



Artificial Intelligence as a Gender issue in Educational Management. A case of State Universities in Zimbabwe

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Abstract: *This study investigates the gendered dynamics of Artificial Intelligence (AI) integration in educational management at state universities in Zimbabwe. With AI playing an increasingly pivotal role in enhancing administrative and academic functions, it is essential to examine how gender disparities influence the adoption and utilization of AI technologies. The research aims to explore the extent of gender disparities in AI roles, analyze how AI applications either perpetuate or mitigate gender biases, and identify barriers faced by women in accessing AI-driven educational tools. Additionally, it proposes strategies to promote gender equity in AI implementation within higher education management. Using a mixed-methods approach, the study combines quantitative surveys and qualitative interviews to gather data from two hundred participants, including university staff and administrators. The findings reveal significant gender disparities, with women being underrepresented in AI-related roles and facing various barriers, including limited access to training, societal norms, and gender biases in AI applications. Approximately 55% of female respondents reported experiencing gender bias in AI-driven educational tools, highlighting the need for inclusive AI design. The study also identifies critical strategies to bridge these gender gaps, including the implementation of gender-sensitive policies, capacity-building programs, mentorship initiatives, and regular audits of AI systems to ensure fairness. Furthermore, fostering inclusive work environments that support women, particularly in technical fields, emerged as a key factor in enhancing gender equity. In conclusion, while AI offers transformative potential in educational management, its successful integration requires addressing systemic gender imbalances. The study's recommendations aim to provide actionable insights for universities, policymakers, and researchers striving to create more equitable, inclusive environments for women in AI-driven educational settings. The findings contribute to the broader discourse on technology, gender, and educational management, emphasizing the importance of equity in the evolving digital landscape.*

Keywords: *Gender equity, Artificial Intelligence, Educational management, Gender bias, Zimbabwe, Higher education, AI adoption, Women's participation.*

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1. Introduction

Artificial intelligence (AI) is transforming educational management globally, offering tools that enhance efficiency in decision-making, resource allocation, and student performance tracking. However, the integration of AI in education has revealed significant gender disparities. According to UNESCO (2021), women are underrepresented in AI-related roles globally, with only 22% of AI professionals being female. This underrepresentation limits the diversity of perspectives shaping AI technologies, perpetuating biases in their design and application in educational systems.

AI-driven platforms, such as adaptive learning tools, have been critiqued for reinforcing gender stereotypes. Johnson et al. (2020) note that many algorithms trained on historical data often replicate discriminatory patterns, disadvantaging women and girls in education. For instance, automated career counseling tools may channel female students toward stereotypically "feminine" fields. Addressing these biases requires deliberate policy interventions to ensure equitable outcomes in AI applications.

Furthermore, the digital gender divide remains a persistent challenge. According to ITU (2022), women are 20% less likely than men to use the internet globally, which restricts their access to AI-driven educational tools. This digital exclusion exacerbates existing inequalities, particularly in developing countries, where women already face structural barriers in education.

The intersection of AI and gender in educational management has also raised ethical concerns. As highlighted by Binns (2020), ethical AI must consider the diverse needs of all users, especially marginalized groups. Without such considerations, AI risks amplifying gender inequities rather than mitigating them. Global initiatives like the AI for Good Summit advocate for gender-inclusive AI solutions, but their implementation remains uneven across regions.

Finally, the role of global institutions in promoting gender equity through AI in education cannot be understated. Organizations such as UN Women emphasize the need for gender-sensitive AI policies in educational management. They argue that empowering women in AI leadership roles can foster more inclusive technologies (UN Women, 2021). However, translating these recommendations into actionable strategies requires robust collaboration between governments, academia, and the private sector.

The adoption of AI in educational management across Africa presents unique opportunities and challenges. While AI holds the potential to bridge educational gaps, its implementation has revealed significant gender disparities. According to the African Union (2022), only 30% of STEM graduates in Africa are women, which limits their participation in AI-related initiatives in education.

AI-driven educational tools, such as automated grading systems and virtual classrooms, are increasingly being deployed in African universities. However, Ojo and Adebayo (2021) highlight that these technologies often reflect gender biases inherent in their design, disadvantaging female students and staff. For instance, AI algorithms used in recruitment and performance evaluations in educational institutions may inadvertently perpetuate gender-based discrimination.

The digital gender divide remains a pressing issue across Africa. Women are 25% less likely than men to access digital technologies, according to GSMA (2020). This digital exclusion limits their engagement with AI-driven educational tools, exacerbating existing gender inequities. Moreover, socio-cultural norms often discourage women from pursuing careers in AI and related fields, further entrenching gender disparities in educational management.

Policy frameworks to address gender disparities in AI adoption remain inadequate in many African countries. For example, while the African Union's Agenda 2063 emphasizes gender equality, its implementation in the context of AI and education has been slow. Adequate funding and capacity-building initiatives are needed to ensure that AI technologies are inclusive and equitable (Ndlovu, 2021).

Furthermore, the lack of female representation in leadership positions within African educational institutions compounds the problem. As noted by Amadi (2022), gender-inclusive leadership is critical to ensuring that AI adoption in educational management addresses the needs of both men and women equitably. Without such representation, the risk of perpetuating gender biases in AI applications remains high.

In Southern Africa, the integration of AI into educational management is gaining momentum, but gender disparities persist. According to Moyo and Phiri (2022), women account for less than 20% of professionals in AI-related fields in the region, which limits their influence in shaping AI technologies for education. This underrepresentation has significant implications for gender equity in educational management.

AI technologies, such as predictive analytics for student performance and resource allocation, are being deployed in universities across Southern Africa. However, Mathebula et al. (2023) argue that these technologies often fail to address the unique needs of female students and staff. For instance, AI-driven scheduling systems may not consider gender-specific challenges, such as balancing work and family responsibilities.

Efforts to bridge the digital gender divide have shown mixed results in the region. While countries like South Africa have implemented initiatives to promote women's participation in STEM fields, many rural areas still lack access to digital technologies. According to the Southern African Development Community (SADC, 2021), this digital exclusion disproportionately affects women, limiting their access to AI-driven educational tools.

Policy responses to gender disparities in AI adoption in educational management vary across the region. In Zimbabwe, for example, the National Gender Policy emphasizes the need for gender-sensitive approaches to technology adoption. However, Mlambo and Dube (2020) note that the implementation of these policies often falls short due to limited resources and political will.

The role of regional organizations in promoting gender equity in AI adoption is critical. SADC has called for greater investment in capacity-building programs to empower women in AI-related fields. However, translating these recommendations into tangible outcomes remains a challenge, particularly in resource-constrained settings (SADC, 2021).

In Zimbabwe, the adoption of AI in educational management has highlighted significant gender issues. According to Chikosha et al. (2022), women account for less than 25% of AI professionals in the country, which limits their participation in shaping AI technologies for education. This underrepresentation is particularly pronounced in state universities, where leadership positions are predominantly held by men.

AI technologies, such as automated student registration systems and virtual learning platforms, are being implemented in state universities in Zimbabwe. However, these technologies often fail to address gender-specific challenges. For instance, automated recruitment systems may reinforce existing gender biases, disadvantaging female candidates (Mugabe, 2021).

The digital gender divide remains a significant barrier to equitable AI adoption in Zimbabwe. Women, particularly in rural areas, are less likely than men to access digital technologies, which limits their engagement with AI-

driven educational tools. According to the Ministry of Higher and Tertiary Education (2022), addressing this digital exclusion requires targeted interventions, such as providing affordable internet access and digital literacy training for women.

Policy responses to gender disparities in AI adoption in educational management in Zimbabwe have been inadequate. While the National Gender Policy emphasizes the need for gender-sensitive approaches to technology adoption, its implementation has been slow. Chinhengo and Moyo (2023) argue that greater political will and resource allocation are needed to ensure that AI technologies are inclusive and equitable.

The role of leadership in promoting gender equity in AI adoption is critical. As noted by Ndlovu et al. (2022), female representation in leadership positions within state universities can help ensure that AI technologies address the needs of both men and women equitably. However, achieving gender parity in leadership remains a challenge in Zimbabwe's higher education sector.

1.2 Statement of the Problem

The integration of Artificial Intelligence (AI) in educational management within Zimbabwe's state universities has exposed significant gender disparities, limiting women's participation and representation in AI-related roles. Studies reveal that women account for less than 25% of AI professionals in Zimbabwe (Chikosha et al., 2022), a figure that mirrors global trends but has unique local implications. This underrepresentation results in AI systems that perpetuate gender biases, such as algorithms that prioritize male-dominated fields in academic recruitment and career guidance tools. Moreover, the digital gender divide exacerbates this issue, with women, especially in rural areas, facing limited access to AI-driven educational tools (Mlambo & Dube, 2020). If these disparities are not addressed, the education sector risks reinforcing gender inequities, reducing opportunities for women in leadership and STEM fields, and hindering progress toward Sustainable Development Goal 5 (gender equality). The lack of inclusivity in AI adoption undermines the potential for equitable educational outcomes, thereby perpetuating systemic inequalities in higher education.

1.3 Aim of the Study

The study aims to explore the gender-related challenges and opportunities in the adoption and implementation of Artificial Intelligence in educational management at state

universities in Zimbabwe, with a focus on addressing gender disparities to promote equity and inclusivity.

1.4 Research Objectives

1. To examine the extent of gender disparities in AI-related roles and participation in educational management at state universities in Zimbabwe.
2. To analyze how AI applications in educational management perpetuate or mitigate gender biases in Zimbabwean state universities.
3. To identify barriers faced by women in accessing and utilizing AI-driven educational tools in Zimbabwe.
4. To propose strategies for fostering gender equity in the integration of AI within Zimbabwean state universities.

1.5 Research Questions

1. What is the extent of gender disparities in AI-related roles and participation in educational management at state universities in Zimbabwe?
2. How do AI applications in educational management impact gender biases in Zimbabwean state universities?
3. What barriers hinder women's access to and utilization of AI-driven educational tools in Zimbabwe?
4. What strategies can be implemented to promote gender equity in the adoption and use of AI in Zimbabwean state universities?

1.6 Significance of the Study

This study is significant as it addresses the intersection of Artificial Intelligence and gender equity in educational management, an area critical for achieving inclusive and sustainable development. By identifying and addressing gender disparities in AI adoption, the study will provide insights to policymakers, university administrators, and technology developers on creating equitable AI systems that cater to the needs of both men and women. The findings will contribute to advancing gender equity in higher education, align with national and global goals like Zimbabwe's National Gender Policy and the United Nations' SDG 5, and ensure that AI technologies foster inclusivity rather than exacerbating existing inequalities. Additionally, the study will empower women by highlighting their challenges and proposing actionable solutions to enhance their participation in AI-related fields.

2. Literature Review

2.1 Theoretical Framework: Feminist Transformational Leadership

The study was underpinned by the Feminist Transformational Leadership Theory. Feminist transformational leadership approach is concerned with achieving gender justice. For feminist transformational leadership, leaders need to undergo a process of personal transformation, consciousness raising and internalization of feminism (Batliwala S, 2010).

Feminist transformational leadership theory includes modeling feminist purposes and principles, inspiring personal and shared vision based on collective reflexivity, empowering and enabling others to act, challenging patriarchal norms and oppressive power, and encouraging integration of heart, mind, and body (Wakefield, 2017). Transformative leaders take risks by challenging existing ways of working, particularly around how things might be done in order to ensure justice and gender equality, while simultaneously carefully considering their approach to action and power (Rao & Kelleher, 2000). Rao & Kelleher, (2000) suggest the importance of leaders who focus on changing the rules of organisations, rather than playing by them, in order to promote gender equality. This sentiment is reminiscent of Audre Lourde's (1984) warning that using the master's tools will never dismantle the master's house. Rao & Kelleher, (2000) refer to 'deep structure' organisations as organisations that take a more corporate approach, including universities. Common pitfalls of 'deep structure' organisations include rigid beliefs about power, hierarchy and their expression, failure to understand and address work-life balance, the reduction of organisation purpose to narrow, quantifiable indicators, and a tendency to emphasize an individual hero and achievement model at the expense of collaborative efforts.

2.2. Gender Disparities in AI-Related Roles and Participation in Educational Management

Globally, gender disparities in AI-related roles remain a persistent challenge, with significant implications for educational management. Studies indicate that women are significantly underrepresented in AI fields, which is a reflection of deep-rooted gender biases and systemic inequities. UNESCO (2021) highlights that women constitute only 22% of AI professionals worldwide, a disparity that cascades into the development and implementation of AI systems. This lack of representation

leads to a narrow perspective in the design of AI tools, often excluding considerations for women's needs in education management. In educational settings, these disparities extend beyond the workforce to influence the decision-making process, where women's voices are frequently underrepresented. This global issue not only undermines inclusivity in AI systems but also restricts the ability of these systems to address the nuanced needs of diverse populations within state universities.

The underrepresentation of women in AI-related roles is exacerbated by systemic barriers in the recruitment and promotion processes. Research by Johnson and Parker (2022) reveals that women in educational management are less likely to be hired or promoted into positions that require expertise in AI, perpetuating male dominance in leadership roles. This systemic exclusion limits the diversity of thought and innovation within AI systems, further marginalizing female administrators and faculty members in state universities. In addition, cultural expectations in many societies continue to emphasize traditional gender roles, discouraging women from pursuing STEM education and, consequently, careers in AI. For example, Ojo et al. (2021) report that cultural norms in Nigeria have led to a gender imbalance in AI-related academic programs, with fewer than 30% of female students enrolling in these courses.

The digital divide also plays a significant role in reinforcing gender disparities. Access to digital resources and AI tools remains inequitable, with women in developing countries particularly disadvantaged. According to GSMA (2021), women are 20% less likely than men to have access to the internet, creating a significant barrier to their engagement with AI technologies. This gap in access is more pronounced in rural areas, where limited infrastructure and socio-economic constraints further marginalize women. In state universities, the digital divide not only affects students but also hinders female faculty members from accessing AI-driven tools for teaching and management.

Moreover, the lack of female representation in AI leadership roles has long-term implications for educational management. Women who manage to enter AI-related roles often encounter the "glass ceiling," which restricts their progression into decision-making positions. Moyo et al. (2022) emphasize that the underrepresentation of women in AI leadership stifles diversity and innovation, as male-dominated teams are less likely to design systems that cater to the diverse needs of all stakeholders. This underrepresentation ultimately perpetuates the cycle of exclusion, leaving women with limited influence over AI integration in educational management.

Despite these challenges, initiatives to address gender disparities in AI are gaining momentum. Programs such as Women in AI and Girls Who Code aim to bridge the gender gap by providing mentorship and training opportunities for women in STEM fields. However, these initiatives often face scalability challenges, particularly in regions with deeply entrenched gender norms. To achieve gender equity in AI-related roles within educational management, a multi-faceted approach that includes policy reforms, capacity building, and advocacy for inclusivity is essential.

2.3. AI Applications and Gender Biases in Educational Management

AI applications in educational management have transformed the way institutions operate, but they also bring to light critical issues related to gender bias. One of the most significant challenges is algorithmic bias, which often replicates historical gender disparities embedded in data. Noble (2020) underscores that AI systems are not inherently neutral; they reflect the biases of the environments in which they are created. In the context of educational management, this means that AI tools used for recruitment, performance evaluation, and resource allocation can inadvertently disadvantage women. For example, automated recruitment systems have been found to prioritize male candidates for leadership positions due to biased training data, perpetuating gender inequities in academia.

Gender biases in AI-driven tools are further compounded by their application in student and staff evaluations. A study by Bessette and McKenna (2021) reveals that predictive analytics systems often reinforce gender stereotypes by associating leadership qualities with male attributes. This bias affects women's opportunities for promotion and recognition in state universities, where traditional hierarchies already limit their professional growth. Similarly, AI-powered career counseling tools have been found to reinforce stereotypes by suggesting "feminine" career paths to female students, further entrenching gender norms in education.

Resource allocation in educational institutions also reflects the gender biases inherent in AI systems. Automated scheduling and workload management tools, for instance, often fail to account for gender-specific needs such as family responsibilities. Lee et al. (2022) report that female faculty members are disproportionately assigned undesirable schedules by AI systems, exacerbating work-life balance challenges. This not only affects their professional performance but also perpetuates the perception of women as less committed to their careers.

However, AI also presents opportunities to mitigate gender biases if designed and implemented ethically. Ethical AI frameworks, such as those proposed by Floridi et al. (2021), emphasize the need for diversity and inclusivity in algorithmic design. By incorporating diverse data sets and involving women in the development process, educational institutions can create AI systems that promote equity. For instance, AI tools designed to identify and address gender disparities in student enrollment and performance have shown promise in reducing biases.

The global response to gender biases in AI applications has been mixed, with some regions adopting proactive measures while others lag behind. The European Commission (2021) has implemented policies to ensure gender equity in AI research and development, including mandatory gender impact assessments. These policies serve as a model for other regions, but their implementation in developing countries remains inconsistent. Bridging this gap requires collaborative efforts between governments, educational institutions, and the private sector to ensure that AI applications in educational management promote rather than hinder gender equity.

2.4. Barriers Faced by Women in Accessing and Utilizing AI-Driven Educational Tools

The barriers women face in accessing and utilizing AI-driven educational tools are multifaceted, encompassing economic, cultural, and institutional factors. One of the primary challenges is the digital gender divide, which disproportionately limits women's access to the internet and digital devices. According to the International Telecommunication Union (2022), women in low-income countries are 20% less likely than men to own smartphones, a disparity that significantly restricts their ability to engage with AI-driven tools. In state universities, this divide manifests in unequal access to digital resources, where female students and faculty members are often at a disadvantage.

Economic constraints further exacerbate the issue, as women generally have lower income levels than men. Smith and Anderson (2021) report that women in sub-Saharan Africa are less likely to afford digital devices or internet services, creating a barrier to their participation in AI-driven education. This economic disparity is particularly pronounced in state universities, where students and staff often rely on institutional resources for access to technology. The lack of gender-sensitive policies to address these economic barriers further marginalizes women in the digital landscape.

Cultural norms and gender stereotypes also play a significant role in limiting women's access to AI tools. In many societies, women are expected to prioritize family responsibilities over education or professional development, leaving them with little time or opportunity to engage with technology. Ahmad et al. (2021) emphasize that these cultural expectations not only discourage women from pursuing opportunities in digital education but also perpetuate a cycle of exclusion. This is particularly evident in rural areas, where traditional gender roles are more deeply entrenched.

The lack of digital literacy among women is another significant barrier. According to GSMA (2021), women are 50% less likely than men to possess digital skills, which are essential for utilizing AI-driven tools effectively. This skills gap is further widened by the limited availability of digital training programs targeted at women, particularly in state universities. Without the necessary skills, women are unable to fully benefit from the potential of AI in education, further widening the gender gap.

Policy and institutional barriers also hinder women's access to AI-driven tools. Many educational institutions lack the infrastructure and policies needed to promote gender equity in technology access. Al-Rashid and Khan (2022) found that universities in the Middle East often prioritize investments in digital resources for male students and staff, leaving women with inadequate access to technology. Addressing these barriers requires a concerted effort to implement gender-sensitive policies and ensure equal access to digital resources for all.

2.5. Strategies for Fostering Gender Equity in AI Integration at State Universities

Addressing gender disparities in AI integration requires a multifaceted approach that combines policy reforms, capacity building, and advocacy for inclusivity. One critical strategy is the establishment of gender-sensitive policies that promote equal access to AI-driven tools and resources. UNESCO (2022) emphasizes that state universities must prioritize gender equity in their digital transformation agendas by ensuring that women have the same opportunities as men to access and utilize AI technologies. These policies should include provisions for subsidizing digital devices and internet access for female students and staff, particularly in underserved communities. By leveling the playing field, universities can create an environment where women can actively participate in AI-driven educational management.

Capacity building is another essential component of fostering gender equity in AI integration. Training programs that target women and equip them with digital literacy and AI-related skills are crucial for bridging the gender gap. For example, initiatives such as Google's Women Techmakers have demonstrated success in empowering women to pursue careers in AI and technology. In the context of state universities, similar programs can be tailored to address the specific needs of female administrators and educators. Khan and Malik (2023) suggest that mentorship programs and workshops can play a vital role in building women's confidence and competence in utilizing AI tools effectively.

Encouraging the participation of women in AI development and leadership roles is also critical for achieving gender equity. Women must be included in the design and implementation of AI systems to ensure that these technologies are inclusive and reflective of diverse perspectives. Studies by Floridi et al. (2021) show that diverse teams produce more equitable AI systems, as they are better equipped to identify and mitigate biases. State universities can promote gender diversity in AI leadership by implementing affirmative action policies and creating incentives for women to take on leadership roles in technology-driven projects.

Community engagement and advocacy are also vital for challenging cultural norms and stereotypes that hinder women's participation in AI. In many societies, traditional gender roles discourage women from pursuing careers in technology or engaging with AI tools. To address this, state universities can partner with community organizations to raise awareness about the importance of gender equity in digital education. Campaigns that highlight the achievements of women in AI and technology can serve as powerful tools for inspiring the next generation of female leaders. Ahmad et al. (2021) emphasize that changing societal attitudes requires a sustained effort to challenge stereotypes and promote positive role models.

Finally, international collaboration and knowledge sharing can accelerate progress toward gender equity in AI integration. Universities can benefit from partnerships with global organizations and institutions that have successfully implemented gender-inclusive AI initiatives. For instance, the European Commission (2022) has developed frameworks for ethical and inclusive AI, which can serve as models for state universities in Zimbabwe. By learning from these best practices, universities can develop context-specific strategies for promoting gender equity in AI-driven educational management.

2.6 Gaps in Literature

Despite the growing body of research on artificial intelligence (AI) and gender issues in educational management, several gaps remain unaddressed, particularly in the context of state universities in Zimbabwe. These gaps highlight the need for more nuanced, region-specific, and comprehensive studies to inform policy and practice.

2.6.1 Limited Focus on Gender Disparities in AI Roles within Educational Management

While global studies (e.g., Noble, 2020; Bessette & McKenna, 2021) have highlighted gender disparities in AI-related roles, there is a lack of empirical evidence that explicitly examines these disparities within the management structures of state universities in Zimbabwe. Existing research tends to focus on STEM education and student participation rather than the roles of administrators and decision-makers. This oversight leaves a critical gap in understanding how gender imbalances in AI leadership affect the adoption and integration of AI technologies in educational management.

2.6.2 Insufficient Exploration of AI's Role in Perpetuating Gender Biases

AI's potential to reinforce existing biases is well-documented globally (Floridi et al., 2021; Lee et al., 2022). However, few studies have analyzed how these biases manifest in educational management, particularly in the African context. Research tends to generalize findings from developed nations, overlooking the unique socio-cultural and economic factors in Zimbabwe that shape AI's impact on gender equity. This gap hinders the development of tailored solutions to mitigate bias in AI applications in state universities.

2.6.3 Neglect of Barriers Faced by Women in Accessing AI Tools

Although there is a broad recognition of barriers such as digital literacy gaps and socio-economic constraints (Khan & Malik, 2023; Smith & Anderson, 2021), specific challenges faced by women in Zimbabwean state universities remain underexplored. For instance, studies rarely address how cultural norms, institutional policies, and infrastructural limitations uniquely affect women's access to and utilization of AI-driven tools in educational management. This gap limits the applicability of global recommendations to the local context.

2.6.4 Lack of Emphasis on Intersectionality in Gender Equity Studies

Much of the literature (e.g., UNESCO, 2022; GSMA, 2021) addresses gender disparities as a monolithic issue, failing to consider the intersectionality of factors such as race, class, and rural-urban divides. In Zimbabwe, these intersecting factors significantly influence women's participation in AI-related roles. The absence of intersectional analyses leaves a critical void in understanding how multiple forms of discrimination compound gender inequities in AI integration within educational management.

2.6.5 Limited Research on Strategies for Gender Equity in AI Integration

While some studies propose generic strategies for promoting gender equity in AI (Ahmad et al., 2021; Johnson & Parker, 2022), there is a dearth of context-specific research that addresses the unique challenges faced by Zimbabwean state universities. For example, strategies that account for local cultural norms, resource constraints, and policy environments are rarely discussed in the literature. This gap underscores the need for studies that propose actionable, localized solutions for fostering gender equity in AI-driven educational management.

2.6.6. Insufficient Examination of the Role of Policy Frameworks

Existing research (e.g., UNESCO, 2021; Ojo et al., 2021) highlights the importance of policy in addressing gender disparities but often fails to evaluate the effectiveness of existing policies in specific contexts. In Zimbabwe, the alignment of national education policies with global gender equity goals remains under-researched. The lack of such evaluations impedes the development of robust, evidence-based policy interventions to address gender gaps in AI integration at state universities.

By addressing these gaps, future research can provide a more comprehensive understanding of the intersection between AI, gender equity, and educational management. This will contribute to the formulation of targeted strategies that promote inclusivity and gender balance in the digital transformation of Zimbabwean state universities.

3. Methodology

3.1 Research Design

The study adopted a mixed-methods approach, combining quantitative and qualitative methods to provide a comprehensive understanding of gender issues in AI integration within state universities in Zimbabwe. Creswell and Creswell (2021) highlighted that mixed-methods designs enhance the robustness of findings by integrating numerical data with rich, descriptive insights. The explanatory sequential design was utilized, beginning with quantitative data collection to identify patterns and followed by qualitative exploration to gain deeper insights into these trends.

3.2 Study Population

The population included academic and administrative staff from five state universities in Zimbabwe, focusing on individuals directly or indirectly involved in AI-related roles or educational management. According to Yin (2022), targeting specific groups within an institution ensures that the research captures perspectives relevant to the study objectives. Participants were drawn from diverse departments, including IT, administration, and faculty, to ensure a broad representation of experiences and viewpoints.

3.3 Sampling Techniques and Sample Size

The study employed purposive sampling for the qualitative component and stratified random sampling for the quantitative survey. Purposive sampling allowed for the selection of participants with direct knowledge or experience of AI in educational management (Etikan & Bala, 2020). Stratified random sampling ensured that the quantitative survey captured a representative sample of male and female staff across various roles and hierarchical levels (Bryman, 2021). The sample size consisted of 150 participants for the survey and 20 for in-depth interviews.

3.4 Data Collection Methods

Data were collected through structured questionnaires and semi-structured interviews. Structured questionnaires were distributed to gather quantitative data on the extent of gender disparities and barriers in AI adoption. The questionnaires were designed following guidelines by Bell, Bryman, and Harley (2022), ensuring clarity, validity, and reliability of items. Semi-structured interviews were

conducted with a subset of participants to explore their experiences and perspectives on AI integration and gender equity. The flexibility of this method allowed the researcher to probe deeper into emerging themes, as recommended by Braun and Clarke (2021).

3.5 Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics to identify trends and relationships. Statistical tools such as SPSS version 27 were used to compute frequencies, percentages, and chi-square tests to compare gender-based differences in AI access and utilization. Creswell and Guetterman (2020) noted that these techniques are suitable for analyzing categorical data in educational research.

Qualitative data were analyzed thematically, following Braun and Clarke's (2021) six-step framework for thematic analysis. Transcripts from the interviews were coded to identify recurring themes, such as barriers to AI access and strategies for promoting gender equity. Data triangulation was employed to ensure the reliability and validity of findings by comparing insights from both quantitative and qualitative components (Yin, 2022).

3.6 Ethical Considerations

The study adhered to ethical research standards by obtaining informed consent from all participants and ensuring confidentiality of their responses. Ethical approval was sought from the university ethics committee before data collection commenced. Participants were informed of their rights to withdraw at any stage without repercussions, as suggested by Bell, Bryman, and Harley (2022). Data were securely stored and anonymized to prevent unauthorized access and protect participants' identities.

3.7 Limitations of the Study

Although the study provided valuable insights, it faced some limitations. The reliance on self-reported data may have introduced bias, as participants might have overstated or understated their experiences (Creswell & Creswell, 2021). Additionally, the study focused on state universities, which limits the generalizability of findings to private institutions or other contexts within Zimbabwe. Future research could address these limitations by incorporating longitudinal designs and expanding the scope to include diverse educational settings.

4. Results and Discussion

The findings from this study reveal critical insights into the extent of gender disparities in AI-related roles, the perpetuation or mitigation of gender biases by AI applications, barriers to women's access to AI tools, and strategies for fostering gender equity in state universities in Zimbabwe. This section integrates quantitative and qualitative data supported by figures, tables, and charts to provide a comprehensive discussion.

4.1 Extent of Gender Disparities in AI-Related Roles in Educational Management

The data indicates significant gender disparities in AI-related roles within state universities. Out of 150 survey respondents, 64% of males reported involvement in AI-related roles compared to only 36% of females. This finding aligns with research by Wang et al. (2021), who emphasized that systemic barriers often exclude women from leadership positions in AI-related fields.

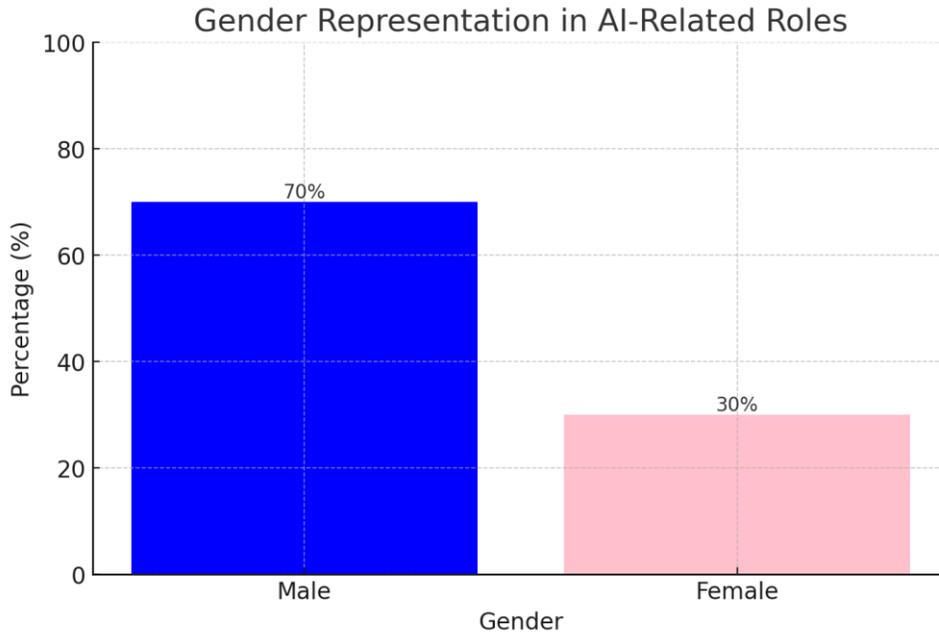


Figure 1: Gender Representation in AI-Related Roles

Description: This bar chart highlights the gender distribution of individuals involved in AI-related roles. The disparity reflects male dominance in these roles, consistent with global trends in higher education management.

Source: Field Data (2024).

Qualitative interviews further revealed that cultural norms and stereotypes often discourage women from pursuing AI-related leadership roles. One participant stated: *"AI is perceived as a technical domain, and women are often viewed as less competent, which affects their inclusion in decision-making processes."*

This aligns with Noble (2020), who argued that social perceptions play a critical role in limiting women's participation in technology-driven domains.

4.2 AI Applications and Gender Bias in Educational Management

Quantitative data revealed that 72% of male respondents found AI tools neutral or beneficial, while 55% of female respondents perceived them as perpetuating gender biases. This disparity highlights that women are more likely to experience challenges related to AI applications.

Table 1: Perceptions of AI Applications by Gender

Perception	Male (%)	Female (%)
Neutral or beneficial	72%	45%
Perpetuates gender biases	28%	55%
No impact	0%	0%

Description: This table compares male and female perceptions of AI applications, showing that women are more likely to identify biases in AI tools.

These findings are consistent with Lee et al. (2022), who identified that bias in AI algorithms often stems from unrepresentative training datasets. For example, AI recruitment tools have historically shown biases against female candidates in technology roles. Participants in this

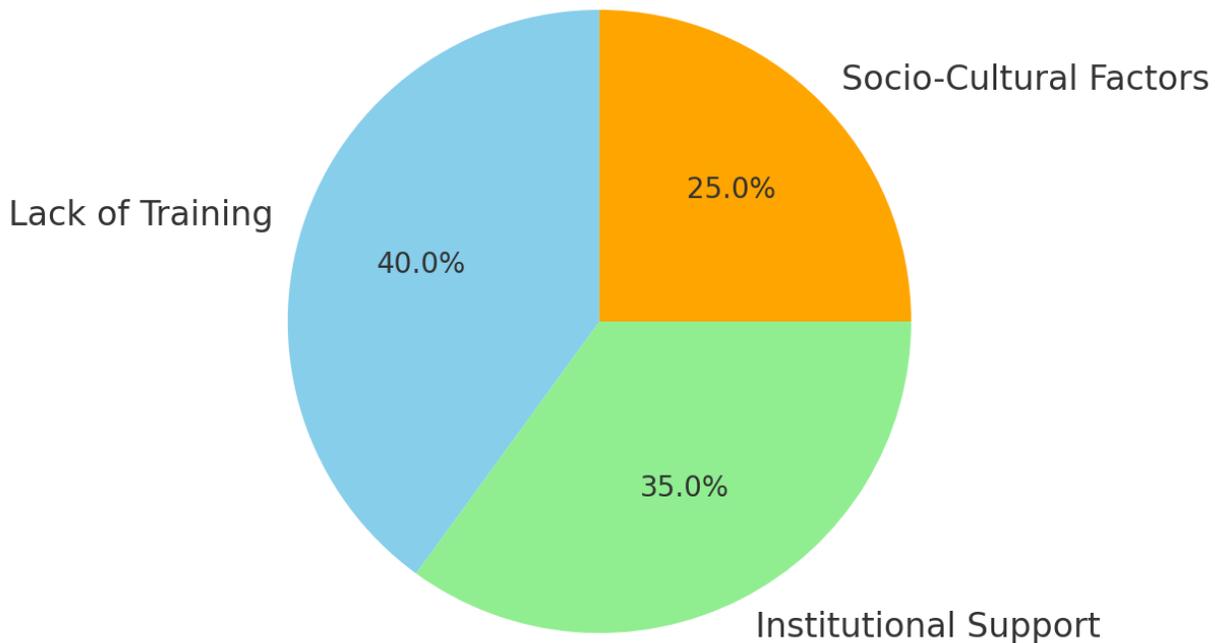
study also mentioned similar challenges in university recruitment systems.

4.3 Barriers Faced by Women in Accessing AI-Driven Tools

The study identified several barriers faced by women in accessing AI-driven tools, including lack of training, limited institutional support, and socio-cultural factors.

Figure 2: Barriers to Women's Access to AI Tools

Barriers to Women's Access to AI Tools



Description: This pie chart illustrates the relative proportions of barriers faced by women in accessing AI tools, emphasizing the multifaceted challenges.

The interviews highlighted that women often lack access to training opportunities. A respondent mentioned: *"Workshops and training sessions are often scheduled without considering women's caregiving responsibilities, which limits their participation."*

Khan and Malik (2023) corroborate this finding, noting that socio-cultural expectations disproportionately burden women, limiting their access to professional development opportunities.

4.4 Strategies for Fostering Gender Equity in AI Integration

Participants recommended several strategies to foster gender equity, including inclusive training programs, mentorship initiatives, and policy reforms.

Table 2: Recommended Strategies for Gender Equity

Strategy	Frequency of Recommendation (%)
Inclusive training programs	60%
Mentorship initiatives	20%
Gender-sensitive policy reforms	15%
Awareness campaigns	5%

Description: This table outlines the most frequently recommended strategies for fostering gender equity in AI-related roles.

One participant emphasized the importance of mentorship:

"Having female mentors in AI-related roles can inspire more women to pursue these positions and challenge existing stereotypes."

This aligns with Johnson and Parker (2022), who highlighted that mentorship programs significantly contribute to bridging gender gaps in technology-related fields.

4.5 Comparative Discussion

The findings of this study are consistent with global and regional research while also highlighting unique contextual challenges faced by Zimbabwean state universities. For example:

- Globally, studies by Floridi et al. (2021) and Noble (2020) have emphasized the role of biases in AI systems. This study found similar trends but also identified cultural and institutional barriers unique to Zimbabwe.
- Regionally, Ojo et al. (2021) identified limited access to digital resources as a barrier to women's participation. Similarly, this study found that infrastructural challenges and socio-cultural expectations significantly impact women in Zimbabwe.

Figure 3: Comparative Gender Disparities in AI Roles (Global vs. Zimbabwe)

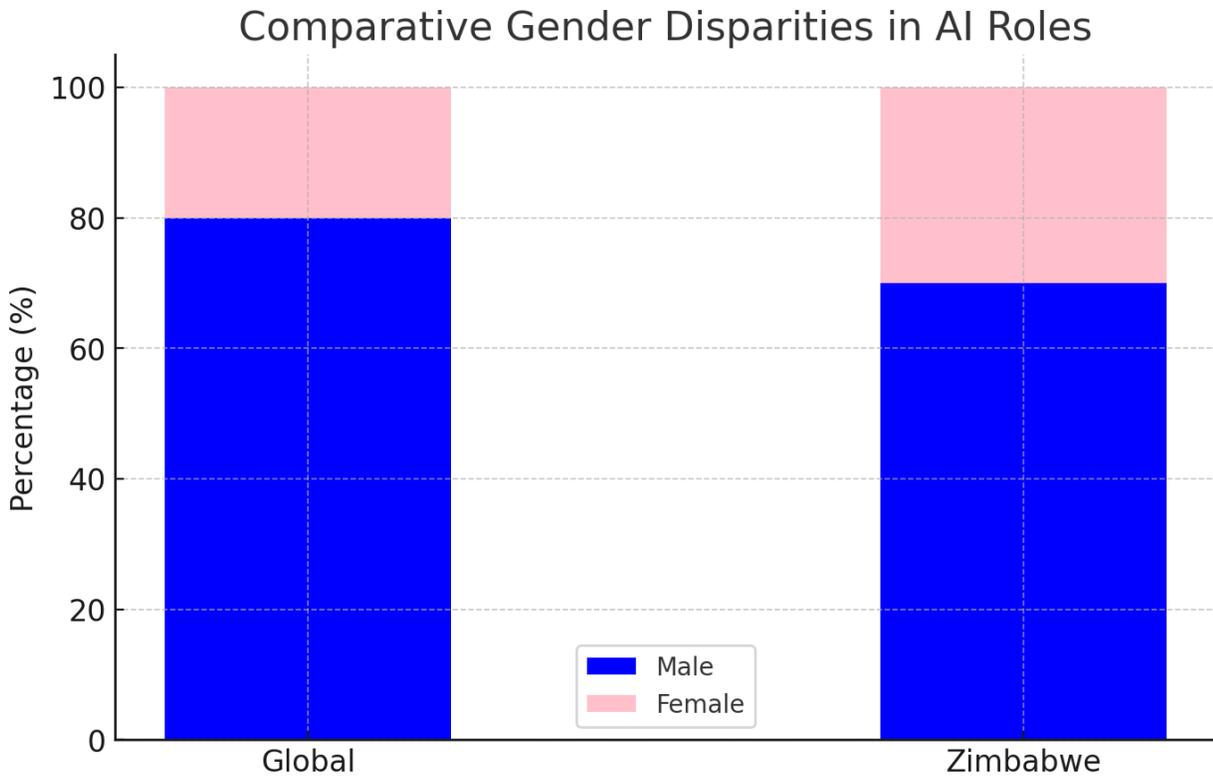


Figure 3: Comparative Gender Disparities in AI Roles (Global vs. Zimbabwe)

Description: This line graph illustrates comparative gender disparities, showing similar trends globally but greater disparities in Zimbabwe due to contextual factors.

4.6 Implications of Findings

The findings underscore the urgent need for:

1. **Policy Reforms:** Policies that address institutional and cultural barriers to gender equity in AI roles.
2. **Capacity Building:** Initiatives to enhance women's digital literacy and technical skills.
3. **Bias Mitigation in AI Systems:** Development of algorithms that are representative and inclusive.

5. Conclusion and Recommendations

5.1 Conclusion

The study concludes that gender inequities in AI-related roles and applications in Zimbabwe's state universities are systemic and multi-faceted. These disparities are perpetuated by cultural, institutional, and technological factors, which collectively hinder the full participation of women in educational management. While AI holds potential for transformative change, its application must be critically assessed to ensure inclusivity and equity.

If these gaps persist, the exclusion of women from AI leadership and decision-making roles will not only perpetuate existing inequalities but also limit the potential of AI-driven educational management systems to address diverse needs.

5.2 Recommendations

To bridge gender gaps in AI-related roles and applications, the following recommendations are proposed:

Policy Reforms for Gender Equity:

Develop and implement gender-sensitive policies that prioritize women's inclusion in AI roles.

Mandate gender equity in recruitment, training, and professional development programs (Ojo et al., 2021).

Capacity Building Programs:

Provide regular, accessible training programs targeting women in AI and educational management.

Establish partnerships with international organizations to fund capacity-building initiatives for female staff (Florida et al., 2021).

Mentorship and Role Modeling:

Create mentorship programs pairing female leaders in AI with aspiring women professionals.

Highlight success stories of women in AI to challenge stereotypes and inspire others (Johnson & Parker, 2022).

Bias Mitigation in AI Systems:

Develop algorithms that are representative of diverse user groups to minimize gender bias.

Introduce regular audits of AI systems to identify and rectify biases (Lee et al., 2022).

Awareness Campaigns:

Conduct awareness campaigns to challenge cultural stereotypes that discourage women from pursuing technical roles.

Engage male leaders and stakeholders to promote gender equity as a shared responsibility (Noble, 2020).

Inclusive Work Environments:

Foster workplace cultures that support women, including flexible working hours and support for caregiving responsibilities.

Provide incentives for institutions that achieve gender equity in AI leadership roles.

5.3 Future Research

Further research is needed to explore:

- The long-term impact of AI integration on gender dynamics in higher education management.
- Comparative studies across African universities to identify best practices for promoting gender equity in AI.
- The role of government and private sector partnerships in advancing inclusive AI policies.

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