

## Ethical Implications of AI and Machine Learning in Education: A Systematic Analysis

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**Abstract**—*Ethical considerations should be examined to determine how AI and ML affect education. Educational AI and ML bring privacy, security, and student data usage problems. This research examined AI and ML ethics in higher education at selected universities. Ethical issues AI and machine learning in education provide fairness, privacy, and openness. AI training data may perpetuate educational biases and impair student achievement. For complete comprehension, mixed methods research included quantitative and qualitative data. Four Lusaka district universities contributed 100 survey respondents. The initiative included four universities' department chairs, professors, and students. Structured open-ended interviews and questionnaires collected data. Quantitative questionnaire data was descriptively examined in SPSS and Excel, while semi-structured interview data was thematically evaluated. According to research, AI may reduce educational monitoring and learner engagement. Another concern is the digital gap and AI access. AI's sophisticated skills may be inaccessible to impoverished students, worsening educational inequity. The report advised training students and staff on data security and providing explicit permission procedures for data use in AI-driven educational systems, including strong encryption, anonymisation, and access limits.*

**Keywords**—*Accountability, Bias, Equity, Security, Transparency*

### 1 Introduction

The ethical implications of AI and machine learning in education encompass a range of critical concerns that impact both students and educators. One major issue is privacy; AI systems often collect and analyze large amounts of personal data, raising questions about data security and the potential for misuse. Ensuring the confidentiality and protection of student information is paramount [1][2]. Additionally, there are concerns about algorithmic bias; AI tools can perpetuate and even exacerbate existing inequalities if their algorithms reflect biased data or societal prejudices, leading to unfair treatment of certain groups of students. Transparency in how AI systems make decisions is also crucial to maintain trust and accountability. Educators and policymakers must address these biases and strive for fairness and inclusivity in AI applications. Furthermore, the reliance on AI in education can diminish the role of human judgment, potentially reducing the nuanced understanding that teachers bring to their interactions with students [3]. The use of AI must balance technological advancements with ethical considerations, ensuring that educational tools enhance learning without compromising ethical standards or student well-being.

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Transparency in AI and machine learning in education is crucial for fostering trust, ensuring accountability, and enhancing the effectiveness of educational tools. As AI systems increasingly play a role in personalized learning, data analytics, and administrative tasks, it is essential that educators, students, and stakeholders understand how these systems operate and make decisions [4]. Transparency involves clarifying the algorithms' decision-making processes, the sources of data used, and how data privacy is maintained. It also means providing clear explanations of how AI tools impact learning outcomes and how they are aligned with educational goals. By promoting transparency, educators can better assess the reliability and fairness of AI tools, address biases, and ensure that these technologies are used ethically and responsibly. This openness helps in building confidence in AI applications and ensures that they are used to complement rather than replace human judgment and expertise in the educational environment [5].

Another issue is the potential for bias in AI algorithms. Jordan & Mitchell noted that if the data used to train these systems is biased or incomplete, it can lead to unfair or discriminatory outcomes [6]. This can impact student evaluations, resource allocation, and even educational content. Bias in AI and machine learning in education refers to the presence of unfair, prejudiced, or skewed outcomes that can arise when algorithms are used to make educational decisions. In educational contexts, this can manifest in various ways, such as biased grading systems, discriminatory recommendations for student support, or unequal access to resources [7]. Addressing bias in AI requires careful consideration of data sources, ongoing monitoring of algorithmic outcomes, and the implementation of fairness measures to ensure that AI tools enhance educational equity rather than perpetuate existing disparities. In addition to technical safeguards, there is a need for transparent policies and ethical guidelines governing the use of AI and ML in education. Educators, policymakers, and technology developers must work together to create frameworks that ensure these technologies are used responsibly and securely.

Kühl et al stated that equity in AI and machine learning in education is a crucial consideration to ensure that technological advancements do not perpetuate or exacerbate existing inequalities [8]. As AI and machine learning technologies are increasingly integrated into educational settings, it is essential to address potential biases and disparities that may arise. AI systems, if not carefully designed, can inherit biases from their training data, leading to discriminatory outcomes that disadvantage certain groups of students. This can manifest in various ways, such as biased grading algorithms or unequal access to educational resources. To promote equity, it is vital to implement strategies that include diverse and representative data in AI training sets, regularly audit and test AI systems for fairness, and ensure that AI tools are accessible to all students, regardless of their socioeconomic background. Chanda & Madoda alluded that socioeconomic disparities can contribute to unequal distribution of wealth and opportunities, leading to systemic inequalities and barriers to social mobility [9]. Furthermore, educators and policymakers must work collaboratively to create guidelines and best practices for the ethical use of AI in education, emphasizing transparency, inclusivity, and the need to continuously evaluate the impact of AI technologies on different student demographics. By prioritizing equity in AI development and deployment, the educational system can harness the potential of these technologies to enhance learning opportunities for all students while mitigating the risk of reinforcing existing inequalities [10].

### 1.1 Statement of the Problem

The ethical implications of AI and machine learning in education present a complex challenge that necessitates careful consideration. As educational institutions increasingly adopt these technologies to personalize learning, automate administrative tasks, and enhance student engagement, concerns arise regarding privacy, equity, and accountability [11]. The collection and analysis of vast amounts of student data can lead to potential breaches of confidentiality and misuse of information. Additionally, there is a risk of perpetuating existing biases if AI systems are not carefully designed and monitored, potentially exacerbating disparities in educational outcomes. Burgess et al noted that the

reliance on automated systems raises questions about the fairness and transparency of decision-making processes, including admissions, grading, and student support [12]. Addressing these ethical concerns requires a robust framework that ensures data security, promotes equitable access, and fosters transparency in AI applications, while also involving educators, students, and policymakers in ongoing dialogue about the responsible use of technology in education.

### 1.2 Purpose of the Study

The purpose of studying the ethical implications of AI and machine learning in education was to explore and address the potential risks and ethical dilemmas these technologies present in educational settings.

### 1.3 Objectives of the Study

To explore the ethical concerns related to the use of AI and Machine Learning in educational settings within selected higher learning institutions.

To assess the impact of AI-driven decision-making on educational equity and access within selected higher learning institutions.

### 1.4 Theoretical Framework

The study was guided by the Socio-Technical Systems Theory. Socio-Technical Systems Theory (STS) provides a valuable framework for examining the ethical implications of AI and machine learning in education by recognizing the interconnectedness of social and technical elements within educational environments. STS posits that technology does not operate in isolation but is deeply embedded in and influenced by the social context, including human behaviors, institutional policies, and cultural norms. When applied to the ethical concerns surrounding AI in education, STS encourages a holistic analysis that considers not only the technological capabilities and limitations of AI but also the potential impacts on students, educators, and the broader educational ecosystem [13]. For instance, issues such as bias in algorithmic decision-making, data privacy, and the dehumanization of teaching are viewed not merely as technical challenges but as social and ethical dilemmas that require collaborative solutions. By integrating the social dimensions with the technical, STS promotes a more comprehensive understanding of how AI and machine learning can be designed, implemented, and governed in ways that align with ethical principles and support equitable educational outcomes.

### 1.5 Significance of the Study

The significance of studying the ethical implications of AI and machine learning in education lies in ensuring that these technologies are implemented in ways that respect students' rights, promote fairness, and enhance learning outcomes. As AI and machine learning become increasingly integrated into educational practices, they bring about opportunities for personalized learning, improved accessibility, and efficient administrative processes. However, these advancements also raise concerns related to privacy, bias, and the potential for unequal access to technology. By critically examining these ethical issues, educators, policymakers, and technologists can work together to develop guidelines and practices that safeguard against misuse, protect student data, and promote equity, thus ensuring that the benefits of AI and machine learning are maximized while minimizing potential harms.

## 2 Methodology

The study adopted a mixed methods approach which is a combination of quantitative and qualitative data to provide a comprehensive understanding [14]. The study was conducted in 4 selected higher learning institutions within Lusaka district in Zambia. The sample consisted 100 respondents; 10% of the target population 1000. The population for the study was purposefully drawn from the 4 institutions. Purposive sampling procedure was used to select Faculty heads of departments (8); 2 representing each institution and Lecturers (20); 5 representing each institution to give an administration view concerning the topic under study. On the other hand, simple random sampling procedure was used to select the Students (72); 18 representing each institution because they were too many to participate. Structured open-ended interviews and questionnaires were used to respondents to collect data. The quantitative data collected through the questionnaires were analyzed using appropriate statistical methods, such as descriptive statistics using SPSS (Statistical Package for Social Sciences) and Microsoft excel whereas the qualitative data from semi structured interviews were analyzed thematically. The study was delimited to the four selected institutions only, hence, the findings cannot be generalized to the rest of the country, Zambia. The study upheld research ethical considerations such as voluntary participation of the respondents, informed consent, confidentiality, honesty, and right of privacy.

### 2.1 Research Design

The research approach used in this study is characterised by its descriptive and exploratory nature. The present study employs a descriptive strategy to collect data on the existing level of AI integration in Pakistan's education field. Additionally, an exploratory approach is used to investigate the possible effects of ChatGPT on educational results. This two-pronged methodology guarantees that the research not only delineates the current state of affairs but also offers valuable perspectives on the optimal integration of ChatGPT within the educational framework.

## 3 Findings And Discussion

This study's research results are derived from the comprehensive examination of quantitative and qualitative data gathered during the research process. The following part provides an exposition of the survey data findings, thematic insights derived from interviews, and the results of a primary research test undertaken to assess the influence of ChatGPT on educational achievements. This study presents the results accompanied by supplementary tables and a comprehensive analysis.

### 3.1 Ethical Concerns Related to the Use of AI and ML in Educational Settings

According to research findings, the study identified six key ethical concerns as a result of the use of AI and ML in educational settings. Privacy and Data Security was at 27%, Inequity in Access at 23%, Erosion of Teacher-Student Relationships at 18%, Shaping Educational Content at 18%, Transparency and Accountability at 9%, and Student Profiling at 5%.

The research found that privacy and data security are ethical issues in educational AI and ML applications. The collecting, processing, and analysis of massive student data is required for AI and ML in education [15]. Personal identities, academic records, and behavioural patterns in this data might be misused to infringe on privacy. AI-driven personalised learning must be balanced with student privacy, creating an ethical dilemma. Data must be securely kept, anonymised, and restricted to authorised persons to avoid abuse. Transparency and accountability of AI and ML systems complicate privacy and data security [16]. These systems often act as "black boxes," making choices or predictions using

algorithms that educators, students, and developers cannot understand. This opacity may make data usage and ethics questionable. Biases in AI models may perpetuate prejudice, or data may be exploited for commercial exploitation or spying without permission. Education institutions must create robust data governance frameworks emphasising openness, permission, and ethical AI and ML usage. The use of AI and ML in education raises questions regarding data ownership and storage. Protecting student rights requires asking who owns, stores, and uses data [17].

Students and parents may need to realise how much data is gathered and used, which might lead to exploitation. Institutions must specify data ownership, retention, and third-party sharing rules. Data minimisation rules should ensure that only relevant data is acquired and retained, lowering breach risk. The studies also showed that integrating AI and ML into education might transform learning experiences and outcomes. However, access inequality presents serious ethical issues. AI and ML technologies may demand sophisticated infrastructure, high-speed internet, and the newest equipment. These criteria may create a digital gap in which kids in well-funded schools or affluent families can access cutting-edge educational resources while those in underfunded schools or low-income households do not [18]. Access to these technologies might increase inequities since students need them to gain out on personalised learning, adaptive learning platforms, and AI-driven educational support systems, which can improve educational performance. Education imbalance in AI and ML access is about more than just technology availability but also its effectiveness. Marginalised students and instructors may need more digital literacy to engage with AI-driven educational solutions fully. This skill gap might expand the accomplishment divide by limiting access to AI and ML developments [19]. AI and ML systems may also reflect the prejudices and attitudes of their creators, who are frequently privileged. This may lead to culturally or contextually inappropriate instructional materials for all children, perpetuating unfairness.

The lecturers explained that the erosion of teacher-student relationships is a significant ethical concern related to the use of Artificial Intelligence (AI) and Machine Learning (ML) in educational settings. Chanda's study explained that traditionally, the teacher-student relationship has been central to the educational process, fostering a connection that supports not only academic learning but also personal development, mentorship, and emotional support [20]. One of the lecturers stated that: "The integration of AI in education might shift the focus away from the interpersonal aspects of teaching, weakening the teacher-student relationship, which is essential for effective learning and student well-being".

Another ethical concern is the potential for AI and ML to depersonalize education. While these technologies can process vast amounts of data to tailor educational experiences, they lack the emotional intelligence and empathy that human teachers bring to the classroom [21]. Teachers are not just instructors but also mentors who can recognize when a student is struggling emotionally or socially. AI lacks this nuanced understanding, which could result in students feeling less supported and more disconnected from their educational environment. This depersonalization can undermine the development of a supportive and inclusive classroom culture, where students feel valued and understood as individuals. Moreover, the over-reliance on AI and ML might shift the focus of education from fostering critical thinking and creativity to merely optimizing performance metrics [22]. Teachers, who play a crucial role in encouraging students to think deeply and creatively, may find their roles reduced to facilitators of AI-driven content delivery. This could lead to a more standardized and less dynamic educational experience, where the unique teacher-student relationship, which often inspires and motivates students, is diminished.

The results further revealed that the integration of Artificial Intelligence (AI) and Machine Learning (ML) in educational settings raises significant ethical concerns, particularly in shaping educational content. AI and ML have the potential to personalize learning experiences by tailoring content to individual student needs and preferences. However, the algorithms that drive these technologies are often influenced by the data they are trained on, which can introduce biases into the content delivered to students. This raises questions about the neutrality and objectivity of educational materials, as AI-driven content might reflect the inherent biases present in the data, leading to a skewed representation of

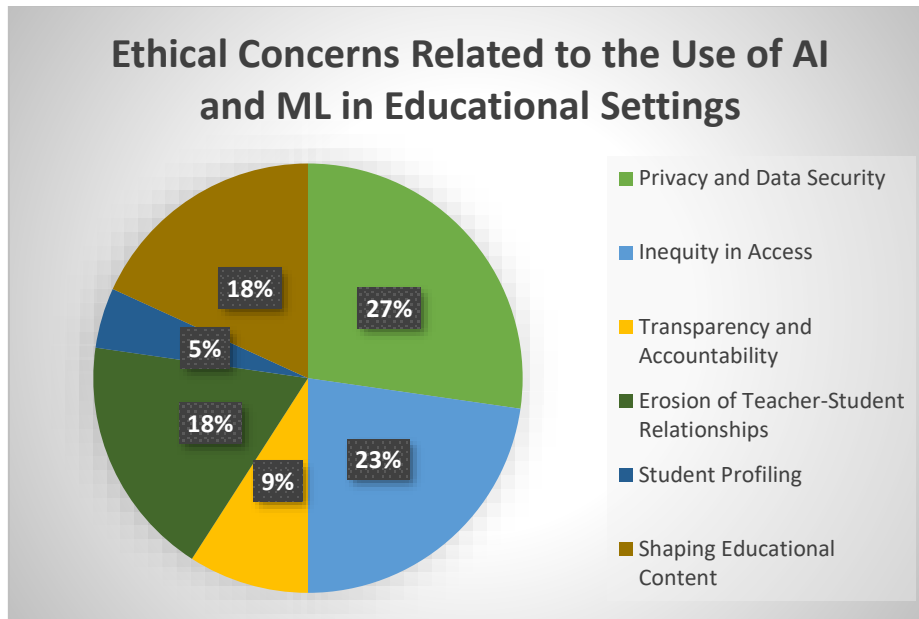
information [23]. Another ethical concern is the lack of transparency in how AI and ML systems select and present content. Educators and students may not fully understand the criteria used by these systems to prioritize certain materials over others. This opacity can result in a lack of trust in the educational content provided by AI, as users may be unaware of potential biases or omissions.

Moving on, department heads noted that openness and accountability are ethical issues in educational AI and ML deployments. AI algorithms' complexity and opacity create a "black box" effect that makes decision-making difficult for educators, students, and administrators—this lack of transparency doubts AI-driven grading, student evaluations, and personalised learning routes. Watters emphasised that stakeholders can only trust these algorithms and the data they use with explicit insights, which might lead to biases and prejudice [24]. Openness and clarity are crucial to AI tool trust; thus, they must be implemented. Liable use of AI and ML in education means defining who is liable when AI-driven actions harm students or educational results. Developers, instructors, or institutions that use these technologies may be responsible for delegating crucial educational choices to algorithms. Accountability methods are needed when AI systems reinforce inequality or make incorrect predictions. Creating robust governance frameworks to oversee AI deployment and use, providing recourse for those affected by its decisions, and prioritising ethics alongside technology is also necessary to ensure accountability [25].

The research also found that AI and ML have improved student data analysis to personalise education [26]. However, student profiling presents serious ethical issues. Collecting and analysing enormous amounts of data, including academic achievement, behaviour, and personal information, create comprehensive student profiles that predict future results. This may personalise learning but can introduce prejudice, discrimination, and privacy issues. AI and ML algorithms may perpetuate prejudices, a major ethical problem [27]. The profiles may worsen student inequality if the data used to train these algorithms is biased. Marginalised pupils may be wrongly categorised or given poorer success forecasts, limiting their chances and resources [28]. This might lead to a self-fulfilling prediction as pupils are guided by biased projections rather than their potential.

AI and ML algorithms' lack of transparency complicated student profiling's ethics. These technologies often function as "black boxes," making decision-making opaque to instructors, students, and parents. Lack of accountability may lead to actions that harm kids' education without a clear justification or remedy [29]. The ethical argument over student profiling also involves privacy considerations. The significant data gathering needed for proper profiling poses problems concerning storage, access, and usage: data breaches or unauthorised access compromise students' personal information. A thorough student profile that follows a person through their schooling and professional life may have long-term consequences for privacy and autonomy.





**Figure 1.** Ethical Concerns Related to the Use of AI and ML in Educational Settings

### 3.2 Impact of AI-Driven Decision-Making on Educational Equity and Access

#### Positive Impact of AI-Driven Decision-Making on Educational Equity and Access

The results showed that AI-driven decision-making is revolutionising education by fostering personalised learning and improving educational fairness and access in higher education. AI systems' capacity to personalise education to students' needs, talents, and learning styles has a significant influence [30]. AI can create personalised learning paths that allow students to proceed at their speed by analysing massive volumes of data, including academic background, engagement, and learning preferences. This flexibility helps children who suffered in conventional, one-size-fits-all schools level the playing field and foster equality. AI-driven personalised learning provides customised materials and assistance to students regardless of geography or socioeconomic background, expanding access to excellent education. Quality education aims to provide students with the information, skills, attitudes, and values they need to live productive and satisfying lives. It promotes critical thinking, creativity, and lifelong learning by providing inclusive and egalitarian education [31]. Instructional gaps may be reduced by providing distant or impoverished students with high-quality, personalised instructional material.

AI can also detect and fix learning gaps in real time, providing tailored interventions and assistance to those who need it most to prevent students from falling behind. This proactive strategy improves academic performance and promotes educational equity for various student groups [32]. AI-enabled personalised learning allows students to manage their education, boosting agency and engagement. Marginalised or non-traditional students need this autonomy to feel engaged in school. Technology-driven learning increases higher education participation and perseverance by letting students study in a manner that fits their talents and aspirations, improving retention and academic achievement [33]. AI makes education more accessible and inclusive, allowing all students to fulfil their potential.

AI-driven decision-making improves educational fairness and access in higher education by allocating resources efficiently. AI systems can analyse vast amounts of student demographic, academic, and institutional resource data using complex algorithms and data analytics. By identifying resource needs, institutions may more evenly allocate finances, teaching personnel, and instructional materials [34]. AI may identify underserved groups or departments, helping administrators give funding where it will have the most

significant effect. This data-driven method eliminates human decision-making biases and assures that all children, regardless of background, have the tools to achieve academically.

AI-driven decision-making helps modify resource allocation to real-time changing demands and situations. If data shows students struggle with online learning, AI might suggest investing in digital infrastructure or coaching. This dynamic resource distribution addresses discrepancies as they develop, creating a more inclusive and supportive learning environment [35]. AI may also optimise classroom and lab usage to ensure all students have equal access. AI-driven decision-making reduces educational inequities and increases higher education accessibility by improving resource efficiency. Students noted that AI-driven decision-making has improved higher education accessibility, improving educational equality and access. AI helps colleges comprehend students' various requirements and personalise educational offerings. AI can analyse massive quantities of data to identify kids at risk of falling behind owing to socio-economic issues, impairments, or language obstacles. With this information, universities may provide personalised assistance like adaptive learning tools, financial aid, and specialised tutoring programs to help all students succeed [36].

AI-driven decision-making also promotes inclusive learning environments. AI reduces learning hurdles by automatically creating video transcripts, text-to-speech choices, and multilingual resources. This accessibility levels the playing field for pupils with impairments or various languages [37]. AI may also assist in creating culturally appropriate and varied student-centred courses, improving education fairness. AI's support for remote and online learning platforms helps improve education access. AI-powered systems can administer and optimise online courses, making them more flexible and accessible to students who cannot attend on-campus sessions [38]. This is crucial for distant students or those with job or family obligations who need flexible study schedules. AI-driven decision-making removes geographical and temporal obstacles to higher education, promoting educational fairness and opportunity for all students.

### **Negative Impact of AI-Driven Decision-Making on Educational Equity and Access**

The research found that AI-driven decision-making in higher education might improve educational procedures and outcomes, although algorithm bias remains a significant worry. Frequently trained on historical data, these algorithms might inadvertently reinforce prejudices and inequality. The biases in the data computers are trained on may affect admissions, financial assistance, and academic evaluations. This may worsen educational inequalities for under-represented and marginalised pupils, according to Braxton et al [39]. An AI system based on data favouring wealthier students may unjustly evaluate pupils from lower socioeconomic backgrounds. Algorithms may also reflect racial, gender, and ethnic prejudices, limiting education for specific populations. These prejudices affect admissions, resource allocation, scholarship prospects, and academic support identification. Biased algorithms in decision-making may prolong marginalisation, preventing some groups from succeeding in higher education [40].

Additionally, the digital divide poses a significant challenge to educational equity and access in the context of AI-driven decision-making within higher learning institutions. As AI technologies become increasingly integrated into educational systems, the disparity in access to digital tools and resources among students becomes more pronounced. One of the lecturers alluded that: "Students from marginalized communities, particularly those in rural areas or from low-income backgrounds, often lack the necessary technological infrastructure, such as reliable internet access or up-to-date devices, to fully engage with AI-driven educational platforms". This lack of access creates a widening gap between students who can leverage AI tools to enhance their learning and those who cannot, exacerbating existing inequalities in educational outcomes.

Moreover, AI-driven decision-making systems often rely on large datasets to make predictions or tailor educational content to individual students. However, if these datasets do not adequately represent the diverse experiences and backgrounds of all students, the decisions made by AI systems may inadvertently reinforce biases and perpetuate educational disparities. For instance, students from underrepresented groups might receive less personalized or less effective educational content due to the lack of data reflecting their



specific needs. This can lead to a cycle where students who are already disadvantaged by the digital divide are further marginalized by AI systems that fail to account for their unique circumstances. Additionally, the implementation of AI-driven decision-making in higher education often assumes a level of digital literacy that not all students possess. Chanda et al's study showed that digital literacy in education has become increasingly essential in preparing students for the modern workforce and ensuring they can navigate the digital world effectively [41]. It encompasses a range of competencies, including the ability to find, evaluate, and use information, communicate and collaborate online, and understand digital tools and technologies. Those who are less familiar with digital tools may struggle to navigate AI-driven platforms, leading to further exclusion from educational opportunities. As AI continues to shape the landscape of higher education, addressing the digital divide is crucial to ensuring that all students have equitable access to the benefits of these technologies. Lins et al stated that without deliberate efforts to bridge this divide, AI-driven decision-making could inadvertently deepen educational inequities, leaving behind those who are most vulnerable [42].

The absence of transparency can undermine trust in the educational system. Students and educators may feel disempowered when they cannot ascertain the rationale behind decisions that significantly impact their academic and professional lives. This lack of trust can lead to disengagement and a perception that the educational system is unjust, particularly if AI-driven decisions appear to disproportionately disadvantage certain groups [43]. In the long run, this erosion of trust can weaken the social contract between educational institutions and the communities they serve, making it more difficult to foster a sense of inclusivity and belonging. Additionally, the lack of transparency in AI-driven decision-making can hinder accountability. In traditional decision-making processes, there are clear lines of responsibility, and those making decisions can be held accountable for their actions. However, when decisions are made by AI systems, it becomes challenging to determine who is responsible for any negative outcomes [44]. This diffusion of accountability can make it difficult to address grievances or seek redress, further disadvantaging students who are negatively impacted by these opaque systems.

AI-driven decision-making in higher learning institutions has introduced efficiency and precision in various educational processes. However, it has also led to a significant reduction in human interaction, which can negatively impact educational equity and access. The automation of tasks such as grading, student assessments, and even personalized learning plans can diminish the traditional face-to-face interaction between students and educators [45]. This reduction in human contact may lead to a lack of personalized support and mentoring, which are crucial for students who may require additional help, particularly those from marginalized backgrounds. Furthermore, the reliance on AI-driven systems can inadvertently create a sense of isolation among students, as they may feel disconnected from the educational community. The absence of meaningful interactions with peers and instructors can hinder the development of critical soft skills, such as communication and collaboration, which are essential for success in both academic and professional environments [19]. This isolation can disproportionately affect students who rely on interpersonal relationships to navigate the challenges of higher education, thereby exacerbating existing inequalities. Moreover, AI-driven decision-making may not always account for the nuanced needs and circumstances of individual students. While algorithms can analyze large datasets to make informed decisions, they lack the empathy and understanding that human educators bring to the learning environment. Gianoni-Capenakas et al's study noted that this can result in decisions that fail to consider the diverse backgrounds and learning styles of students, further marginalizing those who are already at a disadvantage [46]. Consequently, the reduced human interaction brought about by AI can undermine efforts to promote educational equity and access, as it may widen the gap between students who thrive in a tech-driven environment and those who do not.

## 4 Conclusion and Recommendations

The ethical implications of AI and machine learning in higher education are multifaceted and profound, reflecting both potential benefits and significant challenges. While these technologies offer the promise of personalized learning experiences and improved administrative efficiencies, they also raise critical ethical concerns that must be addressed. Issues such as shaping educational content, student profiling, and the impact of AI-driven decision-making on educational equity and access are central to this discourse. The potential for AI to influence curriculum design, potentially imposing biases or limitations, necessitates a careful examination of content creation processes to ensure fairness and inclusivity. Additionally, the use of AI for student profiling can lead to privacy violations and reinforce existing disparities if not managed with stringent ethical guidelines. Moreover, the adoption of AI-driven decision-making may exacerbate the digital divide and reduce human interaction, further entrenching inequities within educational institutions. As higher learning institutions navigate these challenges, it is imperative to establish robust ethical frameworks and practices that prioritize transparency, equity, and the protection of individual rights to ensure that AI and machine learning technologies enhance rather than undermine the educational experience.

The following are actions that should be taken on the basis of the findings of this study:

### **Enhance Data Privacy and Security Measures**

Institutions should implement robust encryption, anonymization techniques, and strict access controls by educating students and staff on data security practices and establish clear consent protocols for data usage in AI-driven educational tools.

### **Establish Ethical Guidelines and Frameworks**

Educational institutions and policymakers should collaborate with ethicists, AI experts, educators, and student representatives to create these guidelines by doing regular updates and reviews to adapt to evolving technologies and challenges.

### **Promote Transparency and Human Oversight**

Institutions should develop AI systems that include explainable AI (XAI) features, allowing users to understand how decisions are made by establishing review committees or panels to oversee AI usage and intervene when ethical concerns arise.

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