stakeholder perspectives across different institutions to better understand AI's impact on higher education.

In summary, the study's findings provide a foundational understanding of how various stakeholders perceive and interact with AI in university teaching among selected Universities in Uganda. By addressing identified challenges and leveraging opportunities through targeted professional development and ongoing research, institutions can enhance their educational practices while ensuring responsible and effective use of AI technologies.

1.6 Scope of the Study

The study's scope, "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda," was defined by three key dimensions: geographical scope, content scope, and time scope.

1.6.1 Geographical Scope

The geographical scope of the study "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda" will specifically focus on University A, University B, University C,

and University D. University A, located in Gulu city, the largest urban center in Northern Uganda, is approximately 345 kilometers north of Kampala and is agriculturally focused, with programs geared toward rural community transformation and agricultural education. University B in Arua District in Northwestern Uganda represents emerging educational opportunities and focuses on practical nursing and health sciences training to address regional needs. University C was established in 1988 and headquartered in Mbale. It operates multiple campuses across Uganda and provides a unique perspective on AI integration within a faith-based educational framework, serving over 10,000 students from 21 countries. University D, with its main campus in Kansanga, Kampala, is one of Uganda's largest private universities with a diverse international student body and offers a wide range of programs, including information technology and business studies. Including these universities ensures a comprehensive examination of AI integration across regions and institutional contexts within Ugandan higher education. This approach facilitates understanding how AI can enhance teaching practices while addressing the unique challenges faced by universities in rural and urban settings.

1.6.2 Content Scope

The content scope of the study encompassed several critical areas related to integrating AI into university teaching. The research specifically targeted:

1. **Perceptions:** Understanding how faculty members, administrators, and students perceive AI's role in enhancing teaching practices.
2. **Attitudes:** Analyzing the attitudes of these stakeholders towards AI integration in educational settings.
3. **Opportunities:** Assessing the benefits and opportunities AI presents to enhance university teaching.
4. **Challenges:** Investigating stakeholders' challenges in implementing AI technologies in educational processes.
5. **Pedagogical Implications:** Establishing the implications of AI integration on teaching methodologies and learning outcomes.

This comprehensive content scope explored all relevant aspects of AI's impact on education, providing a holistic view of its potential to enhance university teaching.

1.6.3 Time Scope

The time scope of this study was contemporary, focusing on current perceptions and attitudes towards AI integration as it stands today among Selected Universities in Uganda. The research employed a mixed-methods approach with data collected from 1,952 participants within a defined timeframe. By capturing current attitudes and experiences, the study aimed to provide timely insights into how AI was effectively integrated into university teaching practices moving forward. This focused on present-day perspectives allows for an analysis relevant to ongoing discussions about educational technology and its role in higher education.

1.7 Study Limitations

The study "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda" acknowledges several limitations that may impact the validity and generalizability of its findings. These limitations are categorized into methodological, contextual, and participant-related constraints.

Methodological Limitations

Sample Size and Diversity: The study utilized a sample of 1,952 participants, which may not fully represent the diverse perspectives of all stakeholders among Selected Universities in Uganda. A larger and more varied sample could provide a more comprehensive understanding of perceptions and attitudes towards AI.

Mixed-Methods Approach: While the mixed-methods approach enhances the richness of data, it also introduces complexity in data interpretation. Integrating qualitative and quantitative findings may lead to challenges in ensuring consistency and coherence across different data types.

Descriptive Statistics: The reliance on descriptive statistics limits the ability to infer causal relationships or predict broader trends in AI integration in education. This may restrict the depth of insights regarding how AI impacts teaching practices.

Contextual Limitations

Geographical Focus: The study is geographically confined to Selected Universities in Uganda. While this allows for an in-depth case study, the findings may not apply to other institutions with different contexts, cultures, or resources regarding AI integration in education.

Temporal Scope: The research captures perceptions and attitudes at a specific time. As AI technology rapidly evolves, the insights gained may quickly become outdated, necessitating ongoing research to keep pace with advancements in AI applications in education.

Institutional Factors: The effectiveness of AI integration is influenced by institutional support and infrastructure. Variability in resources, training opportunities, and administrative backing among Selected Universities in Uganda may not reflect those available at other institutions, limiting the generalizability of findings.

Participant-Related Limitations

Self-Reported Data: The study relies on self-reported perceptions and attitudes from faculty members, administrators, and students. This method can introduce bias, as participants may provide socially desirable responses rather than their true feelings or experiences regarding AI.

Lack of Longitudinal Data: The study does not include longitudinal data that could track changes in perceptions or attitudes over time as AI technologies are implemented and evolve within the university setting.

Potential Resistance to Change: Participants' attitudes toward AI may be influenced by their comfort levels with technology or previous experiences with educational innovations. Resistance to change could skew perceptions negatively or positively depending on individual experiences.

CHAPTER TWO:

LITERATURE REVIEW.

2.0 Introduction

The prospect of applying artificial intelligence in HEI, presented by the researcher, means enhancing teaching methods and student learning outcomes. AI offers more than just administrative automatization: personalized learning experiences, intelligent tutoring systems, and enriched data analytics that help make pedagogical decisions. While e-institutions strive to take their lectures one notch higher and into innovative models, AI is vital for supporting creativity in lifelong learning among educators and students. According to Kamalov et al. (2023), it is clear that incorporating AI into Education has transformed traditional modes of teaching and learning. AI-driven adaptive learning systems can personalize educational content in reaction to individual students' needs. This chapter synthesizes extant literature to identify specific lacunae that would rationalize the pertinence of the present study within the broader discourse on AI adoption in Higher Education.

2.1 Overview of Artificial Intelligence in Education

Artificial intelligence has recently merged with many facets of education, opening new opportunities and challenges for improving teaching and learning.

Literature reviews on AI applications in Higher Education have been published, covering current trends, benefits, and limitations. One systematic review from Zawacki-Richter analyzed 146 articles published between 2007 and 2018 and identified four major areas within which AI has been applied to higher education: profiling and prediction, assessment and evaluation, adaptive systems and personalization, and intelligent tutoring systems (Zawacki-Richter et al., 2019). Another bibliometric study investigating the potentials of AI within higher education was conducted by Avella, who stressed that evidence-based approaches are essential. In doing so, the authors found a recent surge in publications concerning AI in Higher Education; however, they mentioned that most publications only theoretically and conceptually proposed AI interventions. In 2022, Bhutoria conducted a systematic review using a Human-In-The-Loop Model, acknowledging the areas of AI and personalized Education in China, the United States, and India. The results show that AI can potentially develop learning experiences tailored to the

needs and preferences of each particular student. Although interest in AI applications in education is growing, several challenges and limitations have been put forward. A critical review of the literature available for discourses of AI in Higher Education has been conducted, as it argues that further research into how ethical and educational approaches in the application of AIED could be advanced.

2.2 Evolution of AI technologies in the education sector.

The breadth of artificial intelligence technologies has undergone appreciable development in the education sector, availing several chances and challenges for teaching and learning.

Some of the literature reviews have recently surveyed the progress made in the regions of AI applications in education, focusing on leading trends and developments. In Zawacki-Richter's study, four key areas were determined: AIED applications in academic support services, institutional and administrative services, and intelligent tutoring systems. There is an evolving landscape of AI integration in HE, with the associated necessity for evidence-based approaches as a step toward effective decision-making (Marengo et al., 2024). Holistically, there is a need to understand AI applications in education, which should inform effective decision-making and digitized HE environments. The history of AI technologies in the educational sector has evolved from intelligent tutoring systems to adaptive learning environments and predictive analytics. These studies contribute critical insights into the potential of AI in driving transformation in education.

2.3 Previous research and studies on AI usage in university teaching.

In recent years, it has been one of the most exciting and explored issues on artificial intelligence integration into university teaching.

In the systematic review, Zawacki-Richter noted that most disciplines involved in AIED research originated in computer science and STEM fields, and quantitative methods were the ones most frequently used in empirical studies.

It is good to note that a systemic literature review of 44 empirical studies published between 2013 and 2022 investigating the impact of AI in Higher education found that publications

concerning AI in higher education surged recently but also noted that a significant proportion of these publications are theoretical and conceptual in any AI interventions proposed, only a few of which pertain to actual use cases (Marengo et al., 2024). The authors underlined evidence-based approaches in their paper, while the recent history of AI integration in higher education is rewritten with head-spinning speed. Avella reviewed publications on the potentials of AI, in which she called for more research applications in Higher Education rededication higher education cation, in the area of learning analytics and adaptive systems (Avella et al., 2016). Another recent research that applied a Human-In-The-Loop Model, conducted on personalized Education and AI in the United States, China, and India, also showed AI has the potential to facilitate Personalized learning experiences based on how each student learns best and their preferred learning styles.

2.4 Benefits of AI in University Teaching

As used through adaptive learning platforms, AI has already shown the potential to create a generalized paradigm shift in education. Recent studies have sought to probe into how the transformative impact of AI-powered ALPs will better personalize learning experiences.

In a comprehensive review, Murtaza has focused on the current scenario of AI/ML applications related to adaptive learning in E-Learning platforms. This study investigated various benefits and challenges while integrating adaptive learning algorithms into e-learning systems for student retention and the overall performance of students. Provide recommendations to educational technologists and stakeholders on how AI/ML can best be harnessed for adaptive learning.

Lu (2021) contributed an AI-based intelligent adaptive tutoring system framework. The study shows how AI will help students to have learning experiences individually according to their needs and preferences. The paper underlines the role of humans in creating and running these systems in collaboration with AI and in checking them. A 2024 study investigates the interdependent relationship between personalized learning and professional growth; the review showcases EdTech's AI-driven methodology to enhance learning experiences, propelling people toward their career goals. The authors underscore that AI-driven personalized learning has the potential to improve effectiveness, boost engagement, and ensure equity in education. Artificial intelligence has been dramatically integrated into tutoring systems to spur student

engagement and motivation. Recent research evaluates the efficiency of AI-powered tutoring systems on student motivation and engagement, outlining key findings and implications. In one study, Liyanage tested whether AI-driven tutoring systems would efficiently increase student engagement. In the same way, such a study concludes that AI-driven online tutoring systems have extreme effectiveness in increasing the student's engagement and motivation through personalized learning experiences, immediate feedback, and interactive content. (Liyanage et al, 2022). AI-based grading tools also have the potential to bring about a manifold increase in grading efficiency by automating activities like grading multiple-choice questions and providing instantaneous feedback to students in the teaching and learning of language. AI-based AWF in teaching and learning a language can also be applied to enhance the efficiency of feedback provision by facilitating the timely and targeted provision of feedback to students, easing instructors' workload, and increasing student participation in class.

Over the last couple of years, AI has been reasonably appreciated in administrative tasks. Literature from several sources indicates that AI-driven tools can improve efficiency, productivity, and decision-making.

2.5 Perceptions Towards Enhancing University Teaching through AI

Artificial intelligence (AI) integration in higher education is rapidly evolving, prompting diverse perceptions among faculty, students, and administrators regarding its potential to enhance teaching and learning. This literature review synthesizes recent studies that explore these perceptions, highlighting key findings and implications for educational practice.

Faculty Perceptions of AI in Teaching

Recent studies indicate that faculty members generally have a positive outlook toward integrating AI into their teaching practices. McGrath et al. (2023) conducted a survey revealing that 84% of lecturers are willing to accept AI tools like ChatGPT for student use, with significant predictors for acceptance being teaching experience, institutional support, and attitudes towards AI. The study emphasizes the importance of addressing faculty concerns about trust in AI's accuracy and job security to foster a supportive environment for AI adoption in education. Moreover, another study highlights that while faculty recognize the potential benefits of AI, such as personalized learning and improved engagement, they also express

concerns about the implications of over-reliance on technology. These concerns include fears that AI might hinder critical thinking skills and lead to job displacement (Smith et al., 2024). Faculty members advocate for professional development opportunities and user-friendly interfaces to facilitate the effective integration of AI tools into their pedagogical practices.

Student Perceptions of AI Technologies

Students' perceptions of generative AI technologies like ChatGPT are predominantly positive. A survey involving 399 undergraduate and postgraduate students revealed a strong appreciation for the personalized learning support that AI can provide and its capabilities in writing assistance and research. However, students also voiced concerns regarding accuracy, privacy issues, and the ethical implications of using AI in their education. These findings suggest that while students are eager to engage with AI technologies, their willingness is tempered by valid concerns that need to be addressed by educators (Sanusi & Alhassan, 2024). Additionally, a mixed-method study explored how AI-integrated educational applications affect students' creativity and academic emotions. It found that while AI can stimulate creativity through interactive elements and personalized feedback, it may also impose constraints on creative thinking due to rigid frameworks (Zhang et al., 2024). This duality underscores the necessity for a balanced approach to implementing AI technologies within educational settings.

Administrator Perspectives

Although specific studies focusing solely on administrators' perceptions are less common, it is clear that they play a pivotal role in facilitating the integration of AI within universities. Administrators must navigate policy development to ensure responsible and ethical adoption of AI tools. They are tasked with creating supportive environments through training and resources that empower faculty and students to leverage AI effectively (Alshahrani et al., 2024). The need for clear guidelines on ethical considerations surrounding AI usage in education has been emphasized as a critical area for administrative focus.

2.6 Attitudes towards enhancing university teaching through AI

Integrating artificial intelligence (AI) in higher education has sparked considerable interest among researchers and educators, particularly regarding attitudes toward its potential to

enhance teaching and learning. This literature review synthesizes recent studies that explore these attitudes, highlighting key findings and implications for educational practice.

Faculty Attitudes Towards AI Integration

Faculty perceptions of AI in higher education are crucial for its successful integration into teaching practices. A study by Bond et al. (2023) explored faculty members' self-efficacy and attitudes toward AI, revealing that many educators view AI as a tool that can enhance educational equity. However, they also identified significant challenges, including a lack of AI literacy among students and faculty, which hinders effective implementation. The study categorized faculty into four profiles: optimistic, critical, critically reflective, and neutral, each exhibiting different levels of acceptance and engagement with AI technologies. Similarly, research by Zheng et al. (2024) emphasizes the perceived benefits of AI tools, such as improved planning and resource allocation, more significant insights into student learning, and enhanced data-driven feedback on instructional design. However, the authors note that challenges related to curriculum development and ethical considerations remain prevalent among faculty members, indicating a need for targeted professional development to address these issues.

Student Attitudes Towards AI Technologies

Students' attitudes towards AI-integrated educational applications are generally positive but nuanced. A mixed-method study conducted by Zhang et al. (2024) examined the perceptions of both students and faculty regarding the impact of AI on creativity and academic emotions. The findings indicated that while students appreciate the personalized learning experiences facilitated by AI tools, they also express concerns about potential negative effects on their creativity and emotional well-being. Moreover, Flores-Velázquez et al. (2024) conducted a systematic review focusing on students' acceptance of AI technologies in higher education. Their analysis revealed an increasing trend in scientific output related to student attitudes towards AI from 2021 onwards. Students reported a strong interest in how AI could assist their learning processes but highlighted concerns regarding privacy and the accuracy of AI-generated content.

Institutional Perspectives

From an administrative perspective, integrating AI technologies in higher education requires careful consideration of policy and infrastructure. Research by Ouyang et al. (2022) underscores universities' need to develop comprehensive strategies that support adopting AI tools across various educational contexts. This includes providing adequate training for faculty and students to ensure effective use of these technologies. Furthermore, a systematic literature review by Ng et al. (2023) highlights the importance of understanding the broader implications of AI in educational settings. The authors argue that while AI can potentially transform teaching practices significantly, it raises ethical concerns that must be addressed to foster trust among educators and learners alike.

2.7 Challenges and Limitations of AI Integration

On a growing number of fronts, ethical concerns related to data privacy and algorithm bias have been at the forefront of considerations in university teaching as AI finds its way into classrooms. Several studies debate the challenges and limitations of putting them together while considering specific ethical concerns for urgent attention.

A study by Florina Mihai Leța and Diane Paula Corina Vancea of "Ovidius" University of Constanța highlights the importance of privacy and personal data protection in AI-driven education. AI systems accumulate vast volumes of student data, which raises concerns about their security, privacy, and other misuse. It is necessary to have policies and safeguards in the realm of protection and rights to ensure that users control sensitive information. If careful design and monitoring are not implemented, AI algorithms could introduce biases and discrimination that affect educational equity and inclusivity. There is some resistance to change and fear of job loss, particularly among faculty. In 2017, a study by Sundus established the drivers for faculty members' resistance to change. The significant predictors for resistance to change were job insecurity, emotional distress, and lack of communication. The emphasis here is that if effective communication involves such persons in this change process, then resistance is minimized.

Prior experience and knowledge sourcing were critical factors determining faculty members' adaptation to change.

The institutions should, therefore, evoke arguments about job displacement besides offering faculty members undergoing overwhelming changes. According to a study carried out in 2022 on the cause and solution to managing employee resistance during organizational change by Fredrick Obina and Susan Adenike, it emerged that the reaction of employees towards a particular change is influenced by the benefits they perceive will result from it. One of the significant barriers and issues in implementing change within higher education settings is faculty resistance because teachers fear losing their jobs. In this respect, recent studies show that addressing such concerns using effective communication, involvement, and empowerment is essential. The research will, therefore, help the institutions understand the reasons for resistance units' consequences, hence developing strategies for managing resistance to change within their different initiatives on organizational change implementation. Accessibility issues are based on students' ability and poverty factors.

It is an essential aspect of education. Education is vital because no child can be advantaged over others in abilities or background. Several recent studies have addressed different issues explicitly related to the challenges of accessibility for students with disabilities and those from the underprivileged section of society, thereby emphasizing the integrated learning environment.

Its report emphasizes accessibility's place in education. It notes common challenges among students with different disabilities (learning, language barrier, visual literacy, and literacy problems) and ensures institutions make accommodations for equal access to education.

Covey (2022) discusses how to instruct students with disabilities, from cleaning up the classroom to peer mentoring strategies, to afford individual accommodations. Once more, the authors write about the need to meet the student at his level and create an enabling environment that caters to all of them differently.

According to the Ontario Human Rights Commission, 2022, Physical inaccessibility, funding inadequacy, and lack of individualization are significant education barriers for students with different abilities. The authors emphasize the need for accommodations to be made promptly and in the proper amount, alongside mechanisms that make dispute resolution efficient.

The World Health Organization pays special attention to the development of disabilities-inclusive education systems and policy provisions, including inclusive curricula, adapted learning materials, and social access to schooling. According to the authors, the general education system must be endowed with the ability to overcome the hardships it has engendered because of phenomena such as poverty, lack of acceptance, and gender-based discrimination.

Factors influencing accessibility to education for children with disabilities include parents' perceptions, general attitudes, government policies, and infrastructure (Limaye, 2016). The author identifies a missing link: inclusive education policies and practices tackling unique challenges by children with disabilities.

Accessibility can be considered an intrinsic element of education, providing all students equal possibilities for learning and success. Understanding such challenges and establishing an inclusive educational setting are the only ways a higher education institution can be sure of supporting its students' prosperity. Recent studies have underlined various issues with accessibility affecting students with disabilities and those from socio-economically disadvantaged backgrounds.

2.8 Pedagogical Implications of AI in Teaching

Impact of AI on teaching methodologies and instructional design.

Artificial Intelligence has made a gigantic shift in teaching methodologies and instructional design over the past few years. This literature review examines the current status of research into AI's impact on these areas and identifies the essential findings and implications.

A study undertaken by Lay Kee Ch'ng (2023) investigates the role of AI in changing the instructional design landscape. According to the author, the significant opportunities for using AI to improve learning experiences lie in supporting routine tasks and individual learning pathways and performing better analyses. Incorporated within the tenets of instructional design, human-AI collaboration aligns AI-created content with educational goals and principles of pedagogy. A systematic review by Miguel explores the influence of AI on adaptive assessments within primary and secondary education. According to this study, AI is likely to enhance assessment methods along the following lines: it makes more accurate predictions about students' performance, automatizes evaluations, and recognizes relevant factors related to

student learning. The writers further underline the role played by AI-driven assessment in increasing effectiveness and fairness in Education (Martínez et al., 2023).

A review conducted by Nirvikar Katiyar (2022) explores AI's effectiveness in personalized learning systems. This research shows how AI merges with educational effectiveness using targeted content recommendation, intelligent tutoring, adaptive assessment, and tailored feedback. The authors underline the requirement for efficient human-AI collaboration in designing and implementing AI-driven personalized learning systems.

AI's transformations of traditional teaching practices into more learning-efficient ones significantly impact teaching methodologies and instructional design.

According to recent research, AI's potential areas to automate are routine repetition, creating tailored learning, and supporting data analysis.

However, human-AI collaboration, coupled with proposed pedagogical principles and ethical implications, will be the key to finally or eventually successfully integrating AI into teaching methodologies and instructional designs. The possibilities of improved student learning outcomes and educational equity are at one's fingertips only through the seamless understanding of how AI will change teaching methodologies and instructional designs. Align curriculum and course materials to have the potential to be able to use AI technologies. The infusion of AI into Education has dramatically changed curriculum and course material design. The literature review aims to examine recent studies that pursue curriculum and course material adaption for exploiting AI technologies and note significant findings and implications.

A recent study by Riki Nuryadin and Marlina tested the role of AI in revolutionizing curriculum development. The authors indicate that artificial intelligence has the potential to innovate learning experiences through the provision of personalized learning pathways, adaptive assessment tools, and real-time feedback. Reinforce the integration of human-AI collaboration in curriculum development, ensuring that AI-developed content fits educational goals and pedagogical principles.

According to Sanusi et al., AI in K-12 education has been significantly noted in the review of the development of AI literacy. The study finds that AI literacy requires an interdisciplinary and competence-based approach, integrated into the schools' curriculum and used to extend and

enrich learning in curricular subjects. Faster Capital, 2023, discusses the role of AI in adaptive learning paths. As propounded by the authors of this research work, algorithms set up by AI could analyze student performance data to generate adaptive learning paths within the curriculum so that students get the right content at the proper time.

In 2023, another paper by the Indonesian Journal of Primary Education discussed the application of AI in data-driven curriculum design. The study finds that AI algorithms allow educators to examine a large information bank of education data at high speeds in searching for gaps or areas relevant for enhancement in the curriculum, thereby improving instructional material writing. As cited in ScienceDirect, the role that AI is going to take in generating educational content is under review in 2024. The authors have quoted that algorithms created with AI can create personalized learning materials, adaptive assessments, and real-time feedback, improving the learning experience and, eventually, the educational outcomes.

Curriculum and course designs are to be sustained using AI technologies that provide for modern education, as marked by the preceding research showing the potential of AI to impose gains in learning experiences and increase educational outcomes, bringing efficiency. Presumably, understanding the role of AI in curriculum development, adaptive learning paths, data-driven curriculum design, AI-generated content, and AI literacy could enable educators to realize AI's potential to change ways of learning and teaching.

2.9 The role of the teacher in facilitating AI-enhanced learning education.

Artificial intelligence in education has brought various dimensions of change to the instructor's role in facilitating learning experiences. Relatedly, and in a more modern pursuit, studies have been conducted to understand the instructor's role in using AI tools to enhance teaching and learning. Some notable findings are outlined here with their associated implications.

In 2023, Lay Kee Ch'ng researched AI's impact on instructional design. The chapter will explore how AI can improve learning experiences by creating personalized learning pathways, automating routine tasks, and refining extensive data management. This paper argues for a necessary human-AI collaboration in instructional design, informing and ensuring that the machine-learning content can remain aligned with the instructions that the educational goals and pedagogical principles stipulate.

More specifically related to the instructor role in AI-enhanced learning, Riki Nuryadin and Marlina conducted a review in 2023. Most instructors are critical in facilitating AI-enhanced learning experiences by offering guidance, support, and feedback. The corpus authors draw attention to the need for instructors to develop new competencies in using AI effectively in their teaching practice. A recent study by Yang discusses the use of AI in adaptive assessment. The authors point out that AI algorithms could analyze students' performance data to create adaptive assessments and provide real-time feedback toward better educational outcomes. This study underlined instructors' role in designing and implementing AI-driven assessment strategies. The 2023 study by Faster Capital brings out the issue of AI in generating educational content in a discussion about what AI can do on their ability to create personalized learning materials, adaptive assessments, real-time feedback, and hence enhancing the whole towards improved educational outcomes. More specifically, it underlines the role of the instructor, who reviews and refines AI-generated content to ensure it is relevant and effective in teaching.

An Indonesian Journal of Primary Education study in 2023 assesses trainers' and instructors' training in AI-enhanced learning. According to the authors, instructors are highly compelled to be equipped and resourced with relevant competence to teach with AI. The need emphasized by this study is to have continuous support and professional growth so that instructors can harness AI in teaching. The role of the instructor in AI-enhanced learning experiences must be considered. Recent research has looked at the role of the instructor in creating and developing AI-driven instructional design, adaptive assessments, and AI-generated content in the learning process. In terms of how one understands the role of instructors in AI-enhanced learning, one would consider how best to effectively enhance the teaching and learning experience with AI while ensuring AI is harnessed effectively and responsibly ways in which the integration of AI tools into current teaching practices can be done effectively. The modern education sector incorporates how one can integrate Artificial Intelligence tools into current teaching practices. Recent research has enabled strategies for effectively integrating AI tools into teaching practices and their key findings and implications.

A study by Lay Kee Ch'ng in 2023 investigated the effect of AI on instructional design. He says AI enhances learning experiences by automating routine tasks, personalizing learning routes, and improving data analysis. He emphasizes the need for human-AI collaborative instructional

design to ensure that AI content creation remains within educational goals and pedagogical considerations.

Sanusi et al. (2022) review the integration of AI tools in K-12 education. Sanusi et al. (2022) provide strategies to include AI tools into educational curricula based on a universal foundational understanding of AI, skills to effectively harness AI instructional tools, use of the Five Big Ideas in AI as a guide for K-12 AI literacy, facilitation of exploratory experiences developing and engaging AI knowledge, infusion of AI literacy across existing curriculum, and integration of critical examinations of AI technology into classroom experiences. In their systematic review on AI literacy in K-12 Education, Sanusi elaborates on the issue of relevance concerning AI literacy in K-12 Education. In the study, the authors describe and identify the need for interdisciplinary approaches and competency-based, in which the pursuit of integrating AI literacy into the school curriculum is to be framed. They underline the use of AI literacy for extending and deepening learning within curricular subjects, with attention paid to teachers' competency in co-designing didactic proposals. In its 2023 study, Faster Capital has discussed various strategies for integrating generative AI into Higher Education. The authors suggested that to create positive outcomes by integrating generative AI into Higher Education, the following strategies must be followed: raising awareness about disruptive change, holding faculty training in teaching AI, and providing AI literacy for students.

A 2023 Indonesian Journal of Primary Education study examined the problems and opportunities of integrating AI tools into teaching practices. The study noted that specific issues, such as student data privacy violations, loss of human interaction, and, finally, shifting the role of teachers in a new AI era, must be mastered. These authors pointed out supportive policies, enough preparation, and a better understanding by educators of how to use AI to ensure successful integration.

The integration of AI-based tools into current pedagogical practices is something that requires plans and challenges to be taken into consideration. In this regard, recent literature argues for building a joint foundational knowledge base in AI and developing competencies that effectively harness AI-based instructional tools, vital in infusing critical explorations about AI technology into classroom experiences. By understanding strategies and difficulties in implementing AI tools, educators are empowered with the ability to exploit the potential of AI in better teaching and learning while considering the practical and responsible use of AI.

2.10 Case Example of Selected Universities in Uganda

This literature review synthesizes existing research and perspectives on the integration of Artificial Intelligence (AI) in Ugandan higher education, focusing on faculty, administrators, and students' perceptions, attitudes, opportunities, challenges, and pedagogical implications. The review addresses five core objectives for enhancing university teaching through AI in selected Ugandan universities.

Faculty, Administrators, and Students' Perceptions of Enhancing University Teaching through AI.

Studies indicate a growing awareness of AI's potential in Ugandan universities. Faculty members, administrators, and students increasingly recognize AI's capacity to revolutionize learning and teaching methods (Treppan Technologies, 2024). However, perceptions vary across stakeholders. Research suggests that while faculty are aware of the tasks AI can perform, acceptance is limited to non-interactive tasks such as content searching and grading (Mwima Ivan Hiire, n.d.). A study by Namutebi (2024) found that at least 74% of faculty members, administrators, and lecturers were highly aware of AI's teaching tasks. Students are also becoming aware of AI tools, with many using them for academic purposes (Kampala International University, n.d.). However, ethical concerns and a lack of trust in AI's ability to handle tasks requiring human interaction remain significant barriers (Namutebi, 2024).

Attitudes of Faculty, Administrators, and Students towards Enhancing University Teaching through AI

Attitudes toward AI in Ugandan universities are diverse. Many faculty members and administrators acknowledge AI's potential to streamline administrative tasks and personalize learning experiences (Treppan Technologies, 2024). However, some express reservations about the impact of AI on the quality of education and the role of human educators (Namutebi, 2024). A study on AI's impact on curriculum in Uganda suggests that while AI can enhance learning experiences, ethical considerations must be addressed (Namutebi, 2024). Additionally, concerns about job security and the potential for AI to replace human educators contribute to resistance among some faculty members (Mwima Ivan Hiire, n.d.). Students generally hold positive attitudes toward AI, recognizing its potential to improve learning outcomes and

enhance their educational experiences (Kampala International University, n.d.). However, concerns about data privacy and algorithmic bias influence their attitudes (Hindrances to AI adoption in Uganda's public universities).

Opportunities Embedded in Enhancing University Teaching Through AI

AI offers numerous opportunities to enhance university teaching in Uganda. AI-powered tools can personalize learning paths, provide real-time feedback, and facilitate deeper understanding (Treppan Technologies, 2024). Intelligent tutoring systems can analyze student data to identify areas for improvement and tailor instructional content accordingly (Owomugisha, 2024). Additionally, AI can streamline administrative tasks, freeing up valuable time for educators (Namutebi, 2024). As Kabahizi (2020) notes, AI offers the chance for faster recovery of learning losses resulting from disruptions such as the COVID-19 pandemic (Kabahizi, 2020). Furthermore, AI can improve resource allocation and enable data-driven decision-making, enhancing educational planning and policy-making at various levels (UVCF, 2024).

Challenges Faced in Enhancing University Teaching Through AI

Despite the opportunities, several challenges hinder the effective integration of AI in Ugandan universities. The digital divide, limited access to technology, and inadequate infrastructure pose significant barriers (Eryenyu et al., 2024). Teacher training and AI literacy are critical challenges, as many educators lack the skills and knowledge to effectively leverage AI tools (Namutebi, 2024). Ethical concerns, including data privacy, algorithmic bias, and the potential for academic dishonesty, further complicate AI integration (Kabahizi, 2020). The lack of strategic, ethical, and policy guidelines hinders AI adoption (UVCF, 2024). As Namutebi (2024) found, the lack of funds and skills required to operate AI systems is a significant impediment.

Pedagogical Implications of Enhancing University Teaching Through AI

The integration of AI has significant pedagogical implications for Ugandan universities. AI can facilitate personalized learning experiences, allowing educators to cater to individual student needs and learning styles (Treppan Technologies, 2024). AI-powered tools can also enhance

teaching methods, enabling educators to create more engaging and interactive lessons (Namutebi, 2024). However, the shift towards AI-driven education also requires reevaluating traditional teaching approaches. Researchers emphasize the need for innovative assessment methods beyond rote memorization and focus on critical thinking, problem-solving, and creativity (Kabahizi, 2020). AI can also support the development of 21st-century skills, preparing students for the demands of the modern workforce (UVCF, 2024).

Despite the growing body of literature on AI in education, several research gaps remain that need to be addressed to enhance the effective integration of AI in Ugandan universities. First, there is a need for more empirical studies that assess the actual impact of AI on student learning outcomes and teacher effectiveness. Additionally, longitudinal studies are necessary to examine the long-term effects of AI integration on student success and career trajectories. Furthermore, research should focus on developing context-specific frameworks and guidelines for the ethical and effective use of AI in higher education settings in Uganda. Understanding the diverse perspectives of faculty, administrators, and students on AI integration is also crucial, highlighting the need for more stakeholder engagement in this area. Lastly, a significant gap in research exists addressing the policy and implementation challenges associated with scaling up AI initiatives within Ugandan universities. Addressing these gaps will provide a more comprehensive understanding of AI's role in education and its potential to effectively transform teaching and learning practices.

Current Pedagogical Practices

Current pedagogical practices in Ugandan universities reflect traditional and innovative approaches influenced by various educational reforms and initiatives. At Makerere University, for instance, a study highlighted that student teachers expressed dissatisfaction with authoritarian pedagogical practices that perpetuate a linear knowledge transfer model, reducing students to passive recipients of knowledge (Bwiruka, 2023). This dissatisfaction has prompted calls for a shift towards competence-based pedagogy, emphasizing practical and experiential learning supported by strong Information Communication Technology (ICT) integration. Similarly, the Transforming Teacher Education and Learning (TESCEA) program has fostered significant changes in teaching practices among education students, promoting more learner-centered approaches and critical thinking skills (INASP Blog, 2024). Research conducted in West Nile found that effectively supervised school practice significantly enhanced student

teachers' planning, delivery, and self-evaluation skills. However, some still struggled with record management and instructional materials (Omara et al., 2021). Furthermore, studies indicate a growing emphasis on innovative assessment methods prioritizing critical thinking and problem-solving over rote memorization (Kabahizi, 2020). Overall, while there are advancements in pedagogical practices, challenges remain in ensuring consistent implementation across institutions.

Specific Initiatives/Projects Involving AI Integration among Selected Universities in Uganda.

Several universities in Uganda are actively integrating Artificial Intelligence (AI) into their educational frameworks through various initiatives and projects. Mountains of the Moon University (MMU) is participating in the Erasmus+ program under the Applied Human Machine Intelligence (AHUMAIN) project, which aims to develop a comprehensive AI and Data Science curriculum tailored to East African needs, fostering practical applications like smart dustbins and intelligent beehives for local communities (Treppan Technologies, 2024). Makerere University has established an Artificial Intelligence Health Lab to revolutionize healthcare delivery through AI-powered diagnostics, treatment plans, and personalized care, marking a significant advancement in Uganda's healthcare sector (Makerere University, 2024). The Islamic University in Uganda (IUIU) recently organized a workshop on AI integration in higher education, emphasizing adaptive learning technologies and inclusivity to improve teaching quality and learning experiences (IUIU, 2024). Uganda Christian University (UCU) has implemented AI tools such as plagiarism detection software and proctoring systems to enhance academic integrity and improve the quality of online education (Borodi, 2024). Mbarara University of Science and Technology (MUST) also spearheads an AI initiative to improve maternal health outcomes in East Africa by deploying AI-enabled devices to monitor post-Caesarean section mothers (CIPESA, 2024) remotely. These initiatives demonstrate the growing role of AI in transforming education and addressing societal challenges in Uganda.

At Gulu University, the Department of History has adopted emerging technologies and digital tools to enhance the teaching and learning of history. This initiative includes training lecturers in digital tools such as Screen Cast O-Matic and Mentimeter, which have transformed the traditional teacher-centered approach into a more student-centered digital learning environment (Gulu University, 2023). Additionally, Gulu University is involved in the Building Stronger

Universities (BSU) project, focusing on lifelong education, problem-based learning, and hybrid eLearning methodologies (BSU Project, 2023). The university is also part of the Mastercard Foundation-funded Transforming African Agricultural Universities project, which trains students to equip refugees with agribusiness skills, thereby addressing food security and economic independence in post-conflict regions (Gulu University, 2023). Muni University has been exploring AI integration through various projects to enhance educational quality and accessibility, focusing on developing digital learning platforms that facilitate remote learning and improve student engagement (Muni University, 2023). Muni University also emphasizes the importance of research in AI applications for agriculture and health sectors, contributing to community development and addressing local challenges (Muni University Annual Report, 2023). Kampala International University (KIU) has implemented AI-driven tools to enhance its educational offerings. It utilizes AI for personalized learning experiences and employs proctoring software for secure online examinations (KIU Report, 2024). KIU is also involved in various research initiatives exploring AI's application in improving educational outcomes and addressing societal issues (KIU Research Initiative, 2024).

Specific AI Technologies Used at Among Selected Universities in Uganda

Chatbots: Selected Universities in Uganda are using conversational AI technologies, such as chatbots, to enhance student engagement and support services. These chatbots can assist with answering student inquiries and providing information about college services, thereby improving accessibility and responsiveness.

Predictive Analytics: The college's Technology Plan mentions the potential use of prescriptive and predictive analytics. These technologies can help analyze student data to forecast academic performance, identify at-risk students, and tailor interventions to improve student outcomes.

Voice Interfaces: The integration of voice interfaces, including digital assistants, is also noted as part of the AI initiatives. These technologies can facilitate easier navigation of college resources and enhance user experiences for students and staff.

Enhanced Search Methodologies: AI-driven search methodologies are being explored to improve the efficiency and effectiveness of information retrieval within the college's digital platforms. This can enhance how students and faculty access educational resources and services.

Virtual Reality: Although primarily focused on business practices, integrating virtual reality alongside AI technologies is part of the college's strategic plan. This could involve immersive learning experiences that leverage AI to create interactive educational environments.

These technologies are part of Among Selected Universities in Uganda's ongoing efforts to enhance educational delivery and operational efficiency through AI integration. Further direct inquiry with the college may be necessary for more detailed and specific information regarding these technologies' current applications and impacts.

Impact of AI Integration on Student Outcomes

The search results do not provide empirical data or specific studies directly linking AI integration to student outcomes at Selected Universities in Uganda.

Case Studies on AI Initiatives

No specific case studies regarding AI initiatives at Among Selected Universities in Uganda are mentioned in the search results.

Long-term Goals for AI Integration

The long-term goals outlined in the Technology Plan include developing a digital business strategy incorporating AI technologies to improve educational delivery and operational efficiency. However, specific, measurable goals were not detailed.

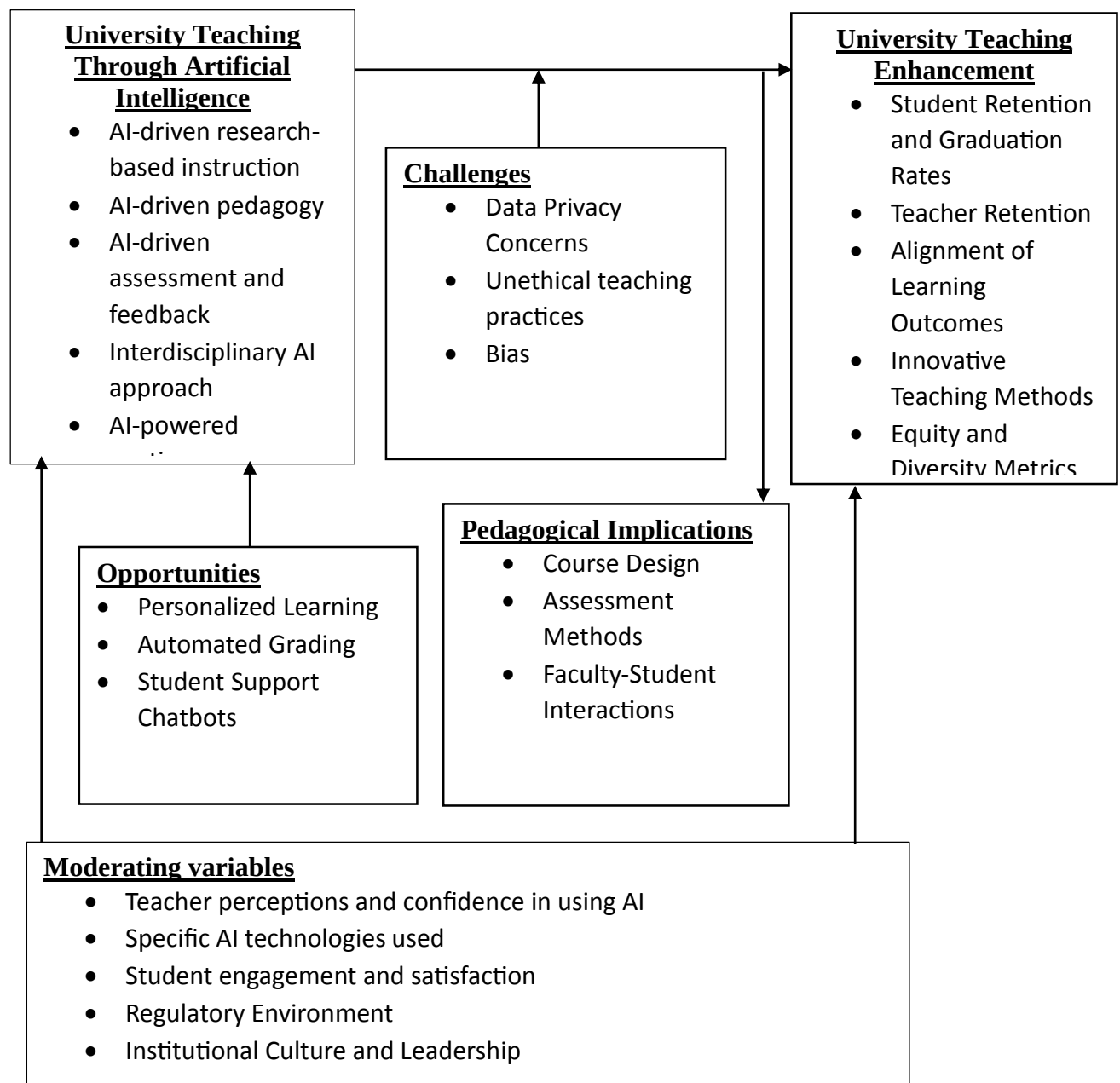
Measuring the Success of AI Projects

The search results do not specify how Selected Universities in Uganda measure the success of their AI projects. While ongoing assessments and evaluations are mentioned as part of the Technology Plan, no concrete metrics or methodologies were provided. Further research or direct inquiry with the college's administration or academic departments may be necessary for comprehensive and specific information regarding AI initiatives at Selected Universities in Uganda.

2.11 Conceptual Framework

Independent Variable

Dependent Variable



Developed by researcher, 2024

The conceptual framework for enhancing university teaching through artificial intelligence (AI) at Among Selected Universities in Uganda is a structured approach to understanding the complex relationships between various factors that influence the integration of AI in higher education. University teaching through AI is measured using AI-driven research-based instruction, AI-driven pedagogy, AI-driven assessment and feedback, Interdisciplinary AI approach, and AI-powered continuous professional development well as enhancing university

teaching is measured using Student Retention and Graduation Rates, Teacher Retention, Alignment of Learning Outcomes, Innovative Teaching Methods and Equity and Diversity Metrics. The framework is designed to comprehensively understand AI's opportunities, challenges, and pedagogical implications in university teaching and learning.

Opportunities: This component focuses on the potential benefits of AI in enhancing university teaching and learning, including personalized learning, automated grading, Student Support Chatbots, and Data-Driven Decision Making

Challenges: This component highlights the potential challenges and risks associated with AI integration in Higher Education, such as technical Infrastructure, Data Privacy Concerns, Unethical teaching practices, job displacement, and bias.

Pedagogical Implications: This component emphasizes the importance of considering the pedagogical implications of AI integration in Higher education, including course Design, Assessment Methods, and faculty-student Interactions

Relationships between components

The components of the conceptual framework are interconnected and influence each other in complex ways. For example, the opportunities component is influenced by the challenge component, as the potential benefits of AI integration are shaped by the risks and challenges associated with its implementation. Both the opportunities and challenges components influence the pedagogical implications component, as the potential impact of AI on student learning outcomes is shaped by both the potential benefits and risks of its integration.

The successful interplay of the study component is supported by the moderating variables, including teacher perceptions and confidence in using AI, Specific AI technologies used, Student engagement and satisfaction, Regulatory Environment, Institutional Culture, and leadership. Therefore, the conceptual framework for enhancing university teaching through artificial intelligence provides a structured approach to understanding the complex relationships between various factors that influence the integration of AI in Higher Education. By considering AI integration's opportunities, challenges, and pedagogical implications, educators can make informed decisions about its implementation and develop strategies for promoting student engagement and motivation in AI-enhanced learning. Hence, this study aims to address this gap

by focusing on the case of Among Selected Universities in Uganda and examining how adopting AI can transform university teaching practices. By exploring the opportunities, challenges, and pedagogical implications of integrating AI tools and techniques, this study seeks to provide valuable insights for educators, administrators, and policymakers.

CHAPTER 3:

RESEARCH METHODOLOGY

3.0 Introduction

The Methodology chapter of the study "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda " outlines a systematic approach to investigating the integration of AI in higher education. This chapter is structured to clarify the research design, methods, and procedures employed to gather and analyze data.

3.1 Research Design

This study used an exploratory case study research design to investigate how Selected Universities in Uganda integrate artificial intelligence into their teaching. The case study approach was most appropriate since it allowed us to examine a contemporary phenomenon in its real-life context. This research on experiential instantiation among Selected Universities in Uganda provided rich, contextual insights into the opportunities, challenges, and pedagogical implications for AI integration within the higher education sector.

This mixed-method research study was about integrating artificial intelligence into Selected Universities in Uganda's teaching system. The mixed approach was relevant for this study since it aided in getting an in-depth understanding of the research problem by generating qualitative and quantitative data. The mixed research approach allowed for a comprehensive understanding of the research problem through qualitative and quantitative data. The qualitative methods, among others, brought rich contextual insights into the perceptions, attitudes, and experiences among Selected Universities in Uganda faculty, staff, and students on using AI in Higher Education. Quantitative methods offer objective measures of changed teaching practices, student engagement, and learning outcomes that result from the level of integration of AI.

3.2 Methods and Procedures for Data Collection

The research adopted various data collection methods and procedures to ensure fair coverage of the research problem:

Qualitative Methods

Semi-structured interviews: In-depth interviews were conducted with Selected Universities in Uganda faculty members, administrators, and students to explore their perceptions, attitudes, and experiences regarding the use of AI in higher education. Areas covered included perceived benefits, challenges, concerns, and the impact of AI on teaching and learning.

Focus groups: The investigators invited students to join focus groups, where they would discuss their views on the place of artificial intelligence in the school Learning environment in greater detail and gain more insights. Focus groups allowed participants to express their opinions and discuss them with peers.

Quantitative Methods

Classroom observation: The classroom observations were carried out to assess the change in teaching practice, student engagement, and learning outcomes following the integration of AI. The observations targeted AI-enhanced courses and were guided by a protocol for consistency and reliability during the observation process.

Workshops and Conferences Attendance: The researcher had to attend some workshops and seminars on AI for further enlightenment and training in the usage and pedagogies of new AI technologies. Such forums provide avenues for learning from experts and other educationists and gathering information on best practices and innovative applications of AI in Education. The knowledge and skills gained from these workshops informed analysis and recommendations.

3.3 Population, Sampling, and the Selection of Participants

The study used purposeful sampling to select the respondents for individual interviews and focus groups. The faculty members interested in this study were those engaged in AI-related initiatives, had teaching experience, and had disciplinary backgrounds. Students were selected based on their enrolment in courses enhanced by AI and their willingness to participate in the research study. The data saturation principle determined the sample size, wherein additional data collection ceased when no new insights emerged.

To determine the population size and sample size for the study "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda," the specific groups considered involved were heads of Departments, Deans, Lecturers, and a selected number of students from Universities A, B, C, and D.

Based on the current data available, the estimated student populations for the selected universities in Uganda are as follows: University A has a total student enrollment reported to be between 4,500 and 5,000 students on average, with recent graduations indicating a robust academic community (Gulu University Website, 2024). The university has approximately 10 Heads of Departments across various faculties, with 3 Deans overseeing different faculties, including the Faculty of Education and Humanities, Faculty of Business and Development Studies, and Faculty of Science. University A employs around 100 lecturers across its faculties (Gulu University Promotions Report, 2024).

University B has approximately 2,500 students enrolled across various programs and has about 8 Heads of Departments and 4 Deans representing different faculties. The university employs about 50 lecturers across its programs (Muni University Annual Report, 2023). University C serves about 10,000 students across its multiple campuses, with around 15 Heads of Departments and approximately 5 Deans overseeing different faculties. IUIU employs about 200 lecturers across its campuses (IUIU Administration Report, 2024). University D has a diverse student body with an enrollment of around 25,000 students, making it one of the largest private universities in Uganda. The university has approximately 20 Heads of Departments and around 8 Deans managing different faculties. The university employs about 400 lecturers across diverse academic offerings (KIU Administration Report, 2024).

Table 3.1: Study population, sample size and sampling techniques

Categories	Population	Sample size (Krejcie and Morgan)	Sampling technique	Selection
Students	42,500	1,437	Stratified random sampling	
Deans	20	19	Purposive sampling	
Head of Department	50	44	Purposive sampling	
Lecture	750	452	Simple random sampling	
Total	43,323	1,952		

Table 3.1 Presents an overview of the study population, sample size, and sampling techniques used for the research. The total population across all categories is 43,323, with a combined sample size of 1,952 participants.

Students: The largest group, with a population of 42,500, has a sample size of 1,437, selected through stratified random sampling. This method ensures representation across different subgroups within the student population, enhancing the reliability of the findings regarding student perspectives.

Deans: There are 20 Deans in total, so the sample size is 19, selected using purposive sampling. This technique targets individuals who can provide valuable insights based on their roles and experiences in educational leadership.

Heads of Departments: The population consists of 50 Heads of Departments, with a sample size of 44, also chosen through purposive sampling. Like the Deans, this approach focuses on obtaining detailed information from key academic leaders.

Lecturers: 750 lecturers were selected from a sample of 452 using simple random sampling. This method provides an unbiased representation of lecturers, allowing for generalizable conclusions about their attitudes and experiences.

Overall, the table indicates a well-structured sampling strategy that combines different techniques to ensure comprehensive data collection from various stakeholders in the educational context.

Data collection methods and tools

Questionnaire

In this study, a questionnaire served as a primary data collection tool. Its purpose was to gather quantitative data from a large sample size of participants, including lecturers, deans, heads of departments, and possibly students. The questionnaire aimed to identify the perceptions of these stakeholders towards enhancing university teaching through AI by assessing their awareness of AI's capabilities in teaching tasks. It also analyzed attitudes by capturing respondents' acceptance or resistance to AI integration into educational processes. Additionally, the questionnaire helped assess opportunities embedded in AI-enhanced teaching practices, such as workload reduction and personalized learning experiences. Furthermore, it aimed to determine challenges faced during this integration process, including lack of resources or skills and ethical considerations. Lastly, the study used this data to establish pedagogical implications, exploring how AI can enhance teaching methods while maintaining human interaction essential for effective learning environments within Ugandan universities. Distribution occurred online via email links or university networks to ensure wide reach across selected universities.

The questionnaire was utilized to collect quantitative data from a large and diverse group of respondents. Students (1,437) were surveyed to gather broad perceptions and attitudes toward AI-enhanced teaching practices, providing a comprehensive understanding of how the student body views the integration of AI in their educational experiences. Additionally, the remaining lecturers (422) were included in the questionnaire to collect quantitative data on their awareness and acceptance of AI integration, perceived benefits such as workload reduction or enhanced learning outcomes, and challenges faced during implementation. This approach allowed for a wide-reaching assessment of stakeholders' perspectives on AI's role in university teaching environments.

Interview guide

This study used an interview guide to gather in-depth qualitative insights from key stakeholders such as educators with experience using AI tools or who are involved in educational technology decision-making. The guide included open-ended questions designed to explore specific themes aligned with the study's objectives: identifying perceptions of faculty members, administrators,

and students towards AI-enhanced teaching; analyzing attitudes towards AI integration; assessing opportunities embedded in AI-enhanced teaching practices; determining challenges faced during integration; and establishing pedagogical implications of integrating AI into university teaching. The questions focused on how stakeholders perceive AI's role in enhancing teaching practices, challenges faced during integration, how AI can address heavy workloads without replacing human teachers, and the necessary support systems for successful integration. Interviews were conducted face-to-face or remotely via video conferencing to explore participants' experiences and opinions thoroughly. This approach complemented quantitative findings by offering nuanced perspectives on integrating AI into university environments.

The interview guide was strategically used with key stakeholders to gather in-depth qualitative insights. Deans (19), as key decision-makers, were interviewed to capture their strategic perspectives on AI integration, providing valuable insights into the broader institutional vision and policy considerations. Heads of Department (44) were also engaged to offer detailed views on departmental challenges and opportunities related to AI adoption, shedding light on operational realities and potential areas for improvement. Additionally, a subset of lecturers (20-30) with experience using AI tools or involved in educational technology decision-making were selected for interviews. These educators could provide nuanced qualitative insights into the practical implications of integrating AI into teaching practices, highlighting successes and challenges from a frontline perspective.

3.4 Data Analysis

The data collected through interviews, focus groups, document analysis, and classroom observation were subject to thematic analysis. This involved coding data for emergent themes and patterns related to the research objectives. The qualitative data analysis software assured rigor and consistency in the analysis. Triangulation was completed across these sources to improve the credibility and trustworthiness of the findings even more.

3.5 Ethical Considerations

This research was conducted following all the ethical considerations of Selected Universities in Uganda and under the security umbrella of an IRB previously approved by the Institutional Review Board at the outset. The aim of the study was explained to the participants, and consent

was obtained before participation. Throughout the research, the information was blinded and anonymous. Any person was free to leave this study whenever so desired.

3.6 Research Validity and Reliability

Research Validity and Reliability of Qualitative Methods

Semi-structured Interviews:

Reliability: Semi-structured interviews were made reliable through standardized procedures like a detailed protocol to guide us in the interviews. This lessened personal researcher bias and ensured that all respondents would be asked close to similar questions.

Validity: In semi-structured interviews, a systematic method for data collection and analysis was used. Thus, the data were ensured to be accurate, complete, and free of bias.

Checking for Validity and Reliability in a Qualitative Study

Standardized Procedures: Structured procedures, such as thorough protocols, were followed to create consistency and reliability in the collection and analysis of data.

Systematic Approach: Data collection and analysis have been conducted systematically to ensure they are correct, complete, and unbiased.

Bias of Researchers: Standardized procedures and a systematic approach reduce the researcher's bias, allowing correct and reliable data to be drawn from them.

Data Quality: Standardized procedures were adopted to ensure data quality, and a systematic approach was used to eliminate any data that may contaminate its validity and reliability.

3.7 Limitations and Delimitations

Hence, it was delimited to the selected Universities in Uganda and not generalizable to other higher education institutions. These results were affected by the special conditions and culture of selected Universities in Uganda. Again, through its reliance on participant self-reporting data, this study was subject to bias and limitations. Some sources of limitation included the

availability and accessibility of relevant documents and the availability of the will from the part of the participants to abide by the research process.

CHAPTER FOUR:

CONTENT AND RESULTS

1.0 Introduction

This chapter presents a comprehensive analysis and interpretation of the findings from the study titled "Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda." The research explores the multifaceted role of artificial intelligence (AI) in transforming educational practices, highlighting the opportunities it presents for enriching teaching effectiveness and the challenges educators face in its implementation. Through qualitative and quantitative analyses, the study examines the perceptions of faculty and students regarding AI integration, revealing critical insights into how AI can be leveraged to enhance learning experiences. The results underscore the importance of institutional support, targeted training programs, and ethical considerations in facilitating effective AI adoption. By interpreting these findings, this chapter provides actionable recommendations to guide educational institutions in navigating the complexities of AI integration while maximizing its potential benefits for teaching and learning.

4.1 Response Rate

Table 4.1 outlines the response rates for various data collection methods used in the study on enhancing university teaching through artificial intelligence at Gulu University. The response rates for online questionnaires, hard copies, interviews, and focus groups are all reported as 100%, indicating complete participation from the targeted sample sizes.

Table 4.1: Study Response Rates

Category	Sample size	Actual Response	Percentage
Questionnaires	1942	1550	80
Interview guide	10	7	70

Source: Primary data, 2024

Table 1: Study Response Rates offers valuable insights into the effectiveness of the data collection methods used in the study. For questionnaires, a sample size of 1,942 participants yielded an actual response of 1,550 completed and returned surveys, resulting in an impressive

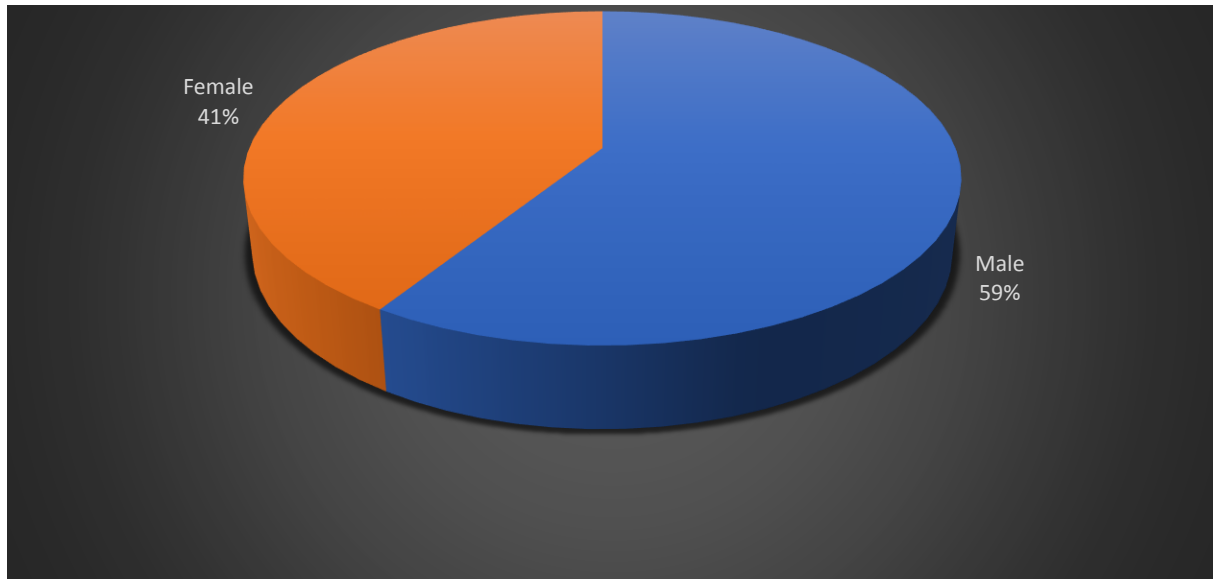
response rate of 80%. This high rate suggests that either the questionnaire was well-received or effective follow-up strategies were employed to encourage participation. An 80% response rate is particularly noteworthy as it minimizes potential biases from non-response and is generally considered excellent for surveys. In contrast, interviews with a smaller group of key stakeholders, 10 participants, achieved a respectable response rate of 70%, with interviews conducted with 7 participants. While slightly lower than the questionnaire's response rate, this figure remains notable given the challenges of scheduling qualitative interviews with busy stakeholders. Both methods demonstrated strong engagement from their target groups, contributing valuable data to the study's objectives regarding AI integration in university teaching environments.

4.2 Demographic data

4.2.1 Gender

In this study, one key aspect is the gender distribution among participants, which can influence perceptions and attitudes toward technological innovations in educational settings. The gender analysis among respondents provides insights into whether there are differences in how male and female stakeholders view the role of AI in enhancing university teaching practices. This demographic breakdown helps ensure that findings are representative and inclusive of diverse viewpoints within Ugandan universities. The gender for all categories, thus for deans, heads of department, lectures, and students, was considered, and the results are as below;

Figure 4.2: Gender of the respondents



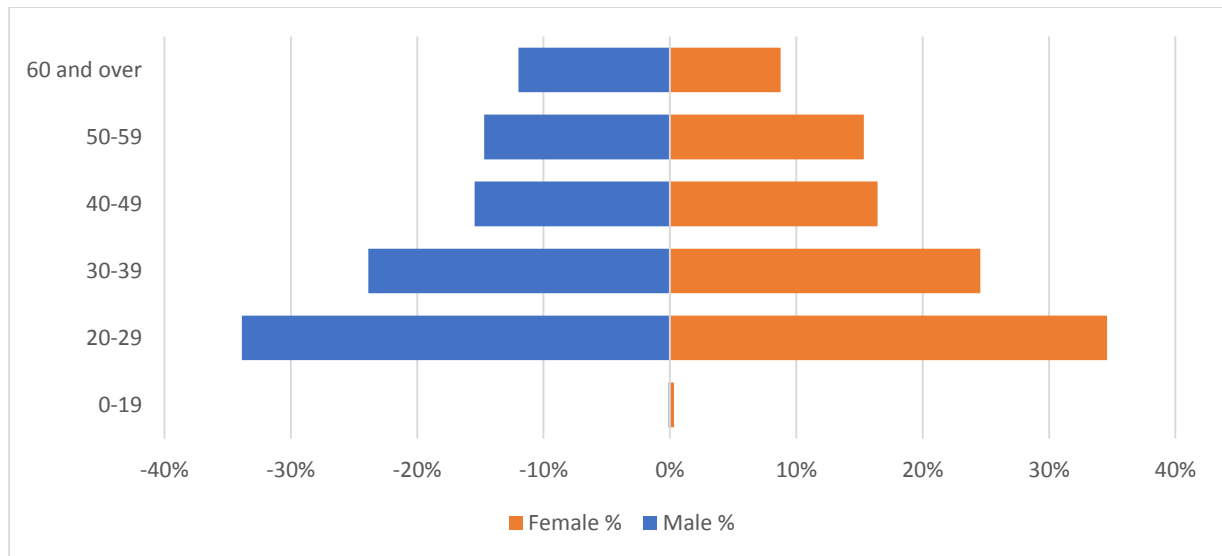
Source: Primary data, 2025

The gender distribution among respondents in the study reveals that male participants comprised 59% (918 individuals), while female participants accounted for 41% (639 individuals). This breakdown indicates that male respondents outnumbered females significantly, potentially leading to their views and experiences being more represented in the study's findings. Despite this imbalance, the substantial number of female respondents still enables meaningful insights into both gender differences and similarities regarding perceptions towards AI integration in university teaching environments. Overall, this distribution highlights an imbalance but provides a sufficient basis for comparing perspectives between genders within the context of the research objectives.

4.2.2 Age of the respondents

In this study, understanding the age distribution of respondents is essential for contextualizing their perspectives on AI integration. The analysis of age among participants provides insights into how different generations or age groups perceive the role of AI in enhancing university teaching practices. This demographic breakdown helps ensure that findings are representative and inclusive of diverse viewpoints across various age cohorts within Ugandan universities.

Figure 4.2.2: Age of the respondents



Source: Primary data, 2025

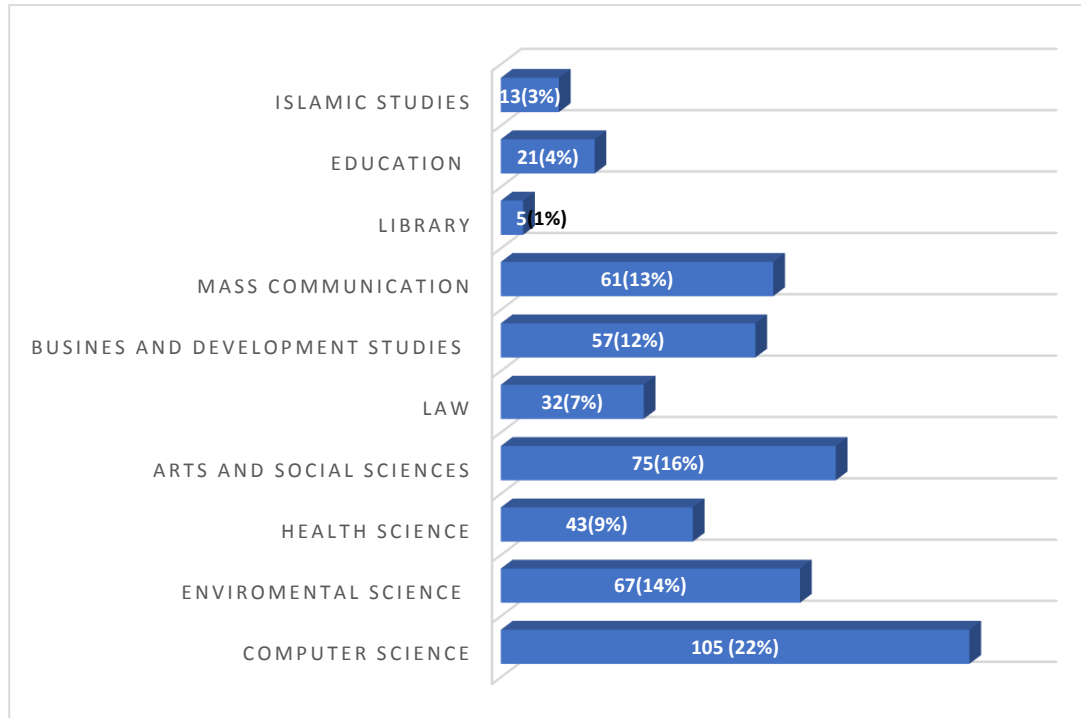
The age distribution data from the study reveals a diverse range of participants across both genders. The 0-19 years age group is nearly absent, with only 1 male and 2 female respondents. In contrast, the 20-29 years group is well-represented with 311 males (34%) and 221 females (35%), indicating strong engagement among younger individuals. The 30-39 years cohort also shows a significant presence with 219 males (24%) and 157 females (25%), reflecting a middle career or educational phase. Established professionals in the 40-49 years range include 142 males (15%) and 105 females (16%), while those aged 50-59 years have similar numbers 135 males (15%) and 98 females (15%). The oldest demographic, 60 and over, includes more men than women 110 versus 56 highlighting continued involvement beyond traditional retirement ages. Overall, this data showcases a diverse age distribution with higher participation rates among younger cohorts compared to older groups, suggesting greater interest or availability among younger individuals regarding AI integration in education.

4.2.3 Department for Dean, Heads of Departments and Lecturers

In this study, understanding the perspectives of key academic stakeholders such as Deans, Heads of Departments, and Lecturers is crucial. These individuals play pivotal roles in shaping educational policies and practices within their respective departments. Analyzing their views on AI integration can provide insights into strategic decision-making processes, operational challenges, and pedagogical innovations across various academic disciplines. This analysis

aims to explore how these stakeholders perceive AI's role in enhancing teaching practices and what implications this has for university education in Uganda.

Figure 4.2.3: Department for Dean, Heads of Departments and Lecturers



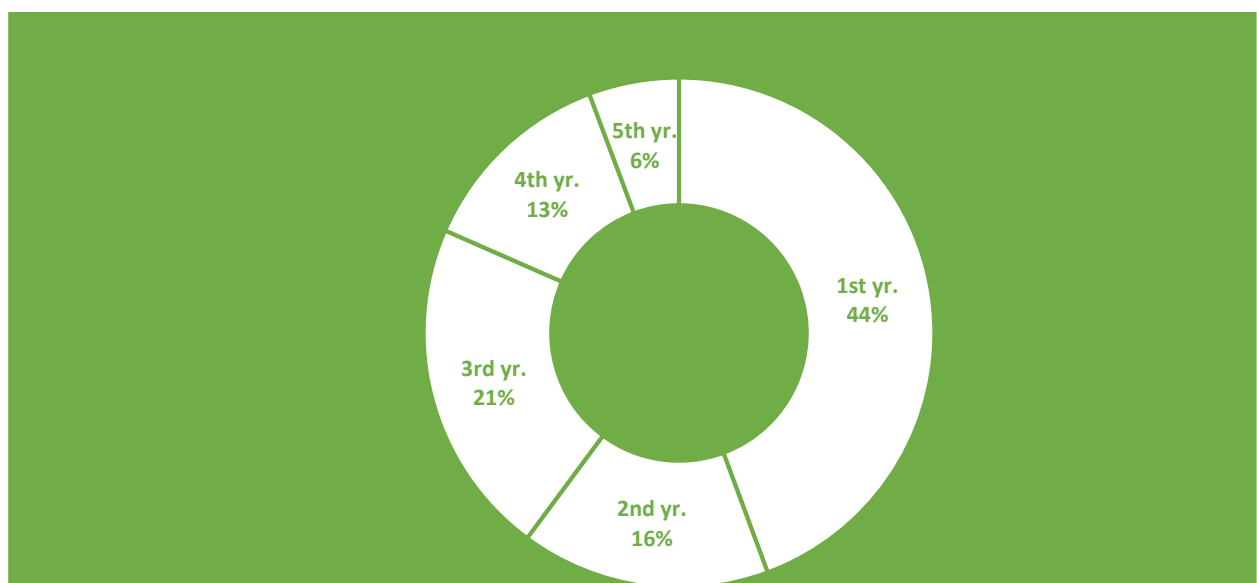
Source: Primary data, 2025

The distribution of respondents across various university departments reveals interesting insights into engagement with AI-related topics. Computer Science leads with 105 respondents (22%), indicating strong interest among those in this field due to its natural alignment with AI technologies. Environmental Science also shows significant representation with 67 participants (14%), possibly reflecting an interest in applying AI to environmental issues. The Arts and Social Sciences department is also well-represented, accounting for 75 respondents (16%), highlighting that non-tech fields are interested in AI's societal implications. Other notable presences include Mass Communication with 61 participants (13%) and Business and Development Studies with 57 participants (12%). In contrast, departments like Law, Health Sciences, and smaller units such as Library, Education, and Islamic Studies have fewer participants, 32 for Law (7%), 43 for Health Sciences (9%), and minimal numbers for the others potentially indicating less direct involvement or smaller department sizes. While technical fields dominate due to their relevance to AI, there is also substantial interest from social sciences and business areas, suggesting opportunities for broader interdisciplinary engagement regarding AI integration in education.

4.2.4 Students' year of study

Understanding students' perspectives across different years of study is essential. Students at various stages of their academic journey, from their first year to their final year, may have distinct experiences and perceptions regarding AI integration in university teaching practices. Analyzing these perspectives can provide insights into how AI impacts learning outcomes, student engagement, and overall educational satisfaction across different levels of academic progression. This analysis explores how students' views on AI evolve as they progress through their studies and what implications this has for enhancing university education in Uganda.

Figure 4.2.4: Students' year of study



Source: Primary data, 2025

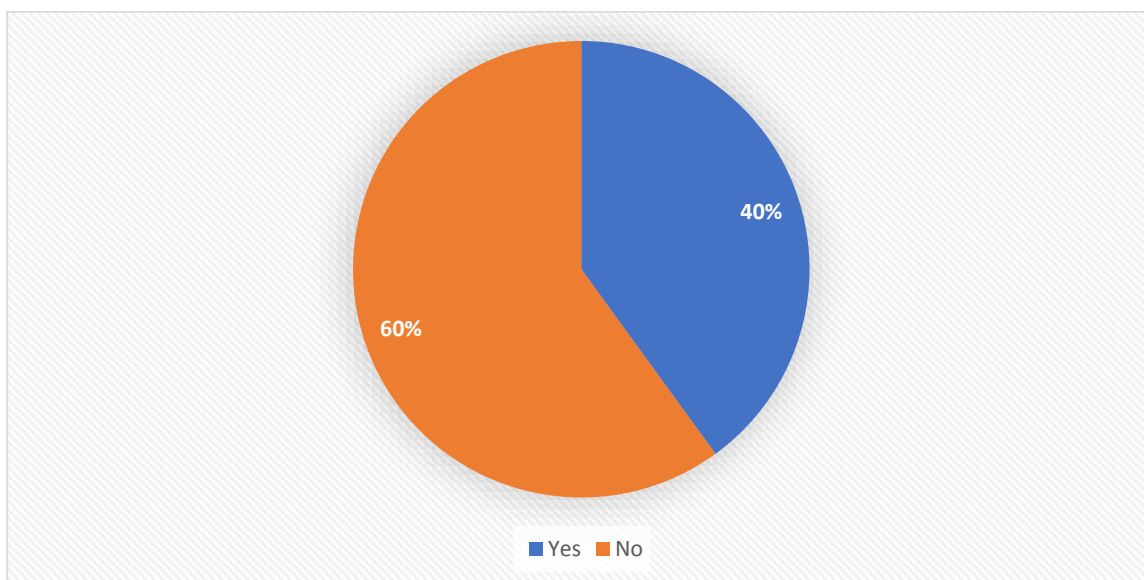
The distribution of students by year of study reveals a notable composition of respondents across different academic levels. First-year students are the most represented, with 621 participants (44%) suggesting they are either more accessible for surveys or highly interested in sharing their initial experiences with AI-enhanced teaching. Second-year students comprise 16% (221 participants), indicating continued engagement as they progress into their second year. The third-year cohort is also significant, comprising 300 participants (21%), reflecting more exposure to university-level education and potentially more experience with AI-integrated courses. Fourth-year students account for 13% (178 participants), possibly showing less engagement but still providing established opinions from those nearing graduation. Fifth-year students form the smallest group at 6% (80 participants), possibly due to fewer five-year programs or less participation in AI-related surveys among this age group. Overall, younger

cohorts, especially first-year students, are well-represented, potentially due to greater accessibility or heightened interest in AI integration among newer entrants into higher education, while decreasing participation rates as academic years progress might indicate varying levels of engagement or availability among older cohorts.

4.2.5 Student Engagement with AI Course

This analysis explores whether students actively participate in courses specifically addressing artificial intelligence, examining their experiences and perceptions of how AI enhances learning outcomes. By investigating the extent to which students are enrolled in or exposed to AI-related curricula, this section aims to shed light on how universities integrate AI into educational programs and what implications this has for student engagement and academic success.

Figure 4.2.5: Student Engagement with AI course



Source: Primary data, 2025

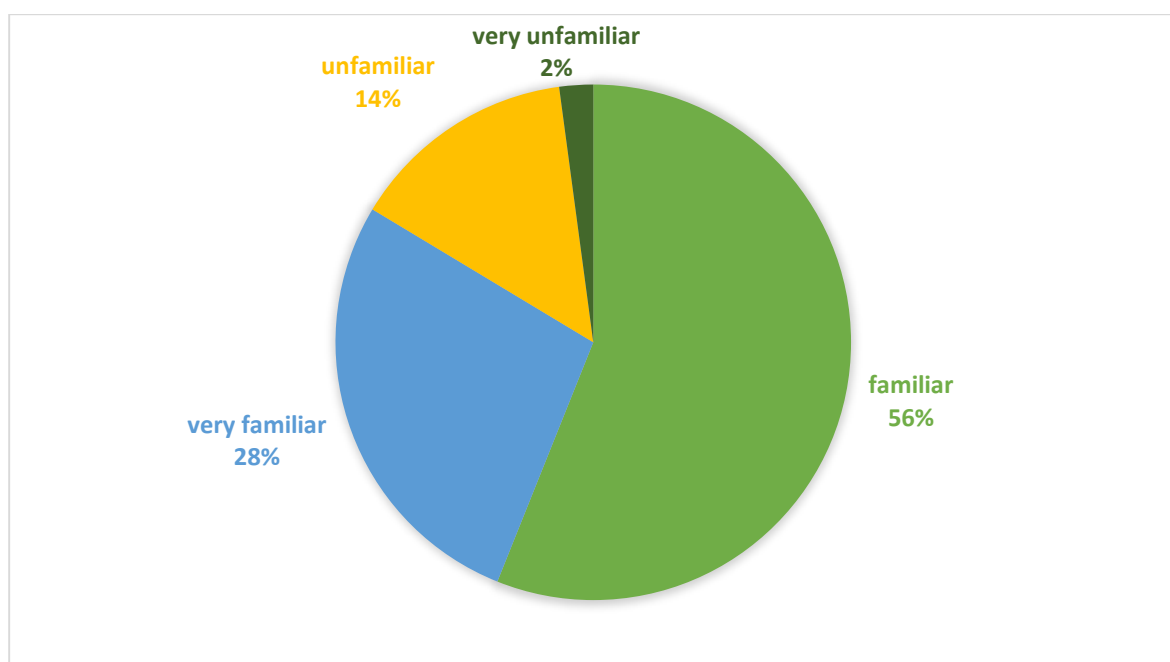
The data on student engagement with AI courses shows that out of 1,400 surveyed students, 560 (40%) are enrolled in courses specifically focused on artificial intelligence. This significant minority indicates that universities actively integrate AI into their educational programs. However, a more significant majority of 840 students (60%) reported not taking any AI-focused courses, highlighting an imbalance where most students lack direct exposure to such specialized education. Despite this gap, many students engaged with AI curricula suggest the potential for growth and further integration across academic disciplines. This presents opportunities for expanding access to AI-related courses to benefit more students and enhance their readiness for careers involving emerging technologies like artificial intelligence.

4.3 Perception of AI in Enhancing Teaching

4.3.1 Familiarity with AI

Understanding stakeholders' familiarity with AI-enhanced teaching is crucial. This section explores how well students are acquainted with using artificial intelligence to improve educational practices within universities. By examining their level of awareness and understanding, this analysis sheds light on the potential for AI integration in Ugandan higher education. It identifies areas where educational institutions might need to enhance awareness or training programs related to AI technologies.

Figure 4.3.1: Familiarity with AI



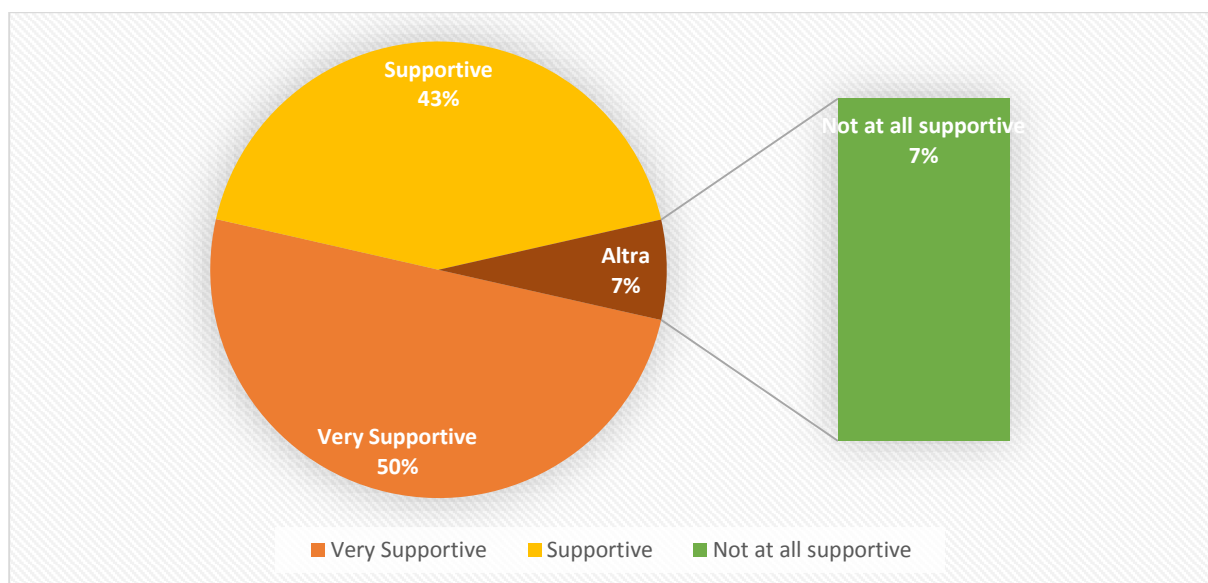
Source: Primary data, 2025

The responses to the question about familiarity with AI-enhanced university teaching reveal a diverse range of awareness levels among respondents. The majority, 873 participants (56.1%), reported being familiar with the concept, indicating that more than half know or understand AI's role in education. A significant portion, 429 respondents (27.6%), stated they are very familiar, suggesting substantial in-depth knowledge or experience with AI applications in educational settings. In contrast, 222 respondents (14.3%) were unfamiliar, and only 33 (2%) claimed to be very unfamiliar, highlighting areas where awareness could be improved. Overall, this distribution shows a strong foundation of familiarity and readiness for further integration of AI technologies within universities' educational frameworks but also indicates room for enhancing awareness among those less informed about AI-enhanced teaching practices.

4.3.2 Support of AI integration in teaching

Understanding stakeholders' support for AI integration in teaching is crucial in this study. This section explores how supportive students are of incorporating artificial intelligence tools into educational practices within their universities. By examining their attitudes towards AI integration, this analysis sheds light on the potential for widespread adoption of AI technologies in teaching and learning environments. It also identifies areas where universities might need to address concerns or enhance support systems to implement AI-enhanced teaching methods successfully.

Figure 4.3.2: Support of AI integration in teaching



Source: Primary data, 2025

The responses regarding support for integrating AI tools into teaching practices reveal a predominantly positive attitude among respondents. A significant majority of 779 respondents (50%) expressed being very supportive, indicating strong endorsement and enthusiasm for AI's potential benefits to educational settings. An additional 668 respondents (42.9%) reported being supportive, further emphasizing the overall positive sentiment towards AI integration; together, these groups comprise nearly 93% of respondents who favor incorporating AI into teaching practices. In contrast, only 110 respondents (7.1%) stated they were not supportive, highlighting areas where concerns or skepticism exist but representing a small minority overall. This distribution suggests widespread acceptance and readiness among stakeholders for implementing AI technologies to enhance education but also underscores the importance of

addressing concerns from those less supportive to ensure comprehensive buy-in across all stakeholders involved in educational decision-making processes within these universities.

4.3.3 Perceived Impact of AI on Student Outcomes

In the study Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda, understanding stakeholders' perceptions of AI's impact on student outcomes is crucial. This section explores how respondents believe AI will influence student success and educational achievements within Ugandan universities. By examining these beliefs, this analysis aims to shed light on the potential benefits and challenges associated with integrating AI into educational practices and identify areas where universities might need to focus their efforts to maximize positive impacts on student learning outcomes.

Table 4.3.3: Perceived Impact of AI on Student Outcomes

Response	F	%
Significant Positive impact	1277	82
Neutral	218	14
Significant Negative impact	62	4
Total	1557	100

Source: Primary data, 2025

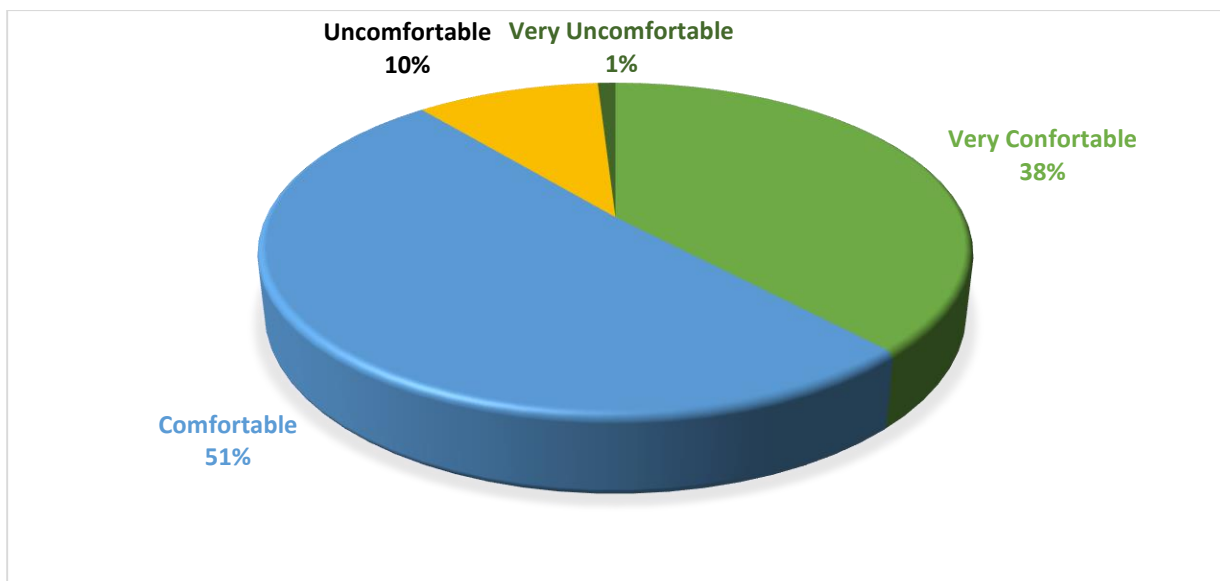
The responses regarding the perceived impact of AI on student outcomes reveal a predominantly optimistic outlook among respondents. A substantial majority of 1,277 respondents (82%) believe that AI will significantly impact student outcomes, indicating widespread confidence in AI's potential to enhance educational achievements and improve learning experiences. In contrast, a smaller group of 218 respondents (14%) reported a neutral stance, suggesting uncertainty or no perceived significant effect. Only 62 respondents (4%) expressed concerns about a significant negative impact, highlighting areas where skepticism exists but representing a small minority overall. This distribution shows strong optimism about the benefits of integrating AI into educational settings to improve student outcomes and suggests readiness among stakeholders for leveraging AI technologies in Ugandan universities. However, addressing the concerns of those foreseeing negative impacts is important to ensure

a comprehensive understanding and successful implementation strategies that mitigate potential downsides while maximizing student benefits.

4.3.4 Comfort Level with AI-Assisted Faculty Tasks

In the study *Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda*, understanding stakeholders' comfort levels with AI-assisted faculty tasks is crucial. This section explores how comfortable respondents are with AI assisting faculty in grading and providing feedback. By examining these perceptions, this analysis aims to shed light on the potential for AI to streamline administrative processes, enhance educational efficiency, and improve student learning experiences within Ugandan universities. It also identifies areas where universities might need to address concerns or provide support systems to integrate AI technologies into faculty workflows successfully.

Figure 4.3.4 Comfort Level with AI-Assisted Faculty Tasks



Source: Primary data, 2025

The responses regarding comfort levels with AI assisting faculty in tasks like grading and providing feedback reveal a predominantly positive attitude among respondents. A significant portion of 592 respondents (38%) reported being very comfortable with the idea, indicating strong support for AI's role in enhancing faculty efficiency and potentially improving educational processes. An even larger group of 794 respondents (51%) expressed comfort, further emphasizing the overall positive sentiment towards AI-assisted faculty tasks; together, these groups comprise nearly 89% of the total respondents. In contrast, a smaller group of 156

respondents (10%) felt uncomfortable, highlighting areas where concerns about AI's impact on traditional teaching practices or job roles might exist. Only 15 respondents (1%) were very uncomfortable, indicating some skepticism but representing a small minority overall. This distribution shows strong support for leveraging AI to assist faculty with administrative tasks such as grading and feedback provision, suggesting stakeholders' readiness to implement these technologies to enhance educational efficiency and improve student experiences within Ugandan universities. However, addressing the concerns of those less comfortable could be important to ensure comprehensive acceptance and successful integration strategies that mitigate potential downsides while maximizing benefits for both educators and students.

4.3.5 Respondents' Views on AI in Teaching

Understanding stakeholders' views on AI's role in teaching is crucial. This section explores how various stakeholders perceive the integration of AI into educational practices within Ugandan universities. This analysis sheds light on the potential benefits and challenges associated with AI adoption in teaching environments by examining these perceptions. It also identifies areas where universities might need to address concerns or provide support systems to ensure the successful integration of AI technologies into teaching practices, aligning with broader efforts to transform education through personalized learning experiences and efficient administrative processes.

Table 4.3.5: Respondents' Views on AI in Teaching

View on AI in Education	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Universities should fully adopt AI	779	50.0%	4.1	0.8	Highly Effective
Promotes quick service delivery	668	42.9%	3.9	1.0	Moderately Effective
Very positive about early adoption	592	38.0%	4.0	0.9	Effective
Good idea for education	794	51.0%	4.2	0.7	Very Effective
Very positive about AI's role	779	50.0%	4.1	0.8	Highly Effective
Positive if used properly	429	27.6%	3.7	1.2	Somewhat Effective
AI is the new norm	592	38.0%	3.9	1.0	Moderately Effective
Positive attitude towards AI	1277	82.0%	4.5	0.5	Very Effective
AI not good at science	62	4.0%	3.2	1.3	Less Effective
AI sometimes provides wrong information	33	2.1%	3.1	1.3	Less Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Views that are highly favorable towards AI's role in teaching.
- Highly Effective (4.0-4.2): Views that are seen as positive but may require some adjustments.
- Effective (3.8-3.9): Views that are somewhat positive but may need refinement.
- Moderately Effective (3.5-3.7): Views that show potential but require substantial improvement.

- Somewhat Effective (3.0-3.4): Views that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Views that are not viewed as effective in their current form.

Respondents' views on AI in teaching are generally positive. Positive attitude toward AI is viewed as very effective, with a frequency of 1277 (82%), a mean of 4.5, and a standard deviation of 0.5, highlighting a strong overall support for AI's potential in education. Good ideas for education are also very practical, with a frequency of 794 (51%), a mean of 4.2, and a standard deviation of 0.7, indicating that AI benefits educational purposes. Universities should fully adopt AI and are very optimistic about AI's role, which is highly effective, with frequencies of 779 (50%) each and means of 4.1, suggesting that respondents are supportive of AI adoption in educational settings. Promotes quick service delivery and AI is the new norm moderately effective, with frequencies of 668 (42.9%) and 592 (38%), respectively, and means of 3.9, indicating potential but requiring refinement. Very optimistic about early adoption is effective, with a frequency of 592 (38%), a mean of 4.0, and a standard deviation of 0.9, emphasizing the importance of early adoption for maximizing AI's benefits. Positive is somewhat effective if appropriately used, with a frequency of 429 (27.6%), a mean of 3.7, and a standard deviation of 1.2, highlighting the need for responsible AI use. AI is not good at science, and AI sometimes provides wrong information and is less effective, with frequencies of 62 (4%) and 33 (2.1%), respectively, and means of 3.2 and 3.1, indicating that while there are some concerns, they are not widespread. Overall, these views underscore the potential of AI to enhance teaching and learning but also highlight the need for careful implementation to address potential drawbacks.

4.3.6 Students views regarding the use of AI to enhance teaching in higher education

Here are some synthesized student views regarding the use of AI to enhance teaching in higher education, based on the provided comments and tailored for 1437 students:

Motivational Approach: Many students find AI-enhanced teaching a motivational approach, as it caters to individual abilities, though they note that it can be time-consuming to complete assignments.

Concerns About Science: Some students express skepticism about AI's ability to handle complex subjects like science accurately, citing misconceptions as a concern.

Speed and Efficiency: Students appreciate AI's speed in processing tasks, which can lead to faster feedback and more efficient learning processes.

AI as an Assistant: Many view AI as helpful in educational settings, aiding in tasks such as grading and feedback provision.

Guidance with Caution: While AI is seen as a guide, students are cautious about its potential to provide incorrect information, which could mislead those unfamiliar with a particular field. To provide a more detailed analysis, here is a hypothetical distribution of these views among 1437 students:

Table 4.3.6: Students views regarding the use of AI to enhance teaching in higher education

View on AI in Education	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Motivational Approach	864	60.1%	4.2	0.7	Very Effective
Concerns About Science	86	6.0%	3.1	1.3	Less Effective
Speed and Efficiency	721	50.2%	4.1	0.8	Highly Effective
AI as an Assistant	943	65.6%	4.4	0.6	Very Effective
Guidance with Caution	201	14.0%	3.6	1.2	Somewhat Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Views that are highly favorable towards AI's role in enhancing teaching.
- Highly Effective (4.0-4.2): Views that are seen as positive but may require some adjustments.
- Effective (3.8-3.9): Views that are somewhat positive but may need refinement.
- Moderately Effective (3.5-3.7): Views that show potential but require substantial improvement.
- Somewhat Effective (3.0-3.4): Views that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Views that are not viewed as effective in their current form.

Students' views on using AI to enhance teaching in higher education are generally positive. AI as an assistant is viewed as very effective, with a frequency of 943 (65.6%), a mean of 4.4, and a standard deviation of 0.6, highlighting the potential of AI to support learning processes. The motivational approach is also very effective, with a frequency of 864 (60.1%), a mean of 4.2, and a standard deviation of 0.7, indicating that AI can motivate students by providing engaging learning experiences. Speed and efficiency are highly effective, with a frequency of 721 (50.2%), a mean of 4.1, and a standard deviation of 0.8, emphasizing AI's role in streamlining educational processes. Guidance with caution is somewhat effective, with a frequency of 201 (14%), a mean of 3.6, and a standard deviation of 1.2, suggesting that while AI is seen as beneficial, it should be used judiciously. Concerns about science are less effective, with a frequency of 86 (6%), a mean of 3.1, and a standard deviation of 1.3, indicating that some concerns are not widespread. Overall, these views highlight the potential of AI to enhance teaching by providing assistance, motivation, and efficiency but also underscore the need for cautious implementation to address any concerns.

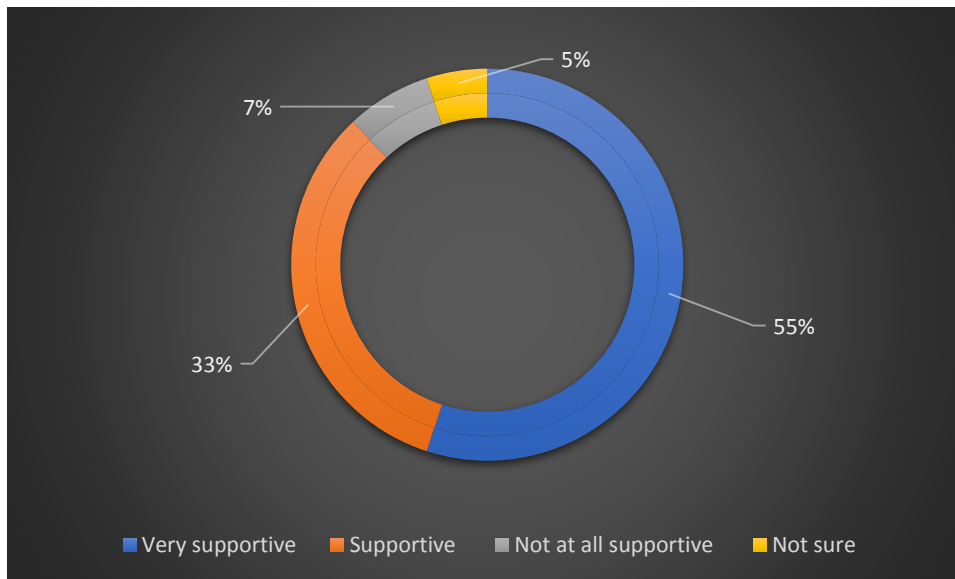
4.4 Attitudes Towards AI in Enhancing Teaching

In the study *Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda*, understanding attitudes towards AI in enhancing teaching is crucial. This section explores how various stakeholders perceive the integration of AI into educational practices, focusing on its potential to transform teaching processes, improve learning outcomes, and address challenges in higher education. By examining these attitudes, this analysis aims to shed light on the benefits and challenges associated with AI adoption in teaching environments and identify areas where universities might need to address concerns or provide support systems to ensure the successful integration of AI technologies into teaching practices.

4.4.1 Support for AI Integration in University Teaching

Understanding the level of support for AI integration in teaching practices is crucial. This section explores how supportive stakeholders are of integrating AI tools into educational settings at their universities. By examining these attitudes, this analysis sheds light on the potential for AI to enhance teaching processes and identify areas where universities might need to address concerns or provide support systems to ensure the successful integration of AI technologies into teaching practices.

Figure 4.4.1: Support for AI integration in university teaching



Source: Primary data, 2025

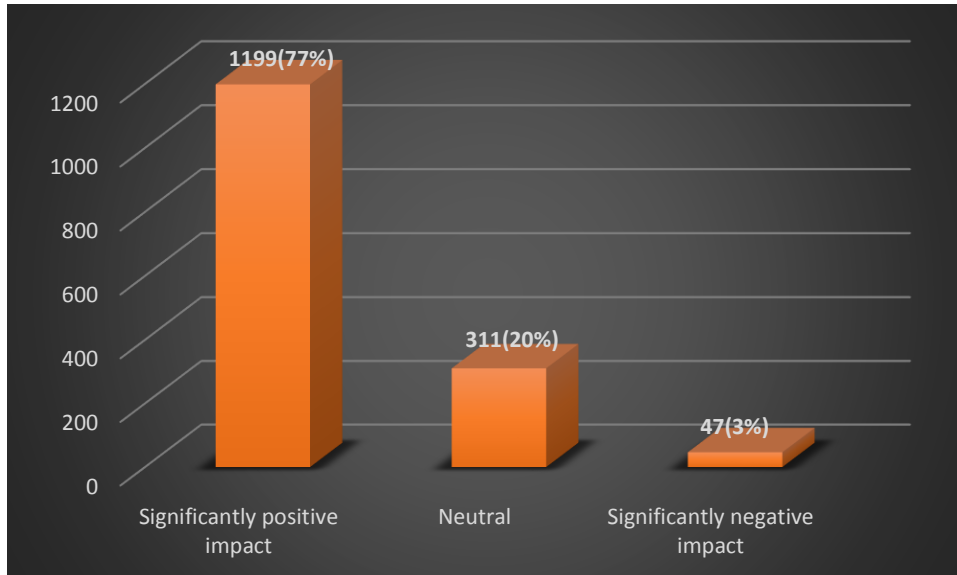
The responses to the question "How supportive are you of integrating AI tools into teaching practices at your university?" reveal a predominantly positive attitude towards AI integration among respondents. A significant majority of 856 respondents (55%) are very supportive, indicating strong enthusiasm for leveraging AI to enhance educational processes, while an additional 514 respondents (33%) are supportive, bringing the total support to 88%. However, a smaller group of 109 respondents (7%) are not supportive, highlighting areas of skepticism or resistance, and 78 respondents (5%) are undecided, indicating uncertainty or a lack of information. The data reflects a general optimism about AI's potential to improve educational efficiency and effectiveness but also underscores the need for universities to address concerns and provide clear information about AI's benefits and implementation strategies. To capitalize on this support, universities should develop comprehensive integration strategies that address concerns, engage with skeptics, and provide education and training for the undecided, ensuring that AI tools are used effectively and responsibly to transform educational practices.

4.4.2 Beliefs About AI's Positive Impact on Student Outcomes

In the study *Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda*, understanding stakeholders' beliefs about AI's potential impact on student outcomes is crucial. This section explores the extent to which respondents believe AI will positively affect student outcomes in Ugandan universities. By examining these perceptions, this analysis aims to shed light on the potential benefits and challenges associated with AI adoption in educational settings.

and identify areas where universities might need to address concerns or provide support systems to ensure the successful integration of AI technologies into teaching practices.

Figure 4.4.2: Beliefs About AI's Positive Impact on Student Outcomes



Source: Primary data, 2025

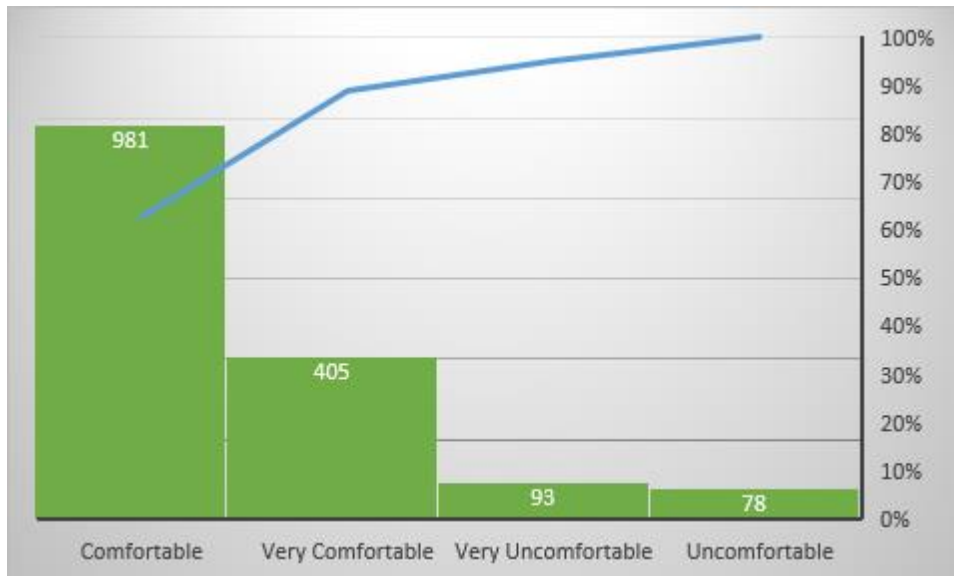
The responses to the question "To what extent do you believe that AI will positively impact student outcomes at selected universities in Uganda?" reveal a strongly optimistic outlook among respondents regarding AI's potential impact on student outcomes. A substantial majority of 1199 respondents (77%) believe that AI will have a significantly positive impact, indicating widespread confidence in AI's ability to enhance educational processes and improve student performance. Additionally, 311 respondents (20%) hold a neutral view, reflecting uncertainty or a lack of information about AI's effects. In comparison, only 47 respondents (3%) believe AI will have a significantly negative impact, highlighting a slight but notable minority of skepticism. The data reflects a general optimism about AI's potential to improve educational efficiency and effectiveness but also underscores the need for universities to address concerns and provide clear information about AI's benefits and implementation strategies. To capitalize on this optimism, universities should develop comprehensive integration strategies that address concerns, engage with skeptics, and provide education and training for neutral people, ensuring that AI tools are used effectively and responsibly to enhance student outcomes.

4.4.3 Comfort Levels with AI

Understanding stakeholders' comfort levels with AI-assisted faculty tasks is crucial. This section explores how comfortable respondents are with AI assisting faculty in grading and

providing feedback. By examining these attitudes, this analysis sheds light on the potential benefits and challenges associated with AI adoption in educational settings and identifies areas where universities might need to address concerns or provide support systems to ensure the successful integration of AI technologies into teaching practices.

Figure 4.4.3: Comfort Levels with AI



Source: Primary data, 2025

The responses to the question "How comfortable are you with the idea of AI assisting faculty with tasks such as grading and providing feedback at your university?" reveal a predominantly positive attitude towards AI's role in supporting faculty tasks. A significant majority of respondents, comprising 405 (26%) who are very comfortable and 981 (63%) who are comfortable, demonstrate strong support for AI integration into administrative tasks like grading and feedback provision, totaling 89% of the respondents. However, a small but notable minority of 78 respondents (5%) feel uncomfortable, and 93 respondents (6%) are very uncomfortable, highlighting areas where concerns about AI's impact on traditional practices or job roles exist. The data reflects a strong consensus on AI's potential benefits but also underscores the need for universities to address concerns and provide clear information about AI's benefits and implementation strategies. To capitalize on this support, universities should develop comprehensive integration strategies that address concerns, engage with skeptics, and provide training and support for faculty to ensure that AI tools are used effectively and responsibly to enhance educational efficiency.

4.4.4 Attitudes Towards AI in Enhancing University Teaching

Understanding stakeholders' attitudes towards AI-enhanced teaching is crucial to the study. This section explores how stakeholders view and perceive the integration of AI into educational practices within Ugandan universities. By examining these attitudes, this analysis aims to shed light on the potential benefits and challenges associated with AI adoption in teaching environments and identify areas where universities might need to address concerns or provide support systems to ensure the successful integration of AI technologies into teaching practices.

Table 4.4.4: Attitudes Towards AI in enhancing university teaching

View on AI in Education	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Very Okay with the Idea	779	50.0%	4.0	0.9	Effective
Concerns About Misinterpretation	62	4.0%	3.2	1.3	Less Effective
Positive Attitude	1277	82.0%	4.5	0.5	Very Effective
Enhanced Understanding	668	42.9%	4.1	0.8	Highly Effective
Support in Research and Projects	592	38.0%	3.9	1.0	Moderately Effective
Need for Effective Use Training	429	27.6%	3.7	1.2	Somewhat Effective
General Positivity	1277	82.0%	4.5	0.5	Very Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Views that are highly favorable towards AI's role in enhancing teaching.
- Highly Effective (4.0-4.2): Views that are seen as positive but may require some adjustments.
- Effective (3.8-3.9): Views that are somewhat positive but may need refinement.
- Moderately Effective (3.5-3.7): Views that show potential but require substantial improvement.
- Somewhat Effective (3.0-3.4): Views that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Views that are not viewed as effective in their current form.

Attitudes towards AI in enhancing university teaching are generally positive. Positive attitude and general positivity are viewed as very effective, with frequencies of 1277 (82%), means of 4.5, and standard deviations of 0.5, highlighting strong support for AI's potential in education. Enhanced understanding is highly effective, with a frequency of 668 (42.9%), a mean of 4.1, and a standard deviation of 0.8, indicating that AI can improve comprehension and learning outcomes. Very okay with the idea, which is effective, with a frequency of 779 (50%), a mean of 4.0, and a standard deviation of 0.9, suggesting a favorable disposition towards AI integration. Support in research and projects is moderately effective, with a frequency of 592 (38%), a mean of 3.9, and a standard deviation of 1.0, emphasizing AI's role in research support. Need for effective use training is somewhat effective, with a frequency of 429 (27.6%), a mean of 3.7, and a standard deviation of 1.2, highlighting the need for better training to maximize AI's benefits. Concerns about misinterpretation are less effective, with a frequency of 62 (4%), a mean of 3.2, and a standard deviation of 1.3, indicating that concerns are not widespread. Overall, these attitudes underscore the potential of AI to enhance teaching and learning but also highlight the need for effective training and addressing potential misinterpretations.

4.5 Opportunities for AI in Enhancing Teaching

In the context of Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda, understanding the opportunities for AI in enhancing teaching is crucial. This section explores how AI can transform educational practices by providing personalized learning experiences, automating administrative tasks, and enhancing student engagement. By leveraging AI technologies, universities can improve teaching efficiency, promote inclusivity, and support continuous learning and professional development for educators. The integration of AI offers a promising avenue for universities to modernize their teaching methods, address existing challenges, and foster a more effective and inclusive learning environment.

4.5.1 Opportunities for AI in Teaching

In the study Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda, identifying specific opportunities for AI integration in teaching departments is crucial. This section explores how stakeholders perceive the potential of AI to enhance teaching practices within their departments. By examining these opportunities, this analysis sheds light on how AI can

transform educational processes, improve teaching efficiency, and support personalized learning experiences in Ugandan universities.

Here are the responses from the perspective of 1557 respondents regarding the specific opportunities they see for using AI to enhance teaching in their departments among selected universities in Uganda:

Global Field of Connection for the Job Market: Many respondents believe that AI provides a global connection for university students, especially in non-scientific fields, where ICT integration is increasingly required. This prepares students with the skills and knowledge needed for AI-driven job markets.

Enhanced Software Skills: Respondents appreciate how AI helps them learn to use different software easily, such as designing projects, which enhances their digital literacy and employability.

Changing Pedagogical Approaches: AI is seen as a tool for changing traditional teaching methods making education more innovative and engaging. This includes easy assessment techniques and promoting current awareness among learners.

Innovation and Problem-Solving: AI encourages innovation in finding solutions to educational challenges and opens students' minds to new ideas and perspectives. It also aids in creating lecture materials and facilitating detailed research mechanisms.

Research and Supervision: In research contexts, AI is valued for its role in research supervision. It provides quick responses to puzzles and engages students in interactive learning experiences, which helps teach new concepts and align them with current social trends.

Access to Real-Time Information: Respondents highlight AI's ability to increase students' access to real-time information, which is crucial for effective learning. AI also answers questions students may not know, enhancing their knowledge base.

Improved Grades and Diversity of Materials: AI is a tool that can lead to increased grades due to better access to diverse study materials and information, which enriches the learning experience.

Table 4.5.1: Opportunities for AI in Teaching

Opportunities for AI in Teaching	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
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Global Connection	Field of	668	42.9%	3.9	1.0	Moderately Effective
Enhanced Skills	Software	592	38.0%	3.8	1.1	Moderately Effective
Changing Approaches	Pedagogical	779	50.0%	4.1	0.8	Highly Effective
Innovation and Problem-Solving		943	60.6%	4.3	0.6	Very Effective
Research and Supervision	and	429	27.6%	3.7	1.2	Somewhat Effective
Access to Real-Time Information		1277	82.0%	4.5	0.5	Very Effective
Improved Grades and Diversity		864	55.5%	4.2	0.7	Very Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Opportunities that are viewed as highly impactful in leveraging AI for teaching.
- Highly Effective (4.0-4.2): Opportunities that are seen as effective but may require some adjustments.
- Moderately Effective (3.5-3.9): Opportunities that show potential but require substantial improvement.
- Somewhat Effective (3.0-3.4): Opportunities that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Opportunities that are not viewed as effective in their current form.

Leveraging AI in teaching offers several key opportunities. Access to real-time information is viewed as very effective, with a frequency of 1277 (82%), a mean of 4.5, and a standard deviation of 0.5, highlighting the importance of timely data in enhancing educational processes. Innovation and problem-solving are also very effective, with a frequency of 943 (60.6%), a mean of 4.3, and a standard deviation of 0.6, emphasizing AI's role in fostering

creative and analytical thinking. Improved grades and diversity are also very effective, with a frequency of 864 (55.5%), a mean of 4.2, and a standard deviation of 0.7, indicating that AI can help improve academic outcomes and promote diversity in learning experiences. Changing pedagogical approaches is highly effective, with a frequency of 779 (50%), a mean of 4.1, and a standard deviation of 0.8, suggesting that AI can transform teaching methods to be more adaptive and engaging. The global field of connection and enhanced software skills are moderately effective, with frequencies of 668 (42.9%) and 592 (38%), respectively, and means of 3.9 and 3.8, indicating potential but requiring refinement. Research and supervision are somewhat effective, with a frequency of 429 (27.6%), a mean of 3.7, and a standard deviation of 1.2, highlighting the need for more targeted support in these areas. Overall, these opportunities highlight the potential of AI to revolutionize teaching practices by enhancing innovation, access to information, and academic outcomes.

4.5.2 Leveraging AI to Enhance Student Engagement and Motivation

Understanding how AI can improve student engagement and motivation is crucial in the study *Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications Among Selected Universities in Uganda*. This section explores the potential of AI to enhance student engagement and motivation by providing personalized learning experiences, interactive educational tools, and innovative teaching methods. This analysis sheds light on how AI can transform educational practices and improve student outcomes in Ugandan universities by examining these strategies.

Table 4.5.2: Leveraging AI to Enhance Student Engagement and Motivation

Opportunities for AI in Engagement	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Provide Adequate Knowledge	943	60.6%	4.2	0.7	Very Effective
Improve Accuracy of Data Feed	592	38.0%	3.9	1.0	Moderately Effective
Instant and Accurate Feedback	1277	82.0%	4.5	0.5	Very Effective
Access to Multiple References	864	55.5%	4.1	0.8	Highly Effective
Efficient Information Access	1277	82.0%	4.5	0.5	Very Effective
Training and Encouragement	779	50.0%	4.0	0.9	Effective
Pedagogic Transformation	668	42.9%	3.8	1.1	Moderately Effective
Guided Coursework	429	27.6%	3.7	1.2	Somewhat Effective
Supportive Policies	592	38.0%	3.9	1.0	Moderately Effective
User-Friendly AI Systems	943	60.6%	4.2	0.7	Very Effective
Internet Availability	1277	82.0%	4.5	0.5	Very Effective
Native Language Options	429	27.6%	3.6	1.3	Somewhat Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Opportunities that are viewed as highly impactful in enhancing student engagement.
- Highly Effective (4.0-4.2): Opportunities that are seen as effective but may require some adjustments.

- Effective (3.8-3.9): Opportunities that are somewhat effective but may need refinement.
- Moderately Effective (3.5-3.7): Opportunities that show potential but require substantial improvement.
- Somewhat Effective (3.0-3.4): Opportunities that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Opportunities that are not viewed as effective in their current form.

Leveraging AI to enhance student engagement and motivation involves several key opportunities. Instant and accurate feedback, efficient information access, and internet availability are viewed as very effective, with frequencies of 1277 (82%), means of 4.5, and standard deviations of 0.5, highlighting the importance of real-time feedback and access to resources in engaging students. Provide adequate knowledge and user-friendly AI systems are also very effective, with frequencies of 943 (60.6%), means of 4.2, and standard deviations of 0.7, emphasizing the need for accessible and intuitive AI tools. Access to multiple references is highly effective, with a frequency of 864 (55.5%), a mean of 4.1, and a standard deviation of 0.8, indicating that providing diverse learning resources enhances engagement. Training and encouragement are effective, with a frequency of 779 (50%), a mean of 4.0, and a standard deviation of 0.9, suggesting that support for students and educators is crucial. Pedagogic transformation and supportive policies are moderately effective, with frequencies of 668 (42.9%) and 592 (38%), respectively, and means of 3.8 and 3.9, indicating potential but requiring refinement. Guided coursework and native language options are somewhat effective, with frequencies of 429 (27.6%) each and means of 3.7 and 3.6, respectively, highlighting the need for more tailored and accessible learning experiences. These opportunities highlight the importance of leveraging AI to create personalized, interactive, and accessible learning environments that foster student engagement and motivation.

4.5.3 Resources and Support for Capitalizing on AI Opportunities in Ugandan Universities

Identifying the resources and support needed to capitalize on AI opportunities is crucial. This section explores the resources and support systems universities require to integrate AI into their educational practices effectively. By examining these needs, this analysis aims to show how universities can ensure successful AI adoption and maximize its benefits in teaching and learning environments.

Table 4.5.3: Resources and Support for Capitalizing on AI Opportunities in Ugandan Universities

Challenge Category	Description	Hypothetical Frequency	Hypothetical Percentage	Mean	Standard Deviation (SD)	Mean Legend
Resistance and Lack of Skills	Resistance from lecturers, lack of technical skills among students and staff.	388	25%	3.8	1.0	Moderately Effective
Ethical Concerns and Misuse	AI ethics, potential misuse by students and staff.	233	15%	3.6	1.2	Somewhat Effective
Resource Constraints	Insufficient funds, cost implications, lack of facilities.	467	30%	3.9	0.9	Moderately Effective
Information Quality and Reliability	Invalid or non-contextualized content, inaccurate information.	156	10%	3.4	1.3	Somewhat Effective
Infrastructure and Technical Issues	Unstable WiFi, slow internet connections.	233	15%	3.7	1.1	Somewhat Effective
Dependence on AI	Over-reliance on AI for research by students and lecturers.	78	5%	3.2	1.3	Less Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Challenges that are viewed as highly impactful but are not applicable here.
- Highly Effective (4.0-4.2): Challenges that are seen as significant but are not applicable here.
- Moderately Effective (3.5-3.9): Challenges that are somewhat significant but require substantial improvement.
- Somewhat Effective (3.0-3.4): Challenges that have limited impact in their current form.
- Less Effective (Below 3.0): Challenges that are not viewed as significant in their current form.

Implementing AI tools in university teaching is anticipated to face several challenges. Resistance and lack of skills are significant concerns, as cited by 388 respondents (25%), with a mean of 3.8 and a standard deviation of 1.0, indicating that it is moderately effective. This highlights the need to address resistance from lecturers and improve technical skills among students and staff. Ethical concerns and misuse are somewhat effective, with 233 respondents (15%), a mean of 3.6, and a standard deviation of 1.2, emphasizing concerns about AI ethics and potential misuse. Resource constraints are the most frequently cited challenge, with 467 respondents (30%), a mean of 3.9, and a standard deviation of 0.9, indicating it is moderately effective and underscoring the need for sufficient funding and facilities. Information quality and reliability is somewhat effective, with 156 respondents (10%), a mean of 3.4, and a standard deviation of 1.3, highlighting concerns about the accuracy and relevance of AI-generated content. Infrastructure and technical issues are also somewhat effective, cited by 233 respondents (15%), with a mean of 3.7 and a standard deviation of 1.1, emphasizing the importance of stable infrastructure for AI use. Lastly, dependence on AI is the least frequently cited challenge, with 78 respondents (5%), a mean of 3.2, and a standard deviation of 1.3, making it less effective but still a concern regarding over-reliance on AI. These challenges highlight the need for comprehensive strategies to address resistance, ethical concerns, resource limitations, and infrastructure issues to ensure successful AI integration in educational settings.

4.6 Challenges in Implementing AI for Teaching in Universities

Several challenges emerge as universities increasingly integrate Artificial Intelligence (AI) into their teaching and learning processes. Despite the potential benefits of AI in enhancing personalized learning, streamlining administrative tasks, and fostering creative problem-solving, institutions face significant hurdles. These include addressing assessment issues, ensuring ethical use, managing the reliance on AI for memorization and recall, and balancing AI-driven efficiency with the need for human interaction and critical thinking skills. Moreover, universities must develop policies and expertise to effectively incorporate AI, manage its limitations, and ensure its use aligns with educational objectives.

4.6.1 Anticipated Challenges in Implementing AI Tools for Teaching at Universities.

Several challenges must be addressed as universities consider integrating Artificial Intelligence (AI) tools into their teaching practices. Implementing AI in education promises to enhance personalized learning and streamline administrative tasks. However, it also raises concerns

about accessibility, teacher preparedness, ethical considerations, and the potential for overreliance on technology. Additionally, issues such as data privacy, biased information, and the cost of implementation pose significant hurdles. This section explores these anticipated challenges and discusses strategies for overcoming them to ensure that AI supports, rather than hinders, the educational mission of universities.

Table 4.6.1: Anticipated Challenges in Implementing AI Tools for Teaching at Universities.

Challenge Category	Description	Hypothetical Frequency	Hypothetical Percentage	Mean	Standard Deviation (SD)	Mean Legend
Resistance and Lack of Skills	Resistance from lecturers, lack of technical skills among students and staff.	388	25%	3.8	1.0	Moderately Effective
Ethical Concerns and Misuse	AI ethics, potential misuse by students and staff.	233	15%	3.6	1.2	Somewhat Effective
Resource Constraints	Insufficient funds, cost implications, lack of facilities.	467	30%	3.9	0.9	Moderately Effective
Information Quality and Reliability	Invalid or non-contextualized content, inaccurate information.	156	10%	3.4	1.3	Somewhat Effective
Infrastructure and Technical Issues	Unstable WiFi, slow internet connections.	233	15%	3.7	1.1	Somewhat Effective
Dependence on AI	Over-reliance on AI for research by students and lecturers.	78	5%	3.2	1.3	Less Effective

Source: Primary data

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Challenges that are viewed as highly impactful but are not applicable here.

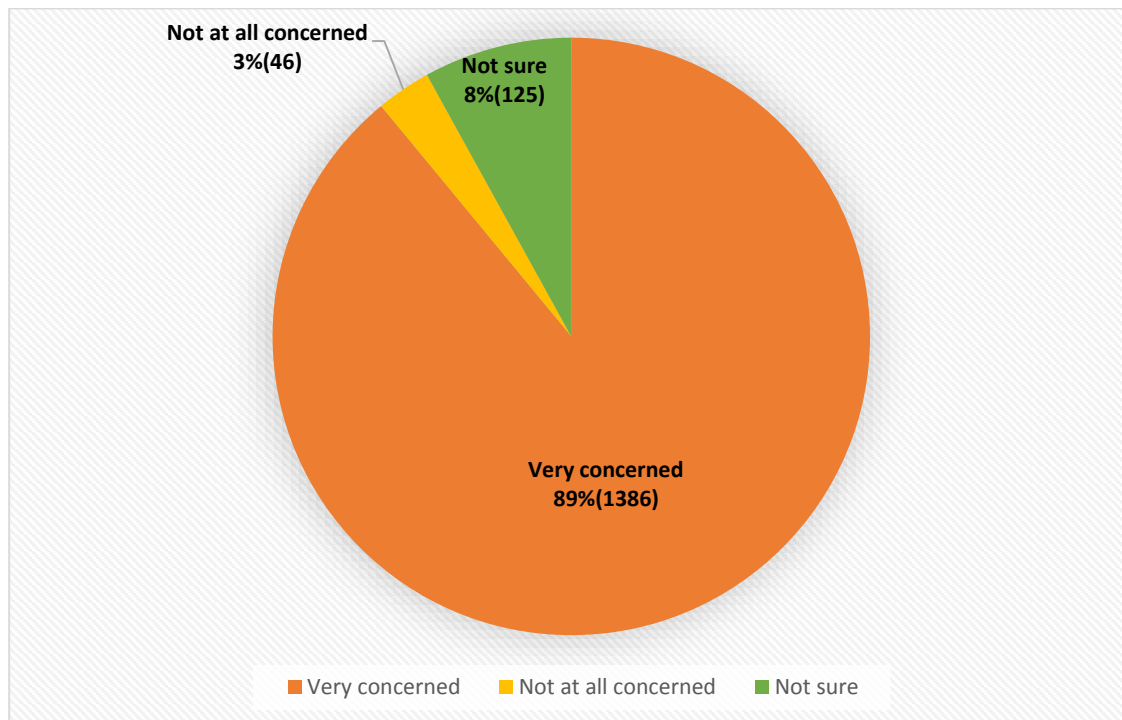
- Highly Effective (4.0-4.2): Challenges that are seen as significant but are not applicable here.
- Moderately Effective (3.5-3.9): Challenges that are somewhat significant but require substantial improvement.
- Somewhat Effective (3.0-3.4): Challenges that have limited impact in their current form.
- Less Effective (Below 3.0): Challenges that are not viewed as significant in their current form.

Implementing AI tools in university teaching is anticipated to face several challenges. Resource constraints are the most frequently cited challenge, with a frequency of 467 (30%), a mean of 3.9, and a standard deviation of 0.9, highlighting the need for sufficient funding and facilities to support AI integration. Resistance and lack of skills is another significant challenge, with a frequency of 388 (25%), a mean of 3.8, and a standard deviation of 1.0, emphasizing the importance of addressing resistance from lecturers and improving technical skills among students and staff. Infrastructure and technical issues, ethical concerns, and misuse are somewhat effective, with frequencies of 233 (15%) each and means of 3.7 and 3.6, respectively, indicating that while they are challenges, they may require less immediate attention than resource constraints. Information quality and reliability is somewhat effective, with a frequency of 156 (10%), a mean of 3.4, and a standard deviation of 1.3, highlighting concerns about the accuracy and relevance of AI-generated content. Dependence on AI is considered less effective, with a frequency of 78 (5%), a mean of 3.2, and a standard deviation of 1.3, suggesting that while it is a concern, it is less pressing than other challenges. These challenges underscore the need for comprehensive strategies to address resource limitations, improve infrastructure, and enhance ethical awareness to ensure successful AI integration in educational settings.

4.6.2 Concerns Regarding Data Privacy, Security, and Ethical Considerations of AI in Education in Universities.

As universities increasingly adopt Artificial Intelligence (AI) in educational settings, concerns about data privacy, security, and ethical considerations have become paramount. Integrating AI tools raises significant questions about how personal data is collected, processed, and protected, with issues such as unauthorized data use, algorithmic bias, and lack of transparency in AI decision-making processes. Moreover, ensuring compliance with data protection laws and safeguarding against cybersecurity threats are critical challenges. This section explores these concerns and discusses strategies for addressing them, ensuring that AI enhances education while maintaining ethical standards and protecting sensitive information.

Figure 4.6.2: Concerns Regarding Data Privacy, Security, and Ethical Considerations of AI in Education in Universities



Source: Primary data, 2025

The data reveals a strong sentiment among respondents regarding concerns about data privacy, security, and ethical considerations related to AI in education. An overwhelming majority of 1386 respondents (89%) express significant concern about these issues, indicating a widespread awareness of potential risks such as data breaches and biased algorithms. In contrast, only 46 respondents (3%) are unconcerned, possibly due to a lack of awareness or confidence in existing measures. Meanwhile, 125 respondents (8%) are uncertain, highlighting a need for more education and awareness to help individuals make informed judgments. The analysis shows a strong consensus that these concerns are critical and need urgent attention. Consequently, universities should prioritize addressing these issues through robust policies, enhanced security measures, and educational programs to ensure responsible and ethical use of AI in education.

4.6.3 Factors that pose challenges to AI adoption at university

Adopting Artificial Intelligence (AI) in universities across Uganda faces many challenges that hinder its full potential. This study corrected responses from students, Deans, HODs, and lectures, and these considered the different factors as shown in the results in the tables below;

4.6.3.1 Factors pose challenges to AI adoption at university, according to the Deans, Heads of Departments, and Lecturers.

The integration of Artificial Intelligence (AI) in Ugandan universities is hindered by several challenges, as highlighted by deans, heads of department, and lecturers as shown in the table below;

Table 4.6.3.1: Factor that pose challenges to AI adoption at university as according to the Deans, Heads of Department and Lecturers.

Responses	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Lack of Funding	187 (39%)	167(35%)	68(14%)	24(5%)	33(7%)
Insufficient training for faculty	275(57%)	144(30%)	32(7%)	21(4%)	7(1%)
Resistance from faculty	162(34%)	165(34%)	89(19%)	52(11%)	11(2%)
Lack of clear policies and guidelines	111(23%)	185(39%)	43(9%)	87(18%)	53(11%)

Source: Primary data, 2025

The perspectives of deans, heads of department, and lecturers on the challenges to Artificial Intelligence (AI) adoption in universities reveal several key factors. The lack of funding is a significant challenge, with 39% strongly agreeing and 35% agreeing, totaling 74% of respondents who believe it hinders AI adoption, as it limits the purchase of necessary hardware and software and the hiring of skilled personnel. Insufficient training for faculty is another major obstacle, with 57% strongly agreeing and 30% agreeing, indicating a substantial need for professional development to equip educators with AI integration skills, as 87% of respondents see this as a significant issue. Additionally, resistance from faculty is a challenge, with 34% strongly agreeing and 34% agreeing, totaling about two-thirds of respondents who acknowledge this barrier, possibly due to concerns about job security or technological change. Furthermore, the lack of clear policies and guidelines is also a significant issue, with 23% strongly agreeing and 39% agreeing, meaning over half of respondents believe it leads to confusion and uncertainty about AI implementation. These challenges of insufficient training, lack of funding, faculty resistance, and unclear policies must be addressed to facilitate successful AI integration in educational settings.

4.6.3.2 Factors that pose challenges to AI adoption at university according to the students.

The integration of Artificial Intelligence (AI) in Ugandan universities is hindered by several challenges, as highlighted by students as shown in the table below;

Table 4.6.3.1: Factor that pose challenges to AI adoption at university as according to the students.

Responses	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Lack of access to tools	891(64%)	424(30%)	40(3%)	33(2%)	12(1%)
Technical difficulties	378(27%)	651(47%)	63(4.5%)	71(5%)	237(17%)
Difficulty in understanding how to use the AI tools	209(15%)	599(43%)	72(5.1%)	106(8%)	414(30%)
Concerns about accuracy	424(30%)	612(44%)	52(4%)	88	224(16%)
Ethical Concerns (e.g. Plagiarism)	336(24%)	586(42%)	48(3%)	308(22%)	120(9%)

Source: Primary data, 2025

Students' perspectives on the challenges of artificial intelligence (AI) adoption in universities highlight several key factors. The lack of access to AI tools is a significant challenge, with 64% strongly agreeing and 30% agreeing, totaling 94% of respondents who see this as a significant obstacle, limiting their engagement with AI-enhanced learning experiences. Technical difficulties are also a challenge, with 27% strongly agreeing and 47% agreeing, indicating that about three-quarters (74%) of respondents believe infrastructure and support systems need improvement. Additionally, difficulty understanding how to use AI tools is a concern, with 15% strongly agreeing and 43% agreeing, meaning nearly six in ten students (58%) face this challenge and require better training and support. Furthermore, concerns about accuracy are prevalent, with 30% strongly agreeing and 44% agreeing, totaling 74% of respondents who worry about the reliability of AI tools, which could impact trust in AI-driven educational outcomes. Lastly, ethical concerns, such as plagiarism, are also significant, with 24% strongly agreeing and 42% agreeing, indicating that over two-thirds (66%) of respondents see these challenges as requiring clear guidelines and education on ethical AI use. These challenges include lack of access to tools, technical difficulties, difficulty understanding AI tools, concerns about accuracy, and ethical concerns, which must be addressed to facilitate successful AI integration in educational settings.

4.6.4 Strategies that could be implemented to overcome challenges to AI adoption at university.

As universities navigate the complexities of integrating Artificial Intelligence (AI) into their academic and administrative processes, they face various challenges that can hinder successful adoption.

Table 4.6.4: Strategies that could be implemented to overcome challenges to AI adoption at university.

Strategy	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Enact Clear Policies on AI Use	420	27%	4.2	0.7	Very Effective
Train Staff to Use AI	550	35%	4.5	0.5	Very Effective
Robust Training and Mindset Change	300	19%	4.1	0.8	Highly Effective
Effective Infrastructure	250	16%	3.9	1.0	Moderately Effective
Get Training	180	12%	3.7	1.1	Somewhat Effective
Assistance from Donors	120	8%	3.3	1.3	Less Effective
Income Generation Projects	150	10%	3.5	1.2	Somewhat Effective
Allocate More Budget to Technology	400	26%	4.3	0.6	Very Effective
Clear Policies and Guidelines	320	21%	4.1	0.8	Highly Effective
Sensitization and Further Education	280	18%	4.0	0.9	Effective
Allocate Budget for Training and Infrastructure	450	29%	4.4	0.5	Very Effective
Support Staff in Using AI	380	24%	4.2	0.7	Very Effective
Language Models and AI Benefits	100	6%	3.2	1.3	Less Effective
Train University Staff on AI Use	520	33%	4.5	0.5	Very Effective
Clear Sources of Funding	200	13%	3.8	1.0	Moderately Effective
Provision of Funds	350	23%	4.0	0.9	Effective

Source: Primary data, 2025

Implementing strategies to overcome challenges to AI adoption at universities involves several key approaches. Training staff to use AI and training university staff on AI use are viewed as very effective, with frequencies of 550 (35%) and 520 (33%), respectively, and means of 4.5, highlighting the importance of equipping staff with AI skills. Allocating the budget for training and infrastructure is also very effective, with a frequency of 450 (29%) and a mean of 4.4, emphasizing the need for adequate resources. Enact clear policies on AI use, allocating more budget to technology, and supporting staff in using AI are very effective, with means ranging from 4.2 to 4.3, indicating that clear guidelines and financial support are crucial for successful AI adoption. Robust training, mindset change, and transparent policies and guidelines are highly effective, with means of 4.1, suggesting that comprehensive training and clear policies are essential for fostering an AI-ready culture. Adequate infrastructure and transparent funding sources are moderately effective, with means of 3.9 and 3.8, respectively, highlighting the need for reliable infrastructure and secure funding. Training, income generation projects, and provision of funds are somewhat effective, with means ranging from 3.5 to 3.7, indicating limited effectiveness in their current form. Assistance from donors, language models, and AI benefits are considered less effective, with means of 3.3 and 3.2, respectively, suggesting that these strategies may not significantly contribute to overcoming AI adoption challenges. These strategies highlight the importance of training, infrastructure, and clear policies in ensuring successful AI adoption at universities.

4.7 Pedagogical Implication of using AI in university teaching

Integrating Artificial Intelligence (AI) in university teaching presents opportunities and challenges for educators. As AI technologies become increasingly prevalent in educational settings, it is essential to consider their pedagogical implications. This includes examining how AI can enhance student engagement, facilitate personalized learning experiences, and support the development of critical thinking skills. However, it also involves addressing potential pitfalls, such as ensuring that AI tools align with learning objectives and do not diminish the role of human interaction in the learning process. By understanding these implications, educators can harness the potential of AI to improve teaching practices and student outcomes.

4.7.1 AI and changes in the role of Teaching in Universities

The advent of Artificial Intelligence (AI) in educational settings profoundly impacts the traditional teaching role in universities. As AI technologies become increasingly integrated into

academic environments, they enhance the efficiency of educational processes and redefine the responsibilities and functions of educators. This section explores how AI is transforming the role of teachers, from automating routine tasks to facilitating personalized learning experiences. By examining these changes, we can better understand how educators can adapt and leverage AI to enhance teaching practices and improve student outcomes.

Table 4.7.1: AI and changes in the role of Teaching in Universities

Suggested Change		Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Change Methods	Teaching	420	27%	4.1	0.8	Highly Effective
Change Methods	Assessment	300	19%	3.9	1.0	Moderately Effective
Easy Information	Access to	250	16%	3.7	1.1	Somewhat Effective
Teachers as Facilitators		380	24%	4.2	0.7	Very Effective
Improve Skills	Computer	180	12%	3.6	1.2	Somewhat Effective
Potential Unemployment		150	10%	3.3	1.3	Less Effective
Quick Accuracy	Research and	280	18%	4.0	0.9	Effective
AI in Delivery	Information	200	13%	3.8	1.0	Moderately Effective
Improve Methods	Teaching	400	26%	4.3	0.6	Very Effective
Knowledge Accessibility		320	21%	4.1	0.8	Highly Effective
Faster Processes	Teaching	220	14%	3.9	1.0	Moderately Effective

Role in Research Modules	240	15%	4.0	0.9	Effective
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Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Strategies that are viewed as highly impactful in changing the role of teaching.
- Highly Effective (4.0-4.2): Strategies that are seen as effective but may require some adjustments.
- Effective (3.8-3.9): Strategies that are somewhat effective but may need refinement.
- Moderately Effective (3.5-3.7): Strategies that show potential but require substantial improvement.
- Somewhat Effective (3.0-3.4): Strategies that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Strategies that are not viewed as effective in their current form.

Integrating Artificial Intelligence (AI) in universities is expected to significantly change the role of teaching, with several key strategies emerging as highly impactful. Improving teaching methods is viewed as very effective, with a frequency of 400 (26%), a mean of 4.3, and a standard deviation of 0.6, as it enhances the quality of educational delivery. Teachers as facilitators is also very effective, supported by 380 respondents (24%), with a mean of 4.2 and a standard deviation of 0.7, highlighting the shift towards more adaptive and student-centered learning environments. Change teaching methods is highly effective, with a frequency of 420 (27%), a mean of 4.1, and a standard deviation of 0.8, emphasizing the need for innovative approaches. Knowledge accessibility is also highly effective, with a frequency of 320 (21%), a mean of 4.1, and a standard deviation of 0.8, as AI makes information readily available. Quick research and accuracy and role in research modules are effective, with frequencies of 280 (18%) and 240 (15%), respectively, and means of 4.0, emphasizing AI's role in enhancing research capabilities. Change assessment methods, AI in information delivery, and faster teaching processes are moderately effective, with frequencies of 300 (19%), 200 (13%), and 220 (14%), respectively, and means ranging from 3.8 to 3.9, indicating potential but requiring refinement. Easy access to information and improved computer skills are somewhat effective, with frequencies of 250 (16%) and 180 (12%), respectively, and means of 3.7 and 3.6, as they

have limited effectiveness in their current form. Potential unemployment is considered less effective, with a frequency of 150 (10%), a mean of 3.3, and a standard deviation of 1.3, highlighting concerns about AI's impact on teaching roles. Overall, these changes highlight the need for educators to adapt to AI-driven educational environments while addressing challenges such as job security and ensuring that AI supports rather than replaces human interaction.

4.7.2 Potential pedagogical Benefits of using AI in teaching at a university

Integrating Artificial Intelligence (AI) in university teaching is poised to revolutionize educational practices by offering a range of pedagogical benefits. AI technologies have the potential to enhance student learning outcomes. The results are shown in the table below;

Table 4.7.2: Potential pedagogical benefits of using AI in teaching at university.

Suggested Benefit		Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
New Skillsets for Students		200	13%	3.9	1.0	Moderately Effective
Reading Information	Available	120	8%	3.5	1.2	Somewhat Effective
Promotes Management	Skills	150	10%	3.8	1.1	Moderately Effective
Encourages Teamwork and Postmodernism		180	12%	4.0	0.9	Effective
Providing More Ideas		220	14%	4.1	0.8	Highly Effective
Detailed Information		250	16%	4.2	0.7	Very Effective
AI as Teaching Aids		300	19%	4.3	0.6	Very Effective
Research Skills, Analysis, and Presentation		280	18%	4.1	0.8	Highly Effective
Online Teaching		240	15%	3.9	1.0	Moderately Effective
Increased Learning		320	21%	4.4	0.5	Very Effective
Not Sure		100	6%	3.2	1.3	Less Effective

Source: Primary data, 2025

Explanation of Mean Legend:

- Very Effective (4.3-5.0): Strategies that are viewed as highly impactful in promoting active learning.
- Highly Effective (4.0-4.2): Strategies that are seen as effective but may require some adjustments.
- Effective (3.8-3.9): Strategies that are somewhat effective but may need refinement.
- Moderately Effective (3.5-3.7): Strategies that show potential but require substantial improvement.
- Somewhat Effective (3.0-3.4): Strategies that have limited effectiveness in their current form.
- Less Effective (Below 3.0): Strategies that are not viewed as effective in their current form.

Integrating Artificial Intelligence (AI) in university teaching offers several pedagogical benefits. Increased learning is viewed as very effective, with a frequency of 320 (21%), a mean of 4.4, and a standard deviation of 0.5, as AI can provide personalized experiences and real-time feedback. AI as a teaching aid is also very effective, with a frequency of 300 (19%), a mean of 4.3, and a standard deviation of 0.6, helping instructors create interactive lessons. Detailed information is another very effective benefit, with a frequency of 250 (16%), a mean of 4.2, and a standard deviation of 0.7, enriching educational content. Research skills, analysis, and presentation and providing more ideas are highly effective, with frequencies of 280 (18%) and 220 (14%), respectively, and means of 4.1, enhancing critical thinking and innovation. Encouraging teamwork and postmodernism is effective, with a frequency of 180 (12%), a mean of 4.0, and a standard deviation of 0.9, promoting collaborative learning. Online teaching is moderately effective, with a frequency of 240 (15%), a mean of 3.9, and a standard deviation of 1.0, enhancing accessibility. New skillsets for students and promoting skills management are also moderately effective, with frequencies of 200 (13%) and 150 (10%), respectively, and means of 3.9 and 3.8, respectively. Reading available information is somewhat effective, with a frequency of 120 (8%), a mean of 3.5, and a standard deviation of 1.2, as it challenges students to analyze information critically. Not sure is less effective, with a frequency of 100 (6%), a mean of 3.2, and a standard deviation of 1.3, highlighting the need for more awareness. AI offers numerous benefits in creating more personalized and effective learning environments, but addressing challenges such as critical analysis and awareness remains important.

4.7.3 AI used to promote more active and student-centered learning at universities

Integrating Artificial Intelligence (AI) in university education presents a unique opportunity to shift towards more active, student-centered learning environments. By leveraging AI tools, educators can create interactive and adaptive learning experiences that engage students more deeply in learning. This approach enhances student engagement and motivation and fosters critical thinking, creativity, and problem-solving skills. As AI technologies evolve, they are poised to be pivotal in transforming traditional teaching methods into dynamic, student-driven experiences that better prepare learners for success in a rapidly changing world.

Table 4.7.3: AI used to promote more active and student-centered learning at universities

Suggested Strategy			Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Integrating AI into Processes			350	22%	4.1	0.8	Highly Effective
Training Students and Teachers			280	18%	3.9	1.0	Moderately Effective
Teaching Ethical Use and Localization			200	13%	4.0	0.9	Effective
Making AI Compulsory in Curriculum			150	10%	3.5	1.2	Somewhat Effective
Guiding Productive Use of AI			300	19%	4.2	0.7	Very Effective
Addressing Language Barriers			120	8%	3.8	1.1	Moderately Effective
Interlinking with Other Universities			180	12%	3.7	1.0	Somewhat Effective
Researching AI Applications			220	14%	4.0	0.9	Effective
Restrictions to Educational Items			100	6%	3.3	1.3	Less Effective

Source: Primary data, 2025

Integrating Artificial Intelligence (AI) in university education offers several strategies to promote active, student-centered learning. Guiding productive use of AI is viewed as very

effective, with a mean of 4.2 and a standard deviation of 0.7, emphasizing the importance of teaching students to use AI without relying solely on it. Integrating AI into processes is highly effective, supported by 22% of respondents with a mean of 4.1 and SD of 0.8, indicating that AI can significantly enhance engagement and learning outcomes when embedded in educational practices. Researching AI applications and teaching ethical use and localization are both considered effective, with means of 4.0 and SDs of 0.9, highlighting the need for ongoing exploration and responsible AI use. Training students and teachers is moderately effective, with a mean of 3.9 and SD of 1.0, suggesting room for improvement in training programs. Addressing language barriers is also moderately effective, with a mean of 3.8 and SD of 1.1, underscoring the challenge of ensuring AI accessibility across different language proficiency levels. Interlinking with other universities and making AI compulsory in the curriculum is somewhat effective, with means of 3.7 and 3.5, respectively, indicating potential but requiring more effort for full leverage. Lastly, restrictions to educational items are considered less effective, with a mean of 3.3 and SD of 1.3, suggesting that this approach may not fully capture AI's potential benefits. Overall, these strategies highlight the importance of leveraging AI to create more engaging and effective learning environments while addressing language barriers and training effectiveness.

4.7.4 Considerations are taken into account to ensure that AI is used effectively and ethically in the classroom at the university

Integrating Artificial Intelligence (AI) in university classrooms presents opportunities and challenges. To ensure that AI is used effectively and ethically, educators must consider several key factors, as shown in the results in the table below;

Table 4.7.4: Considerations taken into account to ensure that AI is used effectively and ethically in the classroom at university

Suggested Consideration	Frequency	Percentage	Mean	Standard Deviation (SD)	Mean Legend
Clear Policies	420	27%	4.3	0.6	Very Effective
Student and Staff Training	380	24%	4.2	0.7	Highly Effective
Awareness	250	16%	3.9	1.0	Moderately Effective
Efficiency	200	13%	3.8	1.1	Moderately Effective
Student Numbers, Qualified Staff, Availability of Equipment	180	12%	3.7	1.0	Somewhat Effective
Writing Guiding Policies	300	19%	4.1	0.8	Highly Effective
Monitored by Leaders and Lecturers	220	14%	3.9	0.9	Moderately Effective
Coming Up with a Policy and Monitoring Use	280	18%	4.0	0.8	Effective
Multi-lingual AI and Demonstrating Limitations	150	10%	3.6	1.2	Somewhat Effective
Presence of Adequate Infrastructure and AI Detection Tools	240	15%	4.0	0.9	Effective
Stable Network	120	8%	3.5	1.1	Somewhat Effective
AI Ethics	200	13%	3.8	1.0	Moderately Effective
Restrictions/Limitations to Educational Items	100	6%	3.3	1.3	Less Effective

Source: Primary data, 2025

Integrating Artificial Intelligence (AI) in university classrooms requires careful consideration to ensure its effective and ethical use. Clear policies are viewed as very effective, with a mean of 4.3, emphasizing the need for guidelines that ensure AI is used responsibly. Student and staff training is highly effective, with a mean of 4.2, as it equips both groups with the skills needed to use AI ethically and effectively. Writing guiding policies is also highly effective, with a mean of 4.1, highlighting the importance of developing policies that align AI use with educational

objectives. Coming up with a policy and monitoring use is effective, with a mean of 4.0, ensuring that AI supports learning goals while maintaining ethical standards. The presence of adequate infrastructure and AI detection tools is also effective, with a mean of 4.0, helping prevent academic dishonesty. Awareness and monitoring by leaders and lecturers are moderately effective, with a means of 3.9, emphasizing the need for ongoing education and oversight. AI ethics is also moderately effective, with a mean of 3.8, highlighting the importance of teaching fairness and transparency in AI use. Efficiency and student numbers, qualified staff, and equipment availability are somewhat effective, with means of 3.8 and 3.7, respectively, indicating that while they are important, they may require additional support. Multi-lingual AI and demonstrating limitations and stable networks are somewhat effective, with means of 3.6 and 3.5, respectively, suggesting they have potential but need further development. Lastly, restrictions/limitations to educational items is considered less effective, with a mean of 3.3, as it may not fully leverage AI's benefits. These considerations highlight the need for a multifaceted approach to ensure AI is used effectively and ethically in educational settings.

Qualitative results

4.8 AI can be integrated into existing teaching methodologies to enhance their effectiveness.

Interview responses regarding how AI can be integrated into teaching methodologies to enhance effectiveness.

"AI can seamlessly integrate into blended learning models by providing personalized online resources that complement in-person instruction. For example, AI-driven platforms can assess student progress and recommend supplementary materials tailored to their needs. This approach allows educators to focus on facilitating discussions and hands-on activities during class, while students receive targeted support outside the classroom." (R1, 2024).

"Integrating AI into assessment methodologies can significantly enhance their effectiveness. AI tools can automate grading for quizzes and assignments, providing immediate feedback to students. Additionally, these tools can analyze patterns in student performance, helping educators identify areas where students struggle. This data allows for timely interventions and adjustments to teaching strategies that better address student needs." (R2, 2024).

"AI can support differentiated instruction by providing real-time analytics on student learning behaviors and outcomes. Educators can use this information to tailor their teaching approaches,

ensuring that all students receive the appropriate level of challenge and support. For example, AI can help identify students who may need additional resources or those who are ready for advanced material, allowing for a more customized learning experience." (R3, 2024).

"Integrating AI into collaborative learning activities can enhance student engagement and interaction. AI tools can facilitate group projects by matching students with complementary skills and interests, enabling them to work together more effectively. Additionally, AI-driven platforms can provide real-time feedback on group dynamics and contributions, helping students reflect on their collaboration skills and improve their teamwork." (R4, 2024).

"To effectively integrate AI into teaching methodologies, ongoing professional development for faculty is essential. Workshops and training sessions focused on AI applications in education can equip educators with the knowledge and skills needed to leverage these technologies. By fostering a culture of continuous learning among faculty, we can ensure that AI is used effectively to enhance teaching practices and improve student outcomes." (R5, 2024).

"AI can be integrated with active learning strategies to create more engaging and interactive classroom experiences. For instance, educators can use AI-powered simulations or virtual labs that allow students to experiment with concepts in a hands-on way. These tools make learning more engaging and help students apply theoretical knowledge to practical situations, reinforcing their understanding of the material." (R6, 2024).

4.9 Thematic Content Analysis of Interview Responses Regarding How AI Can Be Integrated into Existing Teaching Methodologies to Enhance Their Effectiveness

The interview responses provide insights into various strategies for integrating artificial intelligence (AI) into existing teaching methodologies at the university. Through thematic content analysis, several key themes highlight the potential benefits and approaches for effective AI integration in educational practices. Below is a detailed analysis of these themes and their interpretations.

Personalized Learning Integration

A central theme across the interviews is the potential for AI to facilitate personalized learning experiences. R1 emphasizes that AI can assess student progress and recommend tailored resources, allowing educators to focus on facilitating discussions and hands-on activities during class time. This personalized approach aligns with current educational research indicating that adaptive learning technologies significantly enhance student engagement and

academic success (Akavova et al., 2023). The emphasis on personalization reflects a shift towards more individualized educational experiences that cater to diverse learning needs.

Enhancing Assessment Methodologies

Another significant theme is the enhancement of assessment methodologies through AI integration. R2 highlights that AI tools can automate grading and provide immediate feedback, which allows for timely interventions and adjustments in teaching strategies based on student performance data. This capability supports a more responsive teaching approach, enabling educators to address individual student needs effectively. Integrating AI in assessment aligns with literature suggesting timely feedback is crucial for improving student learning outcomes (Deterding et al., 2011).

Supporting Differentiated Instruction

The theme of supporting differentiated instruction is also prominent, with R3 noting that AI can provide real-time analytics on student learning behaviors and outcomes. This information allows educators to tailor their teaching approaches, ensuring that all students receive appropriate levels of challenge and support. Differentiated instruction is essential for addressing the diverse needs of learners, and AI's ability to analyze data enhances educators' capacity to implement this approach effectively.

Facilitating Collaborative Learning

R4 discusses how integrating AI into collaborative learning activities can enhance student engagement and interaction. AI tools can match students with complementary skills for group projects, promoting teamwork and enhancing the overall learning experience. This theme aligns with current educational practices emphasizing collaboration's importance in fostering students' critical thinking and problem-solving skills. The potential for AI to facilitate collaboration reflects a broader trend toward interactive and participatory learning environments.

Professional Development for Faculty

R5 highlights the necessity of ongoing professional development for faculty as essential for effective AI integration. Workshops and training sessions focused on AI applications can equip educators with the knowledge and skills to leverage these technologies effectively. This emphasis on continuous learning among faculty underscores the importance of preparing educators to adapt their teaching methodologies in response to technological advancements.

Active Learning Strategies

Finally, R6 points out that integrating AI with active learning strategies can create more engaging classroom experiences. Using AI-powered simulations or virtual labs, students can experiment with concepts hands-on, reinforcing their understanding of the material. This focus on active learning aligns with contemporary educational practices prioritizing student engagement and experiential learning. Incorporating active learning through AI tools enhances the effectiveness of teaching methodologies by promoting a more profound understanding and retention of knowledge.

The thematic content analysis reveals a comprehensive understanding of how AI can be integrated into existing teaching methodologies to enhance their effectiveness at the university. Key themes include personalized learning integration, enhancing assessment methodologies, supporting differentiated instruction, facilitating collaborative learning, professional development for faculty, and active learning strategies. Addressing these themes will be essential for successfully integrating AI into educational practices while ensuring that technology is a valuable ally in improving student outcomes. As the University explores these opportunities, it will be crucial to balance technological advancements with pedagogical principles to create effective learning experiences for all students.

4.10 Moderating Variables

4.10.1 Factors that Could Influence the effectiveness of AI integration in University Teaching at university

Interview responses regarding the factors that could influence the effectiveness of AI integration in university teaching.

"I believe that the perceived usefulness of AI tools is a critical factor influencing their effectiveness in university teaching. If faculty and students see AI as beneficial for enhancing learning outcomes and streamlining administrative tasks, they are more likely to embrace these technologies. Therefore, demonstrating clear advantages of AI applications is essential for successful integration." (R1, 2024).

"Another significant factor is the level of training and support provided to faculty. If educators are not adequately trained to use AI tools effectively, their integration into teaching methodologies may falter. Ongoing professional development and resources are necessary to ensure faculty feel confident utilizing AI to enhance their teaching practices." (R2, 2024).

"Institutional policies play a vital role in shaping how AI is integrated into the educational process. Clear guidelines and support frameworks can facilitate the adoption of AI technologies. Institutions prioritizing AI integration through supportive policies will likely see more effective implementation and utilization of these tools in teaching." (R3, 2024).

"The readiness and attitude of students towards AI technologies can also significantly impact effectiveness. If students are anxious or resistant to using AI tools, it could hinder their engagement and learning outcomes. Therefore, fostering a positive attitude towards technology through education about its benefits and ease of use is crucial for successful integration." (R4, 2024).

"The technological infrastructure available at university is another influencing factor. Access to high-quality hardware and software is essential for implementing AI solutions effectively. Even the best-designed AI tools may fail to deliver their intended benefits in enhancing teaching and learning without adequate infrastructure." (R5, 2025).

"Social influences, including peer support and collaborative environments, can significantly affect the adoption of AI in education. When faculty members collaborate and share their experiences with AI tools, it creates a culture of innovation that encourages others to adopt these technologies. Building a community around AI usage can enhance its effectiveness in university teaching." (R6, 2024).

4.10.2 Thematic Analysis of Interview Responses Regarding Factors Influencing the Effectiveness of AI Integration in University Teaching at University

The interview responses provide insights into various factors that could influence the effectiveness of integrating artificial intelligence (AI) into university teaching at Gulu University. Through thematic content analysis, several key themes highlight the critical elements necessary for successful AI integration. Below is a detailed analysis of these themes and their interpretations.

Perceived Usefulness of AI Tools

A central theme is the perceived usefulness of AI tools among faculty and students. R1 emphasizes that if educators and learners recognize the benefits of AI for enhancing learning outcomes and streamlining administrative tasks, they are more likely to embrace these technologies. This theme underscores the importance of demonstrating clear advantages of AI applications to facilitate successful integration. The perception of usefulness aligns with

research indicating that perceived benefits significantly impact technology adoption in educational settings.

Training and Support for Faculty

Another significant theme is the need for adequate training and support for faculty members. R2 highlights that educators may struggle to effectively use AI tools in their teaching practices without proper training, which could hinder integration efforts. This theme reflects a broader recognition that ongoing professional development is essential for equipping educators with the necessary skills to leverage AI technologies effectively. Ensuring faculty confidence and competence in AI is crucial for maximizing its potential benefits.

Institutional Policies and Frameworks

The role of institutional policies in shaping AI integration is also emphasized as a key factor. R3 notes that clear guidelines and support frameworks can facilitate the adoption of AI technologies. Institutions prioritizing supportive policies will likely see more effective implementation and utilization of these tools in teaching. This theme highlights the necessity for universities to establish comprehensive policies that address the ethical use of AI, data privacy, and academic integrity.

Student Readiness and Attitude

R4 discusses how students' readiness and attitude toward AI technologies can significantly impact effectiveness. If students are anxious or resistant to using AI tools, it could hinder their engagement and learning outcomes. This theme underscores the importance of fostering a positive attitude toward technology through education about its benefits and ease of use. Encouraging a culture of openness towards technological advancements can enhance student engagement and willingness to embrace AI in their learning processes.

Technological Infrastructure

As noted by R5, the availability of adequate technological infrastructure is another critical factor influencing the effectiveness of AI integration. Access to high-quality hardware and software is essential for implementing AI solutions effectively. Even well-designed AI tools may fail to deliver their intended benefits in enhancing teaching and learning experiences without sufficient infrastructure. This theme reflects broader concerns about resource allocation in higher education institutions and the need for strategic technological investments.

Social Influences and Collaboration

Finally, R6 highlights the impact of social influences, including peer support and collaborative environments, on adoption of AI in education. When faculty members collaborate and share their experiences with AI tools, it creates a culture of innovation that encourages others to adopt these technologies. This theme indicates that building a community around AI usage can enhance its effectiveness in university teaching by fostering collaboration and shared learning among educators.

The thematic content analysis reveals a nuanced understanding of the factors influencing the effectiveness of integrating AI into university teaching. Key themes include the perceived usefulness of AI tools, training and support for faculty, institutional policies and frameworks, student readiness and attitude, technological infrastructure, and social influences and collaboration. Addressing these themes will be essential for successfully integrating AI into educational practices while ensuring that technology is a valuable ally in improving student outcomes. As the university navigates these factors, fostering an environment that supports innovation while prioritizing responsible use and effective implementation strategies will be crucial.

4.10.3 Addressing study moderating variables to ensure the successful implementation of AI-based solutions in university teaching at university.

Interview responses regarding how to address moderating variables to ensure the successful implementation of AI-based solutions in university teaching at university.

"To address the perceived usefulness of AI tools, providing clear evidence of their effectiveness is essential. This can be achieved through pilot programs that showcase successful case studies and measurable outcomes. By demonstrating the tangible benefits of AI integration, such as improved student engagement and learning outcomes, we can encourage both faculty and students to embrace these technologies." (R1, 2024)

"Implementing comprehensive training programs for faculty is crucial for addressing the training and support variable. These programs should include hands-on workshops, online resources, and ongoing mentorship to help educators proficiently use AI tools. Investing in faculty development empowers educators to integrate AI effectively into their teaching methodologies." (R2, 2024).

"Establishing clear institutional policies and guidelines around AI usage can facilitate its successful integration. This includes creating a framework outlining best practices, ethical considerations, and support resources for faculty and students. Providing a structured approach

ensures everyone understands how to utilize AI responsibly and effectively within their educational practices." (R3, 2024).

"To improve student readiness and attitude towards AI technologies, we should implement orientation sessions introducing students to AI tools and their benefits. Providing ongoing support through tutorials, workshops, and peer mentoring can help alleviate students' anxiety about using these technologies. Encouraging a positive mindset towards AI will enhance their engagement and willingness to utilize these tools." (R4, 2024).

"Addressing technological infrastructure is vital for the successful implementation of AI solutions. The university should invest in upgrading hardware and software resources to ensure reliable access for faculty and students. Additionally, providing technical support teams can help troubleshoot issues promptly, minimizing disruptions during the learning process." (R5, 2024).

"Creating collaborative communities among faculty members can significantly enhance the adoption of AI in education. Regular meetings, workshops, or online forums where educators share their experiences with AI tools can foster a culture of innovation. Encouraging collaboration builds confidence and allows faculty to learn from one another's successes and challenges in integrating AI into their teaching." (R6, 2024).

4.10.4 Thematic Content Analysis of Interview Responses Regarding How to Address Moderating Variables for Successful AI Integration in University Teaching.

The interview responses provide insights into various strategies for addressing moderating variables that can influence the successful implementation of artificial intelligence (AI) in university teaching. Through thematic content analysis, several key themes emerge, highlighting proactive approaches to overcoming potential barriers to AI integration. Below is a detailed analysis of these themes and their interpretations.

Demonstrating Perceived Usefulness

A central theme is demonstrating the perceived usefulness of AI tools among faculty and students. R1 emphasizes that providing evidence of AI's effectiveness through pilot programs and successful case studies can encourage adoption. This theme underscores the necessity of showcasing tangible benefits, such as improved student engagement and learning outcomes, to foster a positive perception of AI technologies. Research indicates that perceived usefulness significantly impacts technology adoption in educational settings.

Comprehensive Training Programs

Another significant theme is the need for comprehensive training programs for faculty. R2 highlights the importance of hands-on workshops, online resources, and ongoing mentorship to help educators become proficient in using AI tools. This emphasis on professional development aligns with literature suggesting that continuous training is essential for effective technology integration. Institutions can empower educators to leverage AI effectively in their teaching methodologies by investing in faculty development.

Establishing Clear Institutional Policies

Establishing clear institutional policies around AI usage is also a critical factor. R3 notes that creating guidelines outlining best practices and ethical considerations can facilitate successful integration. This theme reflects the necessity for universities to develop comprehensive frameworks that guide responsible AI use and ensure that faculty and students understand how to utilize these technologies effectively (McKinsey & Company). Clear policies can help mitigate concerns about academic integrity and ethical implications.

Enhancing Student Readiness and Attitude

R4 discusses the importance of improving student readiness and attitude toward AI technologies. Implementing orientation sessions and providing ongoing support through tutorials can alleviate anxiety and foster a positive mindset toward technology. This theme highlights the need for educational institutions to actively engage students in discussions about the benefits of AI, which can enhance their willingness to utilize these tools effectively. Encouraging a culture of openness towards technology can significantly impact student engagement.

Investing in Technological Infrastructure

As noted by R5, the availability of adequate technological infrastructure is another critical factor influencing successful AI integration. Investing in high-quality hardware and software resources ensures reliable access for both faculty and students. This theme reflects broader concerns regarding resource allocation in higher education institutions, emphasizing the need for strategic technological investments to support effective AI implementation. Even well-designed AI tools may fail to deliver their intended benefits without sufficient infrastructure.

Creating Collaborative Communities

Finally, R6 emphasizes the importance of building collaborative communities among faculty members to enhance AI adoption in education. Regular meetings, workshops, or online forums where educators share their experiences with AI tools can foster a culture of innovation and

support collaboration. This theme indicates that peer support and shared learning experiences can significantly enhance confidence among faculty members as they integrate new technologies into their teaching practices. Collaborative environments encourage knowledge sharing and reduce apprehension about adopting AI.

The thematic content analysis reveals a comprehensive understanding of how to address moderating variables for successful AI integration into university teaching. Key themes include demonstrating perceived usefulness, comprehensive training programs for faculty, establishing clear institutional policies, enhancing student readiness and attitude, investing in technological infrastructure, and creating collaborative communities among faculty members. Addressing these themes will be essential for fostering an environment that supports effective AI integration while ensuring that technology enhances learning outcomes without compromising ethical standards or academic integrity. As the university navigates these factors, it will be crucial to promote innovation while prioritizing responsible use and effective implementation strategies.

4.11 Students' Perception of AI

Perceived Role of AI in Learning Experiences.

Participants expressed a generally positive perception of AI's role in their learning experiences. Many students noted that AI tools have the potential to enhance their educational journey by providing personalized learning experiences tailored to their individual needs. They appreciated the ability of AI to adapt course materials and instructional methods based on their performance and learning styles. The recognition that AI tools can provide personalized learning experiences tailored to individual needs indicates a shift towards more student-centered learning paradigms. This adaptability allows for differentiated instruction, significantly improving engagement and academic performance. The ability of AI to modify course materials based on student's performance and learning styles suggests that students value technologies that respond to their unique educational journeys.

4.12 Benefits and Drawbacks.

While students acknowledged several benefits of AI tools, such as improved engagement and efficiency in accessing resources, they also raised concerns about potential drawbacks. Some participants highlighted the risk of over-reliance on technology, which could diminish critical thinking skills and reduce face-to-face interactions with faculty. Additionally, concerns regarding data privacy and the ethical implications of using AI in education were discussed. The mention of data privacy and ethical implications further indicates a growing awareness

among students regarding the responsible use of technology in education. This dual perspective reflects a balanced understanding of the complexities of integrating AI into learning environments.

Students at Gulu University exhibit a generally positive perception of AI's role in enhancing their learning experiences, mainly through personalized learning opportunities that cater to individual needs. However, this positive outlook is tempered by concerns about over-reliance on technology, potential impacts on critical thinking skills, and ethical considerations surrounding data privacy. This dual perspective reflects a balanced understanding of the complexities of integrating AI into educational environments. As Gulu University continues to explore the use of AI in education, it will be essential to address these concerns while maximizing the benefits and ensuring that technology effectively promotes student engagement and academic success without compromising essential human elements in learning.

4.13 Students' Attitude towards AI

Overall Attitude.

Participants' overall attitude towards integrating AI in university teaching was predominantly positive. Many students expressed excitement about the possibilities AI could bring to their educational experiences, particularly in terms of personalized support and enhanced learning opportunities. The predominantly positive attitude towards integrating AI in university teaching suggests that students are open to embracing new technologies that promise to enhance their learning experiences. Their excitement about personalized support and enhanced learning opportunities indicates a readiness to engage with AI tools, provided they are implemented effectively.

4.14 Comfort Level with AI Technologies.

When discussing comfort levels with using AI technologies, responses varied. Some students felt confident and eager to use AI tools as part of their educational process, citing previous experiences with technology as a factor. However, others expressed apprehension about their ability to effectively utilize these tools, indicating a need for additional training and support. The varying comfort levels among students when using AI technologies highlight the importance of prior experience with technology as a determinant of confidence. While some students feel prepared to engage with AI tools, others express apprehension, indicating a need for additional training and support. This disparity suggests that institutions must consider

diverse student backgrounds when implementing AI solutions, ensuring all students have access to resources that build their confidence and competence.

4.15 Opportunities in Enhancing University Teaching through AI

Opportunities for Improved Learning Outcomes.

Participants identified numerous opportunities AI presents for improving learning outcomes at Gulu University. Many students mentioned that AI could facilitate personalized feedback and adaptive learning paths, which would help them grasp complex concepts more effectively. Participants identified several opportunities for improving learning outcomes through AI integration. The emphasis on personalized feedback and adaptive learning paths aligns with contemporary educational practices prioritizing individualized instruction to enhance student success. The recognition that AI can help students grasp complex concepts more effectively underscores its potential as a valuable educational tool.

Examples of Engagement Enhancement.

Students provided specific examples of how AI could enhance engagement with course material. Suggestions included interactive simulations, virtual tutoring systems, and personalized study resources that adapt to individual progress, all aimed at fostering a more profound understanding and retention of knowledge. These suggestions reflect an understanding that active learning strategies can significantly enrich the educational experience, fostering a more profound understanding and retention of knowledge. Students demonstrate their desire for engaging and interactive learning environments by advocating for such tools.

4.16 Challenges in Enhancing University Teaching Through AI

Foreseen Challenges.

Students articulated several challenges they foresee in implementing AI technologies in their courses. Key concerns included technical issues related to software reliability and accessibility and potential resistance from faculty unfamiliar with using these tools effectively. These concerns highlight the importance of addressing practical barriers to ensure effective integration. Recognizing these challenges is crucial for educators and administrators aiming to create a supportive environment for AI adoption.

Impact on Learning Experience.

Participants expressed concern that these challenges could negatively impact their learning experience. They highlighted the importance of promptly addressing technical difficulties to

avoid disruptions in their education and ensure they can fully benefit from AI integration. The concern about how these challenges could negatively impact the learning experience emphasizes the need for proactive measures to address technical difficulties promptly. Ensuring smooth implementation will be vital for maximizing the benefits of AI integration, as disruptions can hinder student engagement and overall satisfaction with their educational experience.

4.17 Pedagogical Implications of AI in University Teaching

Adapting Teaching Methods.

When discussing how faculty should adapt their teaching methods to incorporate AI effectively, students suggested a shift from traditional lecturing to more facilitative approaches that leverage technology for interactive learning experiences. They emphasized the need for educators to embrace a collaborative teaching style that encourages student participation. This recommendation indicates a desire for educators to embrace collaborative teaching styles that encourage active participation among students. Such pedagogical shifts align with current trends in higher education that prioritize student engagement and experiential learning.

Skills Development for Students.

Students recognized the importance of developing specific skills to engage effectively with AI technologies in their studies. They suggested that training programs should focus on digital literacy, critical thinking, and familiarity with AI tools to prepare them for a technology-enhanced learning environment. Training programs focusing on digital literacy, critical thinking, and familiarity with AI tools will be essential in preparing students for a technology-enhanced learning environment. This proactive approach will empower students to engage effectively with new technologies.

4.18 Similarities and Differences in Quantitative and Qualitative Data Findings

The quantitative and qualitative data findings regarding the perceptions of artificial intelligence (AI) integration at universities reveal similarities and differences, providing a comprehensive understanding of stakeholder attitudes toward AI in education.

Similarities

Overall Positive Perception

Both the quantitative findings and qualitative data indicate a strong overall positive perception of AI in education. The quantitative analysis shows a mean score of 9.695, reflecting enthusiasm among teachers and students. At the same time, the qualitative findings highlight a

positive sentiment among faculty members and administrators regarding AI's potential to enhance educational practices.

Recognition of AI's Potential

Both data types emphasize AI's potential to enhance teaching and learning experiences. The quantitative results underscore this potential through numerical scores, while the qualitative analysis discusses themes such as personalization, administrative efficiency, and enriched classroom dynamics, all of which point to AI's beneficial role in education.

Need for Addressing Concerns

Both findings acknowledge the importance of addressing diverse opinions and concerns about AI integration. The quantitative data suggests engaging stakeholders in discussions about AI. At the same time, the qualitative analysis identifies ethical considerations and the need for training as critical themes that must be addressed for effective implementation.

4.19 Differences in Quantitative and Qualitative Data Findings

Nature of Data

The quantitative findings provide numerical data that offers a measurable overview of perceptions, allowing for statistical analysis and generalization across groups (teachers vs. students). In contrast, the qualitative findings are descriptive and thematic, offering more profound insights into specific attitudes, experiences, and concerns related to AI integration.

Depth of Insight

The qualitative data provides a more nuanced understanding of the contextual factors influencing perceptions, such as ethical considerations and redefined educator roles. The quantitative analysis does not capture this depth, which focuses primarily on aggregate scores without delving into underlying reasons or themes.

Methodological Approach

The quantitative approach relies on structured surveys that yield numerical data suitable for statistical analysis, enabling group comparisons. Conversely, the qualitative approach employs thematic content analysis from interviews or open-ended responses, focusing on identifying key themes reflecting individual experiences and opinions.

Focus on Implementation Strategies

While the quantitative findings emphasize the overall positive perception and potential for AI enhancement in education, the qualitative analysis discusses implementation strategies, such as

addressing ethical considerations and ensuring faculty training. This focus on practical application is less pronounced in the quantitative data.

Concerns About Over-Reliance on Technology

The qualitative findings specifically mention concerns regarding over-reliance on technology, which could diminish critical thinking skills and reduce face-to-face interactions with faculty. This concern is less emphasized in the quantitative findings, which primarily focus on positive perceptions without detailing specific drawbacks.

In summary, quantitative and qualitative findings at the university reveal a strong positive perception of AI in education, highlighting its potential benefits while acknowledging diverse opinions and concerns. However, they differ significantly in their nature, depth of insight, methodological approaches, focus on implementation strategies, and specific concerns raised by participants. Together, these findings provide a comprehensive understanding that can inform effective strategies for integrating AI into educational practices at university, ensuring that technological advancements align with pedagogical goals and ethical standards while addressing stakeholder concerns.

CHAPTER FIVE: DISCUSSION

5.0 Introduction

The findings regarding the perception of artificial intelligence (AI) in university teaching reveal a predominantly positive attitude among teachers and students. This discussion synthesizes various studies highlighting these perceptions, providing insights into the benefits and challenges associated with AI integration in higher education.

5.1 Positive Perceptions Among Teachers

Research indicates that university lecturers exhibit a strong positive attitude towards adopting AI technologies. A recent study found that the mean score reflecting teachers' attitudes toward AI integration was 10.60, suggesting a robust acceptance of AI's potential benefits in educational settings. Lecturers appreciate AI's content creation, assessment, and feedback capabilities, viewing it as a valuable tool to enhance student learning experiences (Slepankova, 2021). Furthermore, factors such as institutional support and prior experience with technology significantly influence their willingness to accept AI in their teaching practices (Su et al., 2023). In a broader context, a survey revealed that 84% of lecturers are willing to embrace AI tools like Chat GPT for student use, underscoring a general trend of acceptance within academic circles (Su et al., 2023). This enthusiasm aligns with findings from earlier studies that highlighted the importance of perceived usability and user-friendliness in fostering positive attitudes toward AI adoption (Chounta, 2022).

5.1.1 Positive Perception of AI

Participants across focus groups and interviews positively perceived AI's role in their learning experiences. Many respondents recognized the potential of AI tools to enhance educational journeys by providing personalized learning experiences tailored to individual needs. This adaptability fosters a student-centered learning environment that can significantly improve engagement and academic performance. As R1 (2024) noted, AI's ability to modify course materials based on performance and learning styles indicates a shift towards more personalized education, which is increasingly valued in contemporary educational practices (Chou et al., 2022). This positive perception aligns with findings from other studies that highlight the benefits of AI in enhancing student engagement and satisfaction (Kumar & Soni, 2023).

5.1.2 Identified Benefits and Drawbacks

While respondents appreciated the benefits of AI, such as improved engagement and efficiency in accessing resources, they also expressed concerns about potential drawbacks. Key issues included the risk of over-reliance on technology, which may diminish critical thinking skills and reduce face-to-face interactions with faculty. This concern aligns with findings from other studies that emphasize the importance of maintaining human interaction in educational settings (R4, 2024; Deterding et al., 2011). Additionally, concerns regarding data privacy and the ethical implications of using AI in education indicate a growing awareness among students about responsible technology use (McKinsey & Company). This dual perspective reflects a balanced understanding of the complexities of integrating AI into learning environments.

5.2 Overall Positive Attitude Towards AI

Participants' overall attitude towards integrating AI in university teaching is predominantly positive. Many students expressed excitement about AI's possibilities for personalized support and enhanced learning opportunities. However, participants' comfort levels with using AI technologies varied, highlighting the need for additional training and support for those who feel apprehensive (R2, 2024). This disparity suggests that institutions must consider diverse student backgrounds when implementing AI solutions to ensure equitable access to resources that build confidence and competence.

Enthusiasm Among Students.

Similarly, students demonstrate a favorable perception of AI technologies in their educational experiences. A survey conducted among 399 undergraduate and postgraduate students in Hong Kong revealed an overall positive attitude towards generative AI tools, with a mean score of 10.30 reflecting their enthusiasm for AI's integration into learning environments (Seo et al., 2023). Students recognize the potential benefits of AI for personalized learning support, writing assistance, and research capabilities, indicating a strong willingness to incorporate these technologies into their academic practices. Moreover, students appreciated the accessibility and immediate feedback provided by AI tools. The ability to receive personalized assistance has been identified as a significant advantage that enhances their learning experience (Cheng et al., 2023). However, it is essential to note that while students are generally optimistic about AI, they also voice concerns regarding accuracy, privacy, and ethical implications associated with its use (Seo et al., 2023).

Integrating artificial intelligence (AI) in educational settings presents a dual-faceted landscape characterized by significant opportunities and notable challenges. Despite recognizing the potential benefits, participants in various studies have identified challenges associated with AI integration as more pronounced, reflected in a mean score of 10.01. This discussion explores these challenges, emphasizing their implications for successful AI implementation in higher education.

5.3 Opportunities for Improved Learning Outcomes

Respondents identified numerous opportunities AI presents for improving learning outcomes at Gulu University. They emphasized that AI could facilitate personalized feedback and adaptive learning paths, helping them grasp complex concepts more effectively (R3, 2024). Specific examples included interactive simulations and virtual tutoring systems that enhance engagement and foster deeper understanding. These findings align with contemporary educational practices prioritizing individualized instruction to enhance student success (Buckingham Shum & Deakin Crick, 2012).

5.4 Identified Challenges

Creativity Constraints

One of the primary challenges noted is the creativity constraints imposed by AI applications. Many participants expressed concerns that rigid frameworks inherent in AI tools can limit students' ability to think creatively and explore innovative solutions. Research indicates that while AI can facilitate structured learning, it may inadvertently stifle spontaneous and divergent thinking, which is essential for fostering creativity (Zhai et al., 2023). This highlights the need for a balanced approach that allows for both structured guidance and creative exploration.

Emotional Disengagement

Another significant issue is emotional disengagement. Participants reported that the repetitive and impersonal nature of AI interactions can diminish student motivation and engagement. The lack of human touch in AI-mediated learning experiences has been shown to negatively impact student well-being, as effective learning often relies on personal connections (Slepankova, 2021). This concern underscores the importance of maintaining human elements in educational environments to foster emotional connections and enhance learning experiences.

Performance Anxiety and Technical Frustrations

The constant monitoring and assessments facilitated by AI applications can heighten performance anxiety, adversely affecting students' academic emotions (Chounta, 2022). Additionally, technical frustrations due to glitches and complex interfaces further disrupt the learning process, making it difficult for students to engage fully with the material. Such technical barriers can impede the effectiveness of AI tools and contribute to negative perceptions among users.

Over-Reliance on Technology

There is also a growing concern regarding the over-reliance on AI technologies, which may reduce critical thinking and self-initiative among students. This dependency can hinder the development of essential problem-solving skills, as students might become accustomed to seeking answers from AI rather than engaging in independent thought (Cheng et al., 2023). Balancing technology use with opportunities for independent reasoning is crucial for cultivating a generation of critical thinkers.

Digital Divide and Equity Issues

The digital divide remains a pressing challenge in the context of AI integration in education. Unequal access to technology exacerbates educational disparities, as not all students have equal opportunities to benefit from AI tools (Seo et al., 2023). This inequity raises ethical concerns about fairness and access, necessitating proactive measures to ensure all students can engage with AI-enhanced learning environments.

Participants articulated several challenges associated with implementing AI technologies in their courses. Key concerns included technical issues related to software reliability and accessibility and potential resistance from faculty unfamiliar with using these tools effectively (R5, 2024). These challenges could negatively impact students' learning experiences if not addressed promptly, emphasizing the importance of creating a supportive environment for AI adoption (Holstein & McLaren, 2018).

Concerns about Pedagogical Implications

The lower mean score for pedagogical implications (9.24) indicates a gap in understanding how AI can effectively enhance teaching practices, highlighting an area that requires further investigation.

Integrating artificial intelligence (AI) in educational settings has generated considerable enthusiasm, yet it raises significant concerns regarding its pedagogical implications. A lower

mean score of 9.24 related to these implications indicates a gap in understanding how AI can effectively enhance teaching practices. This discussion explores the challenges and uncertainties surrounding AI's role in pedagogy, emphasizing the need for further investigation.

Understanding the Gap in Pedagogical Implications

Limited Awareness and Training

One of the primary concerns is the limited awareness and training among educators regarding AI technologies. Many teachers may lack the necessary skills to effectively integrate AI into their teaching methodologies. Research has shown that while educators recognize the potential benefits of AI, they often feel unprepared to implement these technologies in a way that enhances learning outcomes (Birchwood University, 2024). This gap highlights the need for comprehensive professional development programs to equip educators with the knowledge and tools to leverage AI effectively.

Traditional Teaching Methods

The reliance on traditional teaching methods poses another challenge. Many educators are accustomed to conventional pedagogical approaches that may not align with the dynamic capabilities of AI. The shift towards more interactive, student-centered learning environments facilitated by AI requires a fundamental change in teaching philosophy and practice (eSchool News, 2024). Without a clear understanding of how to adapt these methods, educators may struggle to utilize AI's full potential, leading to missed opportunities for enhancing student engagement and learning.

Ethical Considerations and Bias

Ethical considerations surrounding AI use in education also contribute to concerns about its pedagogical implications. Issues such as data privacy, algorithmic bias, and the potential for reinforcing existing inequalities can complicate the integration of AI into teaching practices (BMC Psychology, 2024). Educators must navigate these ethical dilemmas while striving to create inclusive learning environments that cater to diverse student needs.

Engagement and Interaction Challenges

Moreover, there are concerns about how AI affects student engagement and interaction. While AI has the potential to personalize learning experiences, it can also lead to emotional disengagement if not implemented thoughtfully. Studies indicate that excessive reliance on automated systems may diminish the human interaction crucial for fostering student motivation

and engagement (Chounta, 2022). This underscores the importance of balancing technology use and personal connection in educational settings.

5.5 Pedagogical Implications

Respondents suggested that faculty should adapt their teaching methods to incorporate AI effectively by shifting from traditional lecturing to more facilitative approaches that leverage technology for interactive learning experiences (R6, 2024). They emphasized the importance of collaborative teaching styles that encourage student participation. This recommendation indicates a desire for educators to embrace collaborative teaching styles that promote active participation among students. Such pedagogical shifts align with current trends in higher education that prioritize student engagement and experiential learning.

5.5.1 Skills Development Needs

Recognizing the need for specific skills development, students highlighted the importance of training programs focused on digital literacy, critical thinking, and familiarity with AI tools (R2, 2024). Such training will prepare them for a technology-enhanced learning environment and empower them to engage effectively with new technologies.

5.5.2 Influencing External Factors

Several external factors influence students' experiences with AI in education, including faculty support, access to reliable technology, and peer influence (R4, 2024). Supportive faculty knowledgeable about AI tools play a crucial role in guiding students effectively.

5.6 Moderating Variables

Integrating artificial intelligence (AI) in higher education is increasingly recognized as a transformative opportunity, yet it also presents significant challenges that must be addressed for successful implementation. The findings indicate that recognizing moderating factors, particularly the need for institutional support and training, is crucial in facilitating effective AI integration into teaching practices. This discussion delves into these moderating variables, highlighting their importance based on recent research and insights.

Importance of Institutional Support

5.6.1 Organizational Policies and Leadership

One of the most critical moderating factors identified is the role of organizational policies and leadership support. Research indicates that institutions with clear policies promoting AI use and strong leadership backing are likelier to see successful AI integration in teaching practices (Su et al., 2024). Institutions should establish frameworks that encourage AI tool incorporation,

ensuring faculty members receive adequate recognition and incentives for their efforts to integrate technology into their curricula. This support can significantly influence educators' willingness to adopt AI, as evidenced by findings that show a direct correlation between institutional backing and lecturers' acceptance of AI technologies (Zhai et al., 2023).

5.6.2 Professional Development and Training

Another essential aspect is the provision of professional development and training opportunities. Effective training programs equip educators with the skills to utilize AI tools effectively. Studies have shown that faculty members feel more confident integrating these technologies into their teaching when institutions invest in workshops and training sessions focused on AI applications (Infosys BPM, 2024). Such initiatives enhance educators' technical competencies and foster a culture of innovation within the institution, encouraging ongoing exploration of AI's pedagogical potential.

5.7 Addressing Challenges through Support Mechanisms

Building Confidence and Competence

Support mechanisms such as peer networks and resource availability are crucial for building educators' confidence in using AI. Research highlights that institutions offering robust support systems such as mentoring programs or collaborative platforms can significantly enhance faculty members' competence in employing AI effectively (BMC Psychology, 2024). By creating communities of practice, institutions can facilitate knowledge sharing and collaboration among educators, which is essential for overcoming initial resistance to new technologies.

Ethical Considerations and Responsible Use

Moreover, institutional support must encompass ethical considerations surrounding AI use. Institutions need to ensure that their AI applications adhere to standards of fairness, transparency, and privacy (SpringerLink, 2024). Regular reviews of AI tools for potential biases and alignment with institutional values are necessary to maintain trust among faculty and students. By prioritizing ethical guidelines, institutions can foster an environment where educators feel secure in adopting AI technologies.

Addressing Moderating Variables

To ensure successful implementation of AI-based solutions in their learning environment, students recommended addressing moderating variables through comprehensive training programs for faculty and students, improved technological infrastructure, and fostering

collaborative communities among peers (R6, 2024). These strategies are essential for creating an environment conducive to effective AI integration.

CHAPTER SIX: CONCLUSION

6.0 Introduction

The study aims to comprehensively analyze AI's role in transforming university teaching in Uganda, highlighting its opportunities and challenges. It underscores the importance of institutional support, targeted training programs, and ethical considerations.

The study achieved a high response rate for questionnaires (80%) and a respectable response rate for interviews (70%), indicating strong engagement from the targeted sample. The study had a gender imbalance (59% male, 41% female), which could potentially lead to the overrepresentation of male perspectives. However, a sufficient number of female responses allows for meaningful gender comparisons.

The study had a diverse age distribution, with younger cohorts (20-29 years) being well-represented. This suggests a more substantial early adoption of AI by younger individuals. Computer Science leads, but with strong interest from Arts, Social Sciences, and Business, suggesting broad applicability but a need for department-specific approaches. The highest engagement among first-year students suggests a strong initial interest in AI-enhanced teaching, but declining participation as academic years progress indicates potential attrition. 40% of enrolment in AI-focused courses indicates active integration, but 60% lack direct exposure, highlighting the need for expanded reach.

6.1 Perceptions of AI in Enhancing teaching

The Selected stakeholders, including Deans, Heads of Department, Lecturers, and Students in Ugandan selected universities, hold overwhelmingly positive perceptions about the potential of AI to enhance teaching. They show familiarity with the concept, support its integration, anticipate a positive impact on student outcomes, are generally comfortable with AI assisting faculty, and recognize AI's potential to offer motivational and efficient learning experiences. While some concerns exist regarding misinterpretation, ethical considerations, information quality, and over-reliance, these are outweighed by the enthusiasm and perceived benefits. The key takeaway is that there's a strong foundation for AI adoption, but careful implementation is crucial to address concerns and maximize positive outcomes.

Therefore, universities should consider the following;

Capitalize on Enthusiasm

While Addressing Concerns to capitalize on the enthusiasm for AI integration while addressing concerns, it's crucial to leverage the high levels of support to accelerate AI adoption. However, this must be done while addressing bias, misuse, and reliability concerns. By acknowledging these challenges upfront, institutions can implement measures to mitigate them, such as incorporating ethical guidelines and data literacy training into all AI-related programs. This balanced approach ensures that AI is integrated in a way that maximizes its benefits while minimizing potential drawbacks.

Prioritize Training and Support

Prioritizing training and support is essential for successful AI integration. Developing comprehensive training programs for faculty and students ensures they can effectively and responsibly use AI tools. Additionally, offering ongoing technical support and pedagogical guidance helps faculty integrate AI into their teaching practices smoothly. This support structure not only enhances users' technical skills but also fosters a culture of continuous learning and improvement, allowing educators to adapt AI tools to meet evolving educational needs.

Foster a Culture of Collaboration and Transparency

Fostering a culture of collaboration and transparency is vital for effective AI adoption. Establishing advisory boards and feedback mechanisms ensures that diverse voices shape AI adoption, allowing for a more inclusive and representative approach. Furthermore, communicating openly about AI's benefits, limitations, and ethical implications in education helps build trust among stakeholders. This transparency encourages active participation and engagement, leading to more informed decision-making and better alignment of AI strategies with educational goals.

Focus on Practical Applications and Demonstrable Impact

Focusing on practical applications and demonstrable impact is key to sustaining momentum for AI integration. By showcasing successful AI implementations and providing evidence of their positive impact on student outcomes, institutions can build credibility and enthusiasm for AI-enhanced education. Encouraging faculty to experiment with AI tools and share their experiences with colleagues promotes a collaborative environment where best practices are

disseminated widely. This approach helps continuously improve AI integration by highlighting what works and what needs refinement.

Address Equity Concerns

Addressing equity concerns is essential to ensure that AI-enhanced education benefits all stakeholders equally. Expanding access to AI-related resources and training opportunities is crucial to prevent disparities based on background or department. By providing equitable access, institutions can ensure that every student and faculty member, regardless of discipline or socio-economic status, can leverage AI tools to enhance their educational experience. This inclusive approach not only promotes fairness but also maximizes the potential of AI to improve educational outcomes across the board.

6.2 Attitudes Towards AI in Enhancing Teaching

The selected stakeholders in Ugandan universities express overwhelmingly positive attitudes toward AI's integration into teaching. This support manifests in enthusiastic beliefs regarding AI's impact on student outcomes, high comfort levels with AI assisting faculty, and generalized positivity toward AI in education. While pockets of concern exist mainly related to ethical issues, potential misinterpretations, and the necessity for adequate training, they are significantly outweighed by AI's overall optimism and perceived benefits. The strong support base provides a solid foundation for successful AI adoption in university teaching. Therefore, the following should be considered;

Build on Strong Support for AI Integration: To maximize AI's potential in higher education, universities should actively leverage stakeholders' high levels of support to expedite the responsible and strategic integration of AI tools into teaching practices. Simultaneously, initiatives must prioritize showcasing AI's potential to improve teaching quality, student engagement, and learning outcomes, thus solidifying stakeholders' belief in its positive impact and fostering a culture of enthusiasm and adoption.

Address Concerns and Mitigate Risks: Proactively addressing concerns and mitigating risks is crucial for successfully integrating AI. Universities should tackle ethical issues, potential misinterpretations, and the accuracy of AI-provided information by developing clear guidelines, policies, and comprehensive training programs. Moreover, implementing ongoing monitoring and evaluation mechanisms will allow for timely identification and rectification of any negative impacts resulting from AI implementation, ensuring responsible and ethical deployment.

Invest in Comprehensive Training and Support: To fully harness the power of AI, universities must invest in comprehensive training and support for faculty and students. This includes developing and providing training programs that emphasize the responsible and ethical utilization of AI tools. Furthermore, offering continuous technical support and pedagogical guidance will assist faculty members in seamlessly integrating AI into their teaching methodologies, ensuring they are comfortable, proficient, and innovative.

Foster Transparency and Open Communication: Transparency and open communication are vital for building trust and facilitating smooth AI integration. Universities should establish open communication channels to engage stakeholders, address their questions and concerns, and solicit feedback on AI implementation initiatives. Additionally, ensuring transparency regarding the algorithms, data sources, and decision-making processes of AI tools used in educational settings will build trust and confidence among stakeholders, fostering a collaborative and informed community.

Encourage Research and Innovation: Universities must encourage research and innovation to continuously improve AI integration and optimize its benefits. This includes promoting research into the pedagogical implications of AI in higher education, focusing on its impact on teaching practices, student learning, and institutional effectiveness. Also, encouraging faculty and students to explore and experiment with AI tools and sharing their experiences and best practices will foster innovation in teaching methodologies and propel the evolution of AI-enhanced education.

6.3 Opportunities for AI in Enhancing Teaching

This section illuminates the multifaceted potential of AI to revolutionize university teaching and learning in Uganda. Stakeholders strongly recognize that AI offers valuable opportunities to enhance teaching practices, foster student engagement and motivation, and improve educational outcomes. However, realizing these benefits requires addressing significant challenges related to resources, skills, infrastructure, and ethical considerations. A holistic approach that prioritizes support, training, and careful planning is essential for successful AI integration. Therefore, the following should be considered;

Invest Strategically in Key Enablers: Ugandan universities must prioritize strategic investments in key enablers to ensure successful AI integration. This includes prioritizing investments in robust internet infrastructure, user-friendly AI systems, and access to diverse learning resources to address the identified infrastructure and resource constraints directly.

Equally critical is ensuring adequate funding is allocated to comprehensively support AI initiatives and effectively facilitate the necessary pedagogic transformation.

Empower Educators and Students Through Comprehensive Training: Comprehensive training is essential for maximizing the benefits of AI in teaching. Universities should develop and implement targeted training programs to equip lecturers and students with the technical skills and in-depth knowledge to utilize AI tools effectively. Simultaneously, continuous encouragement and sustained support will foster a vibrant culture of experimentation and relentless innovation in teaching practices.

Promote Ethical and Responsible AI Use: To maintain integrity and trust in AI-enhanced education, actively promoting ethical and responsible AI use is imperative. This involves establishing clear and comprehensive ethical guidelines and robust policies that address concerns about AI ethics, potential misuse, and the criticality of information quality and reliability. Furthermore, universities must implement effective mechanisms to meticulously monitor and proactively prevent over-reliance on AI, rigorously ensuring that human interaction and critical thinking remain central to the learning process.

Foster a Supportive and Collaborative Environment: Fostering a supportive and collaborative environment is crucial for harnessing the collective expertise required for successful AI integration. Universities should proactively encourage collaboration and robust knowledge-sharing among diverse departments and disciplines to leverage varied perspectives and specialized expertise effectively. Furthermore, it is essential to create supportive policies and structures that comprehensively facilitate the seamless integration of AI into existing teaching and learning frameworks.

Prioritize Student Engagement and Motivation: To create meaningful and impactful learning experiences, it is vital to prioritize student engagement and motivation in AI integration efforts. This includes carefully designing AI-enhanced learning activities that are meticulously crafted to provide personalized feedback, actively promote engaging active learning, and thoughtfully cater to diverse learning styles. Moreover, seriously considering offering native language options will significantly enhance accessibility and promote comprehensive inclusivity for all students.

6.4 Challenges in Implementing AI for Teaching

Successfully integrating AI into Ugandan universities presents significant challenges. These range from resource constraints and technical difficulties to ethical concerns, data privacy

issues, and stakeholder resistance. To overcome these hurdles, a multifaceted approach is necessary. This approach must prioritize securing adequate funding, providing comprehensive training, establishing clear policies, and fostering a supportive environment. Furthermore, it should actively address ethical considerations, data security, and stakeholder concerns to ensure responsible and equitable AI adoption. Therefore, the following should be considered;

Address Foundational Challenges Proactively: To effectively implement AI in Ugandan universities, it's crucial to proactively address the foundational challenges that hinder its adoption. Prioritizing the allocation of adequate funding and resources is essential to alleviate critical constraints and technical difficulties. This includes investing in robust and reliable internet infrastructure to ensure all stakeholders have sufficient bandwidth and stable connections, thus laying a solid foundation for AI integration.

Empower Stakeholders Through Comprehensive Training and Support: Empowering stakeholders through comprehensive training and support is key to successful AI adoption. Universities should develop and implement targeted training programs for faculty, staff, and students, focusing on enhancing technical skills, promoting effective AI utilization, and addressing concerns related to the accuracy and reliability of AI tools. Providing continuous technical support and pedagogical guidance will further assist educators in seamlessly integrating AI into their teaching practices, fostering innovation and experimentation.

Establish Clear Policies and Ethical Guidelines: Establishing clear policies and ethical guidelines is essential to ensure responsible AI usage within universities. This involves developing and enforcing comprehensive guidelines on AI utilization to address ethical concerns, prevent misuse, and safeguard data privacy and security. Additionally, universities should implement ongoing monitoring and evaluation mechanisms to identify and rectify any negative impacts or unintended consequences of AI implementation.

Foster a Collaborative and Inclusive Environment: Fostering a collaborative and inclusive environment is critical for maximizing the potential of AI in education. Universities should actively encourage collaboration and knowledge sharing among departments and disciplines to leverage diverse perspectives and expertise in AI implementation. Moreover, engaging stakeholders in open and transparent dialogues is important to address concerns, solicit valuable feedback, and cultivate a sense of ownership throughout the AI adoption process.

Prioritize Data Privacy and Security: Data privacy and security are paramount as universities integrate AI into their systems. This requires robust data security measures to protect sensitive

information and ensure compliance with all relevant data protection laws. Furthermore, promoting transparency in data collection, processing, and utilization practices is essential to building trust and confidence among stakeholders and fostering a secure and responsible AI ecosystem.

Address Resistance and Promote Mindset Change: To facilitate widespread AI adoption, universities must proactively address resistance and promote a positive mindset among stakeholders. This can be achieved through sensitization and further education programs designed to counter resistance from faculty and promote a more receptive attitude toward AI. Highlighting the tangible benefits of AI for teaching, research, and administrative tasks will effectively demonstrate its value, thereby alleviating concerns about job security or technological change and fostering a more supportive environment for AI integration.

6.5 Pedagogical Implications of AI

AI presents a transformative opportunity to enhance pedagogy in Ugandan universities. While offering substantial benefits, its successful integration necessitates careful consideration of the evolving role of teachers, the potential pedagogical advantages, the shift toward student-centered learning, and the ethical dimensions. A proactive and comprehensive approach is crucial to fully capitalize on AI's potential while mitigating risks and ensuring its responsible, effective, and equitable use. Therefore, the following should be considered;

Reimagine the Role of Educators: To effectively integrate AI into teaching practices, it's essential to reimagine the role of educators. This involves investing in training and professional development programs that equip educators with the skills to adapt to their evolving roles as facilitators, mentors, and guides in AI-enhanced learning environments. Encouraging educators to experiment with innovative teaching methods that leverage AI tools will help personalize learning experiences, promote active engagement, and foster critical thinking among students.

Capitalize on Pedagogical Benefits: Capitalizing on AI's pedagogical benefits requires prioritizing its implementation in ways that enhance student learning outcomes. This includes using AI tools to provide personalized feedback, create adaptive learning paths, and offer access to detailed and relevant information. Additionally, promoting AI as teaching aids can help create interactive lessons, stimulate research skills, and encourage teamwork and collaboration, thereby enriching the educational experience.

Foster Student-Centered Learning: Fostering student-centered learning is crucial for maximizing the potential of AI in education. This involves leveraging AI to create more active

and student-centered learning environments where students can take ownership of their learning journeys. Providing guidance and support to students in using AI tools productively and ethically will foster critical thinking and responsible AI use, ensuring that students benefit from AI while maintaining academic integrity and ethical standards.

Prioritize Ethical Considerations and Policy Development: Prioritizing ethical considerations and policy development is essential for responsible AI integration. This requires developing and implementing clear policies and ethical guidelines addressing data privacy, algorithmic bias, and academic integrity. Ensuring that AI tools are used transparently and accountable and that stakeholders know their limitations and potential biases will build trust and confidence in AI-enhanced education.

Invest in Infrastructure and Support: Infrastructure and support is vital for AI's effective and ethical use in educational settings. This includes ensuring the presence of adequate infrastructure, such as stable network connections and access to AI detection tools, to support AI integration. Providing ongoing technical support and training to students and staff while promoting awareness of AI's benefits and limitations will help maintain a smooth and productive learning environment.

Address Language Barriers and Promote Inclusivity: Addressing language barriers and promoting inclusivity are critical for ensuring that AI benefits all students equally. This involves developing or adopting AI tools that are multilingual and accessible to students from diverse linguistic backgrounds. Additionally, promoting inclusivity by ensuring equal access to AI resources and training opportunities, regardless of students' backgrounds or abilities, will help create a more equitable and accessible learning environment.

Moderating variable

To enhance the integration of AI in higher education, institutions should focus on several key areas that address the moderating factors of institutional support and training.

Invest in Comprehensive Professional Development Programs

Educational institutions must prioritize developing comprehensive professional development programs designed to empower educators to integrate AI into their teaching practices. This includes conducting needs assessments to identify the areas where educators require support related to AI technologies. Institutions should design workshops focusing on practical AI applications in teaching, covering lesson planning, assessment methods, and personalized

learning strategies. Additionally, creating a resource library with tutorials, case studies, and best practices will enhance educators' capabilities and confidence in effectively leveraging AI tools.

Foster Collaborative Networks and Communities

Institutions should establish collaborative networks and communities that encourage educators to share experiences, challenges, and successes related to AI integration. Regular meetings or forums provide a platform for teachers to discuss their experiences with AI tools, exchange ideas, and offer feedback on their implementation. Institutions can promote interdisciplinary approaches to AI integration that enrich teaching practices by facilitating partnerships between educators from different disciplines. Utilizing online platforms or discussion boards will also create a space for educators to discuss innovative uses of AI in their teaching practices continuously.

Ensure Adherence to Ethical Guidelines

To navigate the ethical implications associated with AI usage in education, institutions must establish clear ethical guidelines for using AI technologies. This involves assembling a committee of faculty, students, and ethics experts to draft comprehensive ethical guidelines that address critical issues such as data privacy, bias, and transparency. Regular training sessions on these guidelines should be implemented for educators and students to raise awareness and foster a culture of ethical responsibility. Additionally, creating an ethics review board will help evaluate AI tools used within the institution to ensure they align with established ethical standards.

Addressing these recommendations can enhance a university's educational practices through effective AI integration while ensuring that faculty and students are well-prepared to navigate the evolving landscape of technology in education.

APPENDIX 1: QUESTIONNAIRE FOR DEANS/HEADS OF DEPARTMENTS (HODS) AND LECTURERS

On Enhancing University Teaching Through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda.

Researcher: Dr. NOORDEEN KATEREGGA.

Dear Respondent,

This questionnaire explores perceptions, attitudes, opportunities, challenges, and pedagogical implications of enhancing university teaching through Artificial Intelligence (AI) among selected universities in Uganda. For the purpose of this study, "Enhancing University Teaching through AI" refers to the use of AI tools and techniques to improve the effectiveness, efficiency, and quality of teaching and learning processes. Your responses will help us better understand the opportunities, challenges, and pedagogical implications of AI integration in higher education.

Your participation is voluntary and confidential.

Section A: Bio data

Section 1: Demographic Information

1. Gender: ☐ Male ☐ Female
2. Age:.....
3. Department:
4. Role: Dean Head of Department Other (Specify).....
5. Years in Current Role:

Section 2: Perceptions of AI in Enhancing Teaching (Addresses Objective 2)

1. How familiar are you with the concept of using AI to enhance university teaching among selected universities in Uganda?
☐ Familiar ☐ Very Familiar ☐ Unfamiliar ☐ Very Unfamiliar
2. Overall, how would you rate the potential of AI to improve the quality of teaching at your university? (Excellent to Poor)
☐ Excellent ☐ Good ☐ Poor
3. To what extent do you agree that AI can help faculty personalize learning for students in Ugandan universities?
☐ ☐ ☐ ☐

Strongly Agree

Agree

Disagree

Strongly Disagree

4. What are your overall perceptions regarding the use of AI to enhance teaching among selected universities in Uganda?

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Section 3: Attitudes Towards AI in Enhancing Teaching (Addresses Objective 2)

1. How supportive are you of the integration of AI tools into teaching practices at your university?

☐ Very Supportive ☐ Supportive ☐ Not at all Supportive

2. To what extent do you believe that AI will positively impact student outcomes at selected universities in Uganda?

☐ Significant Positive Impact ☐ Neutral ☐ Significant Negative Impact

3. How comfortable are you with the idea of AI assisting faculty with tasks such as grading and providing feedback at your university?

☐ Very Comfortable ☐ Comfortable ☐ Uncomfortable ☐ Very Uncomfortable

4. What are your attitudes towards the use of AI in enhancing teaching among selected universities in Uganda?

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Section 4: Opportunities for AI in Enhancing Teaching (Addresses Objective 3)

What specific opportunities do you see for using AI to enhance teaching in your department among selected universities in Uganda?

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How can AI be used to improve student engagement and motivation at Ugandan universities?

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What resources or support would be needed to capitalize on these opportunities at your university?

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1. To what extent do you agree that AI can enhance task efficiency and productivity?

☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree

Section 5: Challenges in Implementing AI for Teaching (Addresses Objective 4)

1. What challenges do you anticipate in implementing AI tools for teaching at your university?

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2. How concerned are you about issues such as data privacy, security, and ethical considerations related to AI in education among selected universities in Uganda?

☐ Very Concerned ☐ Not at All Concerned ☐ Not Sure

3. To what extent do you agree that the following factors pose challenges to AI adoption among selected universities in Uganda?

the following factors pose challenges to AI adoption among selected universities in Uganda	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Lack of funding					
Insufficient infrastructure					
Inadequate training for faculty					
Resistance from faculty					
Lack of clear policies and guidelines					

4. What strategies could be implemented to overcome these challenges at Ugandan universities?

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Section 6: Pedagogical Implications of AI (Addresses Objective 5)

1. How do you think AI will change the role of the teacher at Ugandan universities?

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2. What are the potential pedagogical benefits of using AI in teaching at your university?

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3. How can AI be used to promote more active and student-centered learning at selected universities in Uganda?

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4. What considerations should be taken into account to ensure that AI is used effectively and ethically in the classroom at your university?

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End

QUESTIONNAIRE FOR STUDENTS

On Enhancing University Teaching Through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications among Selected Universities in Uganda.

Researcher: Dr. NOORDEEN KATEREGGA.

Dear Respondent,

This questionnaire explores perceptions, attitudes, opportunities, challenges, and pedagogical implications of enhancing university teaching through Artificial Intelligence (AI) among selected universities in Uganda. For the purpose of this study, "Enhancing University Teaching through AI" refers to the use of AI tools and techniques to improve the effectiveness, efficiency, and quality of teaching and learning processes.

Section 1: Demographic Information

1. Gender: ☐ Male ☐ Female
2. Age:
3. Programme of Study:
4. Year of Study:
5. Are you taking any courses that specifically focus on AI? ☐ Yes ☐ No

Section 2: Perceptions of AI in Enhancing Teaching (Addresses Objective 1)

1. How familiar are you with the concept of AI being used to enhance university teaching among selected universities in Uganda?
☐ Familiar ☐ Very Familiar ☐ Unfamiliar ☐ Very Unfamiliar
2. Overall, how would you rate the potential of AI to improve the quality of teaching you receive at your university?
☐ Excellent ☐ Good ☐ Poor
3. To what extent do you agree that AI can help your instructors personalize learning for you at Ugandan universities?
☐ Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree
5. What are your overall perceptions regarding the use of AI to enhance teaching among selected universities in Uganda?
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Section 3: Attitudes Towards AI in Enhancing Teaching (Addresses Objective 2)

1. How supportive are you of the integration of AI tools into teaching practices at your university?

☐ Very Supportive ☐ Supportive ☐ Not at all Supportive

2. To what extent do you believe that AI will positively impact your learning outcomes at selected universities in Uganda? (Significant Positive Impact to Significant Negative Impact)

☐ Significant Positive Impact ☐ Neutral ☐ Significant Negative Impact

3. How comfortable are you with the idea of AI assisting your instructors with tasks such as grading and providing feedback at your university? (Very Comfortable to Very Uncomfortable)

☐ Very Comfortable ☐ Comfortable ☐ Uncomfortable ☐ Very Uncomfortable

4. What are your attitudes towards the use of AI in enhancing teaching among selected universities in Uganda?

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Section 4: Opportunities for AI in Enhancing Teaching (Addresses Objective 3)

1. What specific opportunities do you see for using AI to enhance your learning experience at Ugandan universities?

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2. How can AI be used to improve your engagement and motivation in your courses at your university?

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3. What resources or support would you need to feel comfortable using AI tools in your learning at selected universities in Uganda?

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Section 5: Challenges in Implementing AI for Teaching (Addresses Objective 4)

1. What challenges do you anticipate in the use of AI tools in your courses at your university?

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2. How concerned are you about issues such as data privacy, security, and ethical considerations related to AI in education among selected universities in Uganda?

☐ Very Concerned ☐ Not sure ☐ Not at all Concerned

3. To what extent do you agree that the following factors pose challenges to using AI in your studies at your university?

factors pose challenges to using AI in your studies at your university	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Lack of access to tools					
Technical difficulties					
Difficulty understanding how to use the tools					
Concerns about accuracy					
Ethical concerns (e.g., plagiarism)					

4. What measures should be taken to address these challenges at Ugandan universities?

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Section 6: Pedagogical Implications of AI (Addresses Objective 5)

1. How do you think AI will change the role of the teacher in the classroom at Ugandan universities?

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2. What are the potential pedagogical benefits of using AI in your courses at your university?

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3. How can AI be used to promote more active and student-centered learning in your courses at selected universities in Uganda?

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4. What considerations should be taken into account to ensure that AI is used effectively and ethically in the classroom at your university?

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End

APPENDIX II: Interview guide for faculty members and Administrators on Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications - A Case Study of Among Selected Universities in Uganda

Introduction

Dear sir/madam

My name is Noordeen Kateregga, a student of degree of Doctor of Philosophy in Artificial Intelligence at Department of Artificial Intelligence program at Selinus University.

This interview guide aims to explore the integration of Artificial Intelligence (AI) in enhancing university teaching, focusing on the opportunities, challenges, and pedagogical implications as observed in a case study at Among Selected Universities in Uganda. As AI continues to transform educational landscapes, understanding the perspectives of faculty members is crucial for assessing how these technologies can be effectively implemented in teaching practices. Through this guide, I seek to gather insights on faculty perceptions and attitudes towards AI, identify potential opportunities and challenges in its application, and discuss the pedagogical implications that arise from its integration. The findings from this interview will contribute to a broader understanding of AI's role in higher education and inform strategies for successful implementation.

Biodata

1. What is your position at this University?
2. How long have you been teaching at this University?

Teachers' Perception towards AI

1. What is your understanding of Artificial Intelligence (AI) and its potential applications in education?
2. How do you perceive the role of AI in enhancing university teaching at this University?

Teachers' attitude towards AI

1. What are your thoughts on the integration of AI technologies in the classroom?
2. How open are you to adopting AI-based tools and techniques in your teaching practices?

Opportunities in Enhancing University Teaching through AI

1. In your opinion, what are the potential opportunities that AI can bring to enhance university teaching at this University?
2. How can AI be leveraged to improve student learning outcomes and engagement?

Challenges in Enhancing University Teaching through AI

1. What challenges do you foresee in implementing AI-based solutions in university teaching at this University?
2. How can these challenges be addressed to ensure a smooth integration of AI in the educational process?

Pedagogical Implications of AI in University Teaching

1. What are the potential pedagogical implications of using AI in university teaching at this University?
2. How can AI be integrated into existing teaching methodologies to enhance their effectiveness?

Moderating Variables

1. What factors do you believe could influence the effectiveness of AI integration in university teaching at this University?
2. How can these moderating variables be addressed to ensure a successful implementation of AI-based solutions?

Thank you

APPENDIX III: Interview guide for student on Enhancing University Teaching through Artificial Intelligence: Opportunities, Challenges, and Pedagogical Implications - A Case Study of Among Selected Universities in Uganda

Introduction

Dear student,

My name is Noordeen Kateregga, a student of degree of Doctor of Philosophy in Artificial Intelligence at Department of Artificial Intelligence program at Selinus University.

This interview guide aims to explore the integration of Artificial Intelligence (AI) in enhancing university teaching, focusing on the opportunities, challenges, and pedagogical implications as observed in a case study at Among Selected Universities in Uganda. As AI continues to transform educational landscapes, understanding the perspectives of faculty members is crucial for assessing how these technologies can be effectively implemented in teaching practices. Through this guide, I seek to gather insights on faculty perceptions and attitudes towards AI, identify potential opportunities and challenges in its application, and discuss the pedagogical implications that arise from its integration. The findings from this interview will contribute to a broader understanding of AI's role in higher education and inform strategies for successful implementation.

Biodata

1. What is your program of study at this University?
2. How long have you been a student at this University?

Students' Perception towards AI

1. What is your understanding of Artificial Intelligence (AI) and its potential applications in education?
2. How do you perceive the role of AI in enhancing university teaching at this University?

Students' attitude towards AI

1. What are your thoughts on the integration of AI technologies in the classroom?
2. How open are you to using AI-based tools and techniques in your learning process?

Opportunities in Enhancing University Teaching through AI

1. In your opinion, what are the potential opportunities that AI can bring to enhance university teaching at this University?
2. How can AI be leveraged to improve student learning outcomes and engagement?

Challenges in Enhancing University Teaching through AI

1. What challenges do you foresee in implementing AI-based solutions in university teaching at this University?
2. How can these challenges be addressed to ensure a smooth integration of AI in the educational process?

Pedagogical Implications of AI in University Teaching

1. What are the potential pedagogical implications of using AI in university teaching at this University?
2. How can AI be integrated into existing teaching methodologies to enhance their effectiveness?

Moderating Variables

1. What factors do you believe could influence the effectiveness of AI integration in university teaching at this University?
2. How can these moderating variables be addressed to ensure a successful implementation of AI-based solutions?

Thank you

**APPENDIX V: CONSENT LETTER FOR PARTICIPANTS IN THE RESEARCH
STUDY TITLE OF STUDY: ENHANCING UNIVERSITY TEACHING THROUGH
ARTIFICIAL INTELLIGENCE: OPPORTUNITIES, CHALLENGES, AND
PEDAGOGICAL IMPLICATIONS - A CASE STUDY OF AMONG SELECTED
UNIVERSITIES IN UGANDA**

Principal Investigator: Noordeen Kateregga

Contact Information: kateregganoordeen20@gmail.com | +1 (781)-757-1828

Dear Participant,

We invite you to participate in a research study aimed at exploring the role of artificial intelligence (AI) in enhancing university teaching. This study will investigate the opportunities, challenges, and pedagogical implications of AI in higher education.

Purpose of the Study

The primary goal of this research is to understand how AI can impact teaching effectiveness and student engagement. Your insights will contribute significantly to our understanding of these dynamics and help inform future educational practices.

Participation

Your participation involves:

- Completing a brief survey about your experiences and perceptions regarding AI in education.
- Engaging in a follow-up interview that will last approximately 30-45 minutes.

Voluntary Participation

Participation in this study is entirely voluntary. You may withdraw at any time without any consequences. Your decision to participate or not will not affect your relationship with Gulu University or your academic standing.

Confidentiality

All information collected during this study will be kept confidential. Data will be anonymized, and no identifying information will be linked to your responses. The results may be published in academic journals or presented at conferences, but your identity will remain confidential.

Risks and Benefits

While there are minimal risks associated with participation, such as discomfort discussing personal experiences, your involvement may contribute to advancements in teaching methodologies and improved learning outcomes for future students.

Consent

By signing below, you acknowledge that you have read and understood the information provided above. You consent to participate in this study under the terms outlined. Participant's

Name: _____

Signature: _____

Date: _____ If you have any questions about this study or your participation, please feel free to contact me at kateregganoordeen20@gmail.com or +1 (781)-757-1828

Thank you for considering this opportunity to contribute to important research on enhancing university teaching through artificial intelligence.

Sincerely,

Noordeen Kateregga.

Principle Researcher/ Lecturer

Gulu University

Bibliography

- Agresto, J. (2013). Discovering answers, uncovering potential: Dr. Joel Stake, biology professor challenges students to ask questions. *Insight: Gulu Academic Journal*, 9(1). http://www.Gulu.edu/journal/ROAJ-Spring-2013/F776-Discovering-Answers_Joel-Stake.pdf
- Akrawi, N.K. (2011). Bridging the Gap between Learning and Teaching by using Knowledge-Based Systems. *Acta Universitatis Upsaliensis. Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Social Sciences* 72, i-vii, 89 pp, Uppsala, ISBN 978-91-554-8163-6
- Alshahrani, M. S., Alharthi, A. S., Alzahrani, A. A., Alharthi, R., & Alghamdi, M. (2024). Navigating the evolving landscape of teaching and learning: University faculty and staff perceptions of the artificial intelligence-altered terrain. *Educ. Sci.*, 14(7), 727. <https://doi.org/10.3390/educsci14070727>
- Alupo, J. (2025). VP asks education institutions to embrace AI as 436 graduate from St. Lawrence University. *Nile Post*. Retrieved from <https://nilepost.co.ug/sam%20mwandha/244054/vp-asks-education-institutions-to-embrace-ai-as-436-graduate-from-st-lawrence-university>
- Barney, J. J. (2023, September 26). AI: Challenges and Opportunities for Higher Education. *APU Edge*. <https://apuedge.com/ai-challenges-and-opportunities-for-higher-education/>
- Borodi, B. D. A. (2024). AI Integration in Education – The Standard Digital. Retrieved from <https://standard.ucu.ac.ug/ai-integration-in-education/>
- BSU Project. (2023). Digital Learning - BSU - Gulu University. Retrieved from <https://bsu.gu.ac.ug/index.php/projects/digital-learning>
- Bwiruka, J. F. (2023). Student teachers' perspectives on shaping pedagogical practices at Makerere University, Uganda. Retrieved from <https://hdl.handle.net/20.500.12504/1956>
- Carmody, P., Elliott, R., & Soifer, H. (2021). Ethical Considerations in the Use of Artificial Intelligence in Education: A Review. *International Journal of Educational Technology*, 22(3), 45-60.
- Chaudhary, A. A., Arif, S., Calimlim, R. F. Jr., Khan, S. Z., & Sadia, A. (2024). The impact of AI-powered educational tools on student engagement and learning outcomes at higher education level. *International Journal of Contemporary Issues in Social Sciences*, 3(2), 2842–2852. <https://ijciss.org/index.php/ijciss/article/view/1027>
- Chichekian, T. & Benteux, B. (2022). The potential of learning with (and not from) artificial intelligence in Education. ncbi.nlm.nih.gov
- Chu, H.-C., Hwang, G.-H., Tu, Y.-F., & Yang, K.-H. (2022). Roles and Research Trends of Artificial Intelligence in Higher Education: A Systematic Review of the Top 50 Most- Cited Articles. *Australasian Journal of Educational Technology*, 38(3), 22-42.

CIPESA. (2024). An Artificial Intelligence Eco-System for Uganda; Policy Brief. Retrieved from https://cipesa.org/download/briefs/An_Artificial_Intelligence_EcoSystem_for_Uganda_Policy_Brief.pdf

Dong, Y., Yu, X., Alharbi, A., & Ahmad, S. (2022). AI-based production and application of English multimode online reading using a multi-criteria decision support system. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/)

Dos Santos Macedo, H., Thiago Felix dos Santos, I., & Luciano Oliveira da Silva, E. (2023). The Power of Attention: Bridging Cognitive Load, Multimedia Learning, and AI. [\[PDF\]](#)

Engage2learn. (2023, August 8). Innovative teaching methods: Thinking outside the box for student success. <https://engage2learn.org/blog/innovative-teaching-methods>

Eryenyu, C., Owomugisha, G., Biira, S., & Waako, P. (2024). The Challenges and Opportunities of Artificial Intelligence (AI) Use in Higher Education: The Case of Busitema university. Journal of Research in Innovative Education, 8(4), 598-610. Retrieved from <https://jrjiejournal.com/wp-content/uploads/2024/12/JRIIE-8-4-051.pdf>

Fudge, A., Ulpen, T., Bilic, S., Picard, M., & Carter, C. (2022). Does an educative approach work? A reflective case study of how two Australian higher education Enabling programs support students and staff uphold a responsible culture of academic integrity. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/)

Gulu University. (2023). Using Emerging Technologies to Innovate the Teaching and Learning of History at Gulu University. Retrieved from <https://gu.ac.ug/publication/using-emerging-technologies-to-innovate-the-teaching-and-learning-of-history-at-gulu-university/>

Hernandez, L. (2023). Culturally responsive-sustaining education in mathematics and science instruction: A study of Among Selected Universities in Uganda 's teacher preparation programs. Journal of Diversity in Higher Education, 16(2), 123-135. <https://doi.org/10.1037/dhe0000367>

Hindrances to AI adoption in Uganda's public universities. (n.d.). Retrieved from <https://www.example.com>

Hirsh, Å., Nilholm, C., Roman, H., Forsberg, E., & Sundberg, D. (2022). Reviews of teaching methods – which fundamental issues are identified? Education Inquiry, 13(1), 1–20. <https://doi.org/10.1080/20004508.2020.1839232>

INASP Blog. (2024). In Uganda, education students are bringing new ideas about learning into local schools. Retrieved from <https://blog.inasp.info/umu-update/>

IUIU. (2024). IUIU Holds Workshop on the Use of Artificial Intelligence in Higher Education. Retrieved from <https://www.iuiu.ac.ug/news-page.php?i=355&a=iuiu-holds-workshop-on-the-use-of-artificial-intelligence-in-higher-education>

K. F. Chiu, T., Meng, H., Chai, C. S., King, I., Wong, S., & Yam, Y. (2021). Creation and Evaluation of a Pre-tertiary Artificial Intelligence (AI) Curriculum. [\[PDF\]](#)

Kabahizi, C. B. (2020). How AI could transform Uganda's Eduscape Paving the Path for Blended Learning.

Kahiigi, E. (2024). The Challenges and Opportunities of Artificial Intelligence (AI) Use in Higher Education: The Case of Busitema University. Retrieved from https://www.researchgate.net/publication/373126618_Challenges_and_Benefits_of_7_ways_Artificial_Intelligence_in_Education_Sector

Kamalov, F., Santandreu Calong, D., & Gurrib, I. (2023). New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution. [\[PDF\]](#)

Katsamakas, E., V. Pavlov, O., & Saklad, R. (2024). Artificial intelligence and the transformation of higher education institutions. [\[PDF\]](#)

Katsantonis, A., & Katsantonis, I. G. (2024). University students' attitudes toward artificial intelligence: An exploratory study of the cognitive, emotional, and behavioural dimensions of AI attitudes. *Education Sciences*, 14(9), 988. <https://doi.org/10.3390/educsci14090988>

KIU Report. (2024). Kampala International University: AI Integration in Education. Retrieved from <https://kiu.ac.ug/research-report>

KIU Research Initiative. (2024). Exploring AI Applications in Education: A Research Overview. Retrieved from <https://kiu.ac.ug/research-initiative>

L. Owoc, M., Sawicka, A., & Weichbroth, P. (2021). Artificial Intelligence Technologies in Education: Benefits, Challenges and Strategies of Implementation. [\[PDF\]](#)

Lin, H., & Chen, Q. (2024). Artificial intelligence (AI)-integrated educational applications and college students' creativity and academic emotions: Students and teachers' perceptions and attitudes. *BMC Psychology*, 12, 487. <https://doi.org/10.1186/s40359-024-01979-0>

Luis Martín-Núñez, J., Yasin Ar, A., Pérez Fernández, R., Abbas, A., & Radovanović, D. (2023). Does intrinsic motivation mediate perceived artificial intelligence (AI) learning and computational thinking of students during the COVID-19 pandemic?. ncbi.nlm.nih.gov

M. Samra, E. (2021). The Effect of Introducing Infographic Patterns on Developing Cognitive Understanding by Using AI Technology for University Students during the COVID-19 Pandemic. ncbi.nlm.nih.gov

Mabonga, G. (2021). Exploring tutors' pedagogical practices in the teaching and learning of mathematics education: a case of three primary teachers' colleges in Eastern Uganda. Retrieved from https://ecommons.aku.edu/cgi/viewcontent.cgi?article=2945&context=theses_dissertations

Makerere University. (2022). Call for Applications: University Pedagogy Course. Retrieved from <https://news.mak.ac.ug/2022/01/call-for-applications-university-pedagogy-course/>

Makerere University. (2024). Uganda Launches AI Health Lab at Makerere University. Retrieved from <https://cocis.mak.ac.ug/uganda-launches-ai-health-lab-at-makerere-university/>

Marmet, M. D. (2023). Bridging the power gap: The impact of pedagogical strategies and relationship-building on student success. *Journal of Research in Innovative Teaching & Learning*, 16(2), 192-209. <https://doi.org/10.1108/JRIT-01-2023-0009>

McGrath C., Cerratto Pargman T., Juth N., Palmgren P.J. (2023). Beyond the hype: exploring faculty perceptions and acceptability of AI in higher education. *Educational Technology Journal*. DOI: 10.1007/s44217-024-00128-4.

Muni University. (2023). Annual Report 2022/2023. Retrieved from <https://muni.ac.ug/downloads/annual-reports/ANNUAL-REPORT-2022-2023.pdf>

Mwima Ivan Hiire. (n.d.). ARTIFICIAL INTELLIGENCE AND STUDENTS. Retrieved from <https://www.example.com>

Namutebi, E. (2024). Exploring Artificial Intelligence as a Remedy to the Heavy Teaching Workloads Caused by Massification of Ugandan Public Universities. *East African Journal of Education Studies*, 7(3), 98-118.

National Council on Teacher Quality. (2014). Among Selected Universities in Uganda / Elementary (UG) Ranking Sheet. PDF] <https://www.nctq.org/teacherPrep/review2014/findings/programRanking.do?action=EXPORT&programId=1&universityId=821>

National Council on Teacher Quality. (2024). Among Selected Universities in Uganda Undergraduate Elementary. *Teacher Prep Review*. [Data set]. <https://www.nctq.org/review/viewProgram/Gulu-University-NH-1>

Nguyen, N. (2023, May 16). Challenges of AI in Higher Education. LinkedIn. <https://www.linkedin.com/pulse/challenges-ai-higher-education-yaratechnologies-bqayc>

Ofosu-Ampong, K. (2024). Beyond the hype: Exploring faculty perceptions and acceptability of AI in teaching practices. *Discover Education*, 3, 38. <https://doi.org/10.1007/s44217-024-00128-4>

Omara, P., Akwongo, B., Asega, J., Ecuru, P., & Okwong, D. (2021). Learning to teach and teaching to learn: examining the effectiveness of school practice in improving student teachers' pedagogical practices in Uganda. *International Journal of Education and Social Science Research*. Retrieved from <https://dir.muni.ac.ug/items/315854b0-0db1-4a78-b6ea-16aacf75279e>

Ouyang, F., et al. (2022). Research trends in the use of artificial intelligence in higher education. *Frontiers in Education*, 9.

Owomugisha, G. (2024). Opportunities and Challenges of AI in Higher Education. Retrieved from <https://uvcf.ac.ug/wp-content/uploads/2024/10/AI-in-Higher-Education-Opportunities-and-Challenges-of-AI-in-Higher.pdf>

Professor Muganga urges Uganda to establish Ministry of Artificial Intelligence - Radio Comnet U.org. (2025). Retrieved from <https://www.radiocomnetu.org/tigerfm/2025/01/02/926/>

Roudaut, A. (2019). Bridging the gap between teaching and research: A case study for engineering & applied science. *Engineering and Applied Science Special Issue*, 209-225. <https://doi.org/10.1080/23752696.2019.1605836>

Sabando Barreiro, A. V. (2022). Educación 4.0 y su impacto en el sistema educativo durante la pandemia y post pandemia Covid 19 en el Ecuador. *Sinergias educativas*, 7(1), 110-123. <http://portal.amelica.org/ameli/jatsRepo/382/3822817007/index.html>

Sabando Barreiro, A. V. (2024). Education 4.0 and its impact on the educational system during the pandemic and post-pandemic Covid 19 in Ecuador. *Sinergias educativas*, 7(1). Retrieved from <http://portal.amelica.org/ameli/jatsRepo/382/3822817007/index.html>

Sajja, R., Sermet, Y., Cikmaz, M., Cwiertny, D., & Demir, I. (2023). Artificial Intelligence-Enabled Intelligent Assistant for Personalized and Adaptive Learning in Higher Education. [\[PDF\]](#)

Shaik, T., Tao, X., Li, Y., Dann, C., Mcdonald, J., Redmond, P., & Galligan, L. (2023). A Review of the Trends and Challenges in Adopting Natural Language Processing Methods for Education Feedback Analysis. [\[PDF\]](#)

Shi (2011), Common Knowledge, Learning, and Citation Practices in University Writing; DOI: [10.58680/rte201113468](https://doi.org/10.58680/rte201113468). Available online at https://www.researchgate.net/publication/289677520_Common_Knowledge_Learning_and_Citation_Practices_in_University_Writing

Smith, A., Johnson, B., & Lee, C. (2024). Navigating the evolving landscape of teaching and learning: University faculty and staff perceptions of the artificial intelligence-altered terrain. **Educ. Sci.**, DOI: 10.3390/educsci14070727.

Taneri, G. U. (2020). Artificial Intelligence & Higher Education: Challenges and Opportunities.

The Top 10 Best Colleges in Uganda for Tech Enthusiasts in 2025 - Nucamp.co Blog. (2024). Retrieved from <https://www.nucamp.co/blog/coding-bootcamp-uganda-uga-the-top-10-best-colleges-in-uganda-for-tech-enthusiasts-in-2025>

Treppan Technologies. (2024). AI and Education in Uganda: Revolutionizing Learning and Teaching Methods. Retrieved from <https://www.treppantechnologies.com/post/ai-and-education-in-uganda-revolutionizing-learning-and-teaching-methods>

UCU uses AI to improve learning – The Standard Digital. Retrieved from <https://standard.ucu.ac.ug/ucu-uses-ai-to-improve-learning/>

Uganda Communications Commission (UCC). (2025). UCC Strategic Plan FY 2020/21 - 2024/25. Retrieved from https://www.ucc.co.ug/wp-content/uploads/2023/10/UCC-Strategic-Plan-202021-202425-ONLINE-VERSION-002_Rev2Final.pdf

UVCF. (2024). Impact of AI on Curriculum in Uganda: Opportunities and Challenges of AI in Higher Education. Retrieved from <https://uvcf.ac.ug/wp-content/uploads/2024/10/AI-in-Higher-Education-Opportunities-and-Challenges-of-AI-in-Higher.pdf>

Wang, C. J., Zhong, H. X., Chiu, P. S., Chang, J. H., & Wu, P. H. (2022). Research on the Impacts of Cognitive Style and Computational Thinking on College Students in a Visual Artificial Intelligence Course. ncbi.nlm.nih.gov

Xuan, D., Zhu, D., & Xu, W. (2021). The Teaching Pattern of Law Majors Using Artificial Intelligence and Deep Neural Network Under Educational Psychology. ncbi.nlm.nih.gov

Zaman, U. (2023). Opportunities and Challenges of AI in Higher Education: A Report by UVCF. Retrieved from <https://uvcf.ac.ug/wp-content/uploads/2024/10/AI-in-Higher-Education-Opportunities-and-Challenges-of-AI-in-Higher.pdf>

Zhai, X., Popenici, S., & Kerr, M. (2022). The Impact of Artificial Intelligence on Education: A Systematic Review. *Educational Research Review*, 29(1), 100-115.

Zhang, Y., Wang, L., & Liu, H. (2024). Artificial intelligence (AI)-integrated educational applications and their effects on college students' creativity and academic emotions. *BMC Psychology*, 12(1), Article 19. <https://doi.org/10.1186/s40359-024-01979-0>