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The Role of Artificial Intelligence (AI) in Advancing Gender Equality and Women's Empowerment in Academia: A Conceptual Framework

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Abstract

Education has a major impact on a society's political, social, economic, technological, and human capital development. The history of women's exclusion from higher education has resulted in a lack of diversity among the highest levels of leadership, particularly at significant institutions. Barriers, including institutional bias, gender preconceptions, and a lack of administrative support, must be overcome by women who aspire to hold leadership positions in higher education. However, AI is an effective tool for promoting gender equality and empowering women around the world through a number of charitable endeavours. The main aim of the study was to present a conceptual framework of AI's role for gender equality and women's empowerment in academia. This study used a qualitative and conceptual design of study. A total of 30 identified reviewed articles published between 2015 and 2025 were systematically analysed using thematic analysis to identify the role of AI among women in academia. Three major themes were identified: AI capabilities and tools, empowerment and support mechanisms, and gender equality and institutional impact. A conceptual framework was developed from these findings and shows that these three framework components were connected through a multifaceted, intricate network of interactions and introduced to guide future research that explains the role of AI in advancing gender equality and women's empowerment in academia. The

study serves as a catalyst for creating a more equitable AI landscape. Consequently, this study will promote diversity, which underscores the importance of gender diversity in AI, and can lead to more innovative and well-rounded solutions.

Keywords: Artificial Intelligence, women, gender equality, academic field, conceptual framework

Introduction

Gender equality is a basic human right that must be the cornerstone of a world that is prosperous, peaceful, and sustainable. Promoting gender equality is the primary focus of Sustainable Development Goal 5 (SDG 5), which was created by the UN in 2015 (Somerville & Pesantes, 2022). The fifth SDG 5 aims to promote equal leadership opportunities and women's full and effective engagement in all levels of decision-making in public, political, and economic life. This particular goal primarily addresses concerns pertaining to women's leadership opportunities and women's full and effective engagement in all levels of decision-making in public, political, and economic life. This particular goal primarily addresses concerns pertaining to women's leadership opportunities. In times of economic instability, it is even more important to enable every employee to reach their full potential because women comprise a significant share of the global workforce. Achieving gender parity in the workplace is crucial for the well-being of the global economy as well as for women's experiences but there is still no country or industry that has achieved gender parity in leadership as of yet. According to the World Economic Forum (2024), it is unlikely to change anytime soon unless a major shift in approach occurs. In terms of female representation, there have undoubtedly been some encouraging advancements. More women eventually rise to senior positions in sectors like education, government, and consumer services, where more women start in entry-level roles, despite the ongoing drop. The complicated issue of gender equality has led to a myriad of legislation in nations across the globe. No matter where they reside, discrimination against women persists, and it covers every facet of life, such as politics, work, and education (Karim et al., 2021). Despite growing discourse on ethical AI, there remains a significant gap in research exploring how AI can be strategically leveraged to promote gender equality and empower women in academic institutions. Because women have historically been excluded from higher education, there is a lack of diversity in the top tiers of leadership, particularly at larger schools. Obstacles, including institutional bias, gender preconceptions, and a lack of administrative support, must be overcome by women who aspire to hold leadership positions in higher education. Research on AI in higher education often emphasizes technical fairness but overlooks empowerment,

intersectionality, and systemic impacts on women in academia. Evidence is limited, concentrated in the Global North, and reliant on proxy measures. A comprehensive, context-sensitive framework is needed to link AI adoption with gender equity outcomes.

Objective of the Study

As AI applications spread throughout the world in the digital age, the study aims to develop a conceptual framework of AI role for gender equality and women's empowerment in academia.

Methodology

1. Research Design

This study adopts a qualitative, conceptual research design aimed at developing a conceptual framework that illustrates how AI can advance gender equality and women's empowerment in the academic field. This study utilised an integrative literature review which is a systematic literature review to explore and synthesise the main components of the proposed framework and combined with thematic analysis approach following Braun & Clarke's (2006) six-phase model: (1) familiarisation, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes and (6) producing the report.

2. Data Sources and Search Strategy

The aim of the study was to construct a conceptual framework illustrating how AI can advance gender equality and women's empowerment in academic settings. The review synthesised knowledge from interdisciplinary sources, including peer-reviewed journal articles, conference proceedings, and policy documents from international organisations such as UNESCO, UN Women, OECD. The research is based on an integrative literature review, drawing from interdisciplinary sources that cover scholarly articles, policy documents from international organisations and case studies from higher education institutions related to AI integration, higher education leadership, and gender equality. A systematic search was conducted across major academic databases including Scopus, Web of Science, IEEE Xplore, and Google Scholar, to ensure coverage of both technological and social science perspectives. The search included publications between 2010 to 2025. Using an Atlas.ti 22 data software, keywords and Boolean operators were applied to refine results. To ensure comprehensive retrieval, Boolean operators (AND, OR, NOT) and specific keyword combinations such as "artificial intelligence" AND "higher education" AND "gender equality", "AI" AND "women's empowerment" AND "academia", and "machine learning" OR "learning analytics" AND "gender bias" were applied. The

initial search yielded 120 results, which were screened for relevance using title, abstract, and full-text review. The selected keywords spanned were Artificial Intelligence, Gender Equality, Academic Field, and Framework from the analysis. The PRISMA approach was used for the selection and screening of pertinent papers, ensuring a thorough and methodical evaluation.

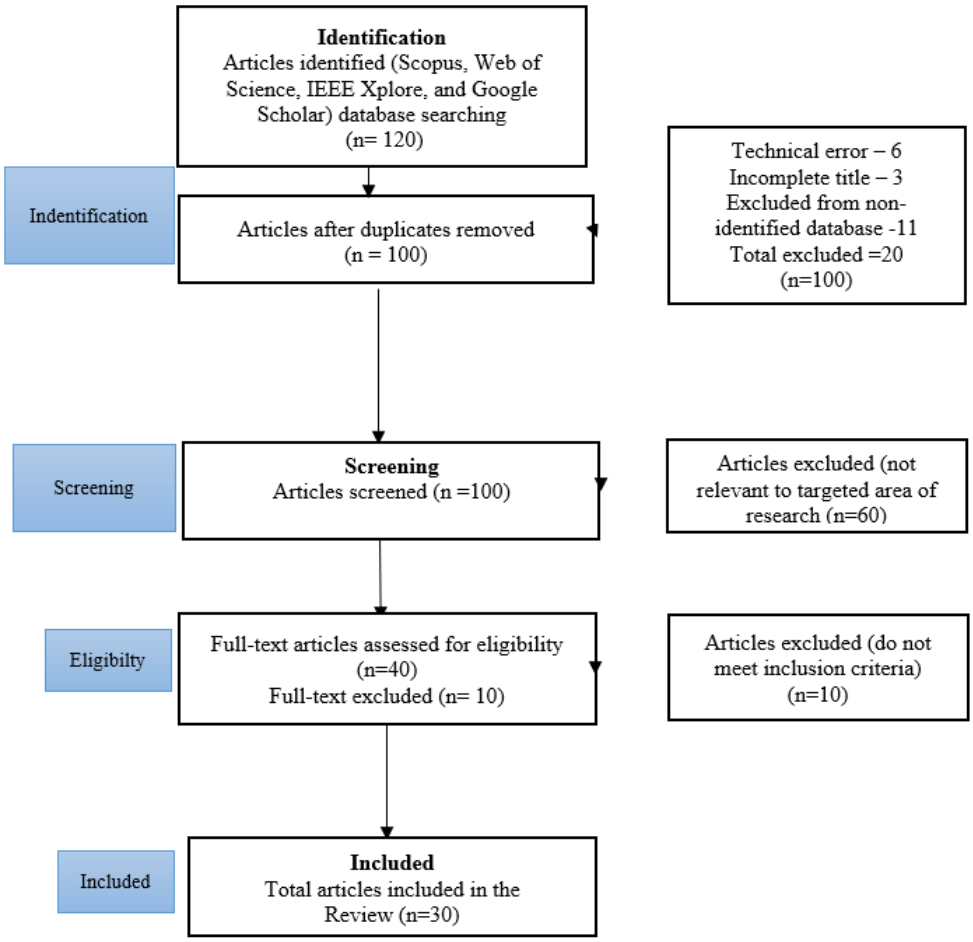

Figure 1. Reviewed Articles Identification Process Diagram

The selection and screening process for literature followed the PRISMA method, and it is illustrated in the PRISMA flow diagram in Figure 1. Specific inclusion and exclusion criteria were developed to ensure that only relevant and appropriate research was included. Only sources that: (a) discussed AI applications relevant to higher education or academic contexts, and (b) addressed gender equality or women's empowerment explicitly, were included. Studies focusing exclusively on industry or unrelated technological contexts were excluded. The researcher used the inclusion criteria: (a) they had to be relevant to AI in the academic field; (b) they had to focus on women's

empowerment or gender equality; (c) they had to be peer-reviewed publications or reliable policy reports; and (d) they had to be published between 2015 and 2025. After the previously indicated procedure, 30 scholarly articles were obtained from the database. After removing 20 of the 120 documents,100 publications were left that will give a reliable research perspective on the AI for gender equality and women's empowerment in the academic field.. Through the PRISMA-guided process, 120 sources were refined to 30 key publications directly addressing AI, higher education, and gender equality. This rigorous selection ensures credible and relevant perspectives on how AI supports women's empowerment in academia.

3. Data Analysis

The next step was to analyse the data collected. All selected literature was imported into the ATLAS.ti 22 qualitative data software for systematic coding and theme analysis. Using Braun and Clarke's six-phase method, each source was coded for text segments relevant to AI capabilities, empowerment mechanisms, and gender equality outcomes. Through iterative coding, thematic analysis relationships emerged which were grouped into three core components: AI Capabilities and Tools, Empowerment and Support Mechanisms and Gender Equality and Institutional Impact. Atlas.ti's tools helped trace links and feedback loops between themes, culminating in the conceptual framework.

Results and Discussion

This literature review analysed 30 articles related to the study, which are divided into three main components: (1) AI Capabilities and Tools, (2) Empowerment and Support Mechanisms and (3) Gender Equality and Institutional Impact. These three categories offer a thorough summary of the evolution of research on AI roles in education contexts, as well as how AI can advance gender equality and women's empowerment in the academic field. The analysis of 30 reviewed articles are presented in Table 1.

Table 1. Analysis of Reviewed Articles (n = 30)

Category	Author & Year	Article Titles	Focus Area	Region
AI Capabilities and Tools	Ahmad et al., 2024	Awareness, benefits, threats, attitudes, and satisfaction with AI tools	Level of awareness, perceived benefits, threats, attitudes, and level of satisfaction with AI tools among individuals	Asia & Africa
	Cowan et al., 2024	Can AI Level the Playing Field? How AI-Assisted Assessment Impacts Gender Bias in Student	AI bias in marketing instructors' evaluations	North America

		Evaluations of Marketing Instructors		
	Pedró et al., 2019	Artificial Intelligence in Education: Challenges and Opportunities for Gender Equality	AI tools in education and their impact on women's participation	Europe
	Maurat et al., 2024	A Comparative Study of Gender Differences in the Utilization and Effectiveness of AI-Assisted Learning Tools in Programming Among University Students	Gender differences in adoption of AI teaching tools	Asia
	Mat Yusoff et al., 2025	Understanding the role of AI in Malaysian higher education curricula: an analysis of student perceptions	The role of Artificial Intelligence (AI) in higher education curricula	Asia
	Liu & Murphy, 2022	Applying a Trustworthy AI Framework to Mitigate Bias and Increase Workforce Gender Diversity	Ethical discussion regarding gender equity in AI-enabled workforce decision applications	North America
	Albuquerque et al., 2024	From hype to evidence: exploring large language models for inter-group bias classification in higher education	Classifying bias in learning	Europe
	Shah, 2024	Gender Bias in Artificial Intelligence: Empowering Women Through Digital Literacy	Potential of digital literacy to empower women in AI	Asia
	Møgelvang, 2024	Gender Differences in the Use of Generative Artificial Intelligence Chatbots in Higher Education: Characteristics and Consequences	Generative artificial intelligence (genAI) chatbot use and gender differences	Europe
	Bulathwela, 2024	Artificial Intelligence Alone Will Not Democratise Education: On Educational Inequality, Techno-Solutionism and Inclusive Tools	The future of AI in Education	Europe
	Hwang et al.,2020	Vision, challenges, roles and research issues of Artificial Intelligence in Education	Implementing AIED in different learning and teaching setting	Asia
Empowerment and Support Mechanism	Kalim et al., 2025	Barriers to AI adoption for women in higher education: A systematic review of the Asian context. Smart Learning Environment	Barriers and biases in AI adoptions and representation of women in AI policy formulation	Asia
	Mahmood et al.,2023	Organizational culture, AI training, and technological	The factors that influence leadership	Asia

		tools: influencing women's leadership success in the unique context of the UAE	experiences of women in UAE	
	Ebrahimi et al,2024	Empowering Women through Artificial Intelligence: Opportunities and Challenges	AI opportunities an challenges among women	Asia
	Mehrunisa et al., 2024	The impact of artificial intelligence on women's empowerment, and work-life balance in Saudi educational institutions	The implications of AI capabilities on work-life balance and the empowerment of female faculty members	Asia
	Rana et al., 2024	Assessing AI adoption in developing country academia: A trust and privacy-augmented UTAUT framework	The users' perspective to align AI-based technologies with the education system	Asia
	Ferk Savec et al., 2025	The Role of AI Implementation in Higher Education in Achieving the Sustainable Development Goals: A Case Study from Slovenia	SDGs and AI in Education	Europe
	Voutyrako & Skordoulis, 2025	Algorithmic Governance: Gender Bias in AI-Generated Policymaking?	Governance and gender bias in policymaking.	Europe
	Jin et al.,2025	Generative AI in higher education: A global perspective of institutional adoption policies and guidelines	Characteristics of GAI	Africa, Asia, Europe, Latin America, North America, and Oceania
	Roumate, 2023	Ethics of Artificial Intelligence, Higher Education, and Scientific Research	Ethics of Artificial Intelligence in HEIs	Morocco
Gender Equality and Institutional Impact	Helmiatin et al.,2024	Investigating the adoption of AI in higher education: A study of public universities in Indonesia	Attitudes toward the adoption of AI in higher education	Asia
	Kumar et al., 2022	Gender and feminist considerations in Artificial Intelligence from a developing-world perspective, with India as a Case Study	The affect of AI and robotics affect women's opportunities in developing countries	Asia
	Leavy, 2018	Gender bias in artificial intelligence: The need for diversity and gender theory in machine learning.	Gender bias in training data for machine learning algorithms	Europe
	Moges, 2019	One-Hand Clapping: Gender Equality and Its Challenges in Pastoralist Secondary Education in	Gender equality and challenges	Ethiopia

		Afar Region--A Quality Concern		
	Quaquebeke et al., 2023	The Now, New, and Next of Digital Leadership: How Artificial Intelligence (AI) Will Take Over and Change Leadership as We Know It	Academia and practice that idealise human leadership and think that this support can never be overtaken by AI	Europe
	Najafi, 2025	Strengthening Women's Leadership and Management in the Digital Age: Innovation, Opportunities, and Challenges	Digital transformation positively impacts women's leadership in academia	Asia
	Srinate et al., 2025	Transforming Women's Futures: A Case Study on The Role of Artificial Intelligence in Digital Education in State of UttarPradesh, India	AI integrated into digital education for reshaping opportunities for empowering women	Asia
	Kautsar et al.,2023	Prediction of Gender-Biased Perceptions of Learners and Teachers Using Machine Learning	Gender- biased in AI Education	Asia
	Ehlers, 2020	Digital leadership in higher education.	Identifying the dimensions of good HE leadership	Europe
	Chauhan, & Kaur, 2022.	Gender Bias and Artificial Intelligence: A Challenge within the Periphery of Human Rights	AI and threats to gender equality	Asia

The review identified three predominant themes that structure the current discourse on artificial intelligence (AI) and gender equality in higher education: (1) AI Capabilities and Tools, (2) Empowerment and Support Mechanisms, and (3) Gender Equality and Institutional Impact. The first theme, AI Capabilities and Tools, was represented by eleven keywords, including pedagogical integration, assessment tools, fairness, bias in large language models, and gender inclusion. This cluster highlights how AI is positioned both as a transformative educational tool and as a site where issues of bias and equity emerge. While much of the literature emphasises the potential of AI to enhance learning processes, there is equal concern about algorithmic bias, gender disparities, and the inclusivity of AI-driven educational environments.

The second theme, Empowerment and Support Mechanisms, was attached by ten keywords, notably institutional dynamics, leadership, governance, capacity building, policymaking, and ethics. This theme shifts attention from technological tools to the structural and cultural supports necessary for equitable adoption. It emphasizes that leadership readiness,

ethical policymaking, and governance mechanisms are crucial for ensuring that AI implementation empowers rather than marginalizes. In particular, institutional capacity building and policy alignment emerge as central levers for creating an enabling environment that promotes inclusivity and fairness in AI adoption.

The third theme, Gender Equality and Institutional Impact, was the largest cluster with thirteen keywords, including institutional culture, equity, access, bias origins, content bias, fairness, and leadership. This theme foregrounds how AI adoption intersects with broader systemic issues in higher education, such as gender bias, cultural norms, and governance practices. The literature underscores that AI can function as both a catalyst for equity and a mechanism for reinforcing existing inequalities, depending on how it is embedded into institutional systems. Here, challenges such as bias in training data, inequitable access to AI resources, and the reproduction of gendered stereotypes are particularly salient. At the same time, the theme highlights pathways for reform through inclusive leadership, structural change, and the integration of gender-sensitive policies. When combined, these themes show an increasing understanding of the complex role AI plays in promoting gender equality. It extends beyond technical capabilities to include institutional readiness, governance reform, and cultural transformation. By mapping these thematic clusters, this study provides a structured overview of how AI adoption is currently conceptualized in the literature and offers a foundation for developing an integrative framework that links technological tools, institutional mechanisms, and equity outcomes in higher education. The analysis of thematic keywords highlights three interconnected domains: AI Capabilities and Tools, Empowerment and Support Mechanisms, and Gender Equality and Institutional Impact that together shape the role of AI in academia. The first theme emphasises technological opportunities and risks, with keywords such as AI tools, pedagogical integration, assessment tool, bias, and fairness reflecting both innovation and concerns over equity. The second theme focuses on institutional enablers, where keywords like leadership, empowerment, capacity building, governance, policymaking, and ethics point to the importance of supportive structures that allow women to benefit fully from AI. The third theme addresses systemic reform, with keywords including institutional culture, equity, access, gender bias, and challenges, highlighting the need for accountability and long-term transformation. Together, the themes show that AI's effectiveness in advancing gender equality depends not only on its technical capabilities but also on empowerment strategies and institutional governance that ensure fairness, inclusion, and sustainable impact.

Table 2. Analysis of Thematic Keywords and Sub-theme

Main Theme	Keywords	Sub-theme	Number of Keywords
AI Capabilities and Tools	AI Tools, Pedagogical integration, AI in education, Assessment tool, Bias, Bias in LLMs, Fairness, Gender, Gender equity, Gender differences, Inclusion	Intelligent Tutoring, Intelligent Tutee, AI-Based Policy Advisors, Generative AI	11
Empowerment and Support Mechanisms	Institutional dynamics, Leadership, Empowerment, Capacity building, Institutional readiness, Governance, Governance bias, Policymaking, Policy implications, Ethics	Capacity Building, Inclusive Governance, Work-Life Balance, Representation in Policy	10
Gender Equality and Institutional Impact	Institutional culture, Equity, Capacity building, Access, Bias origins, Governance, Leadership, Fairness, Content bias, Inclusion, Gender, Challenges, Gender bias	Equal Access, Bias Reduction, Cultural and Policy Shift, Enhanced Women's Leadership	13

The analysis demonstrates that AI's contribution to gender equality depends not only on technological innovation but also on empowerment strategies and institutional reforms. The keyword analysis reveals that AI's role in advancing gender equality in academia lies at the intersection of technological capabilities, empowerment mechanisms, and institutional reform. Sustainable progress depends on integrating these themes to ensure AI-driven innovation translates into inclusive and equitable academic environments.

The sub-components of the framework were developed through a systematic thematic analysis of the extracted keywords. First, a pool of keywords was identified from the reviewed literature and documents, reflecting recurrent issues such as AI tools, pedagogical integration, bias, fairness, empowerment, governance, and leadership. These keywords were then clustered into groups of related concepts to highlight patterns and conceptual similarities. For example, terms such as AI in education, assessment tools, and pedagogical integration were grouped to form the sub-component Intelligent Tutor, while bias, fairness, and gender bias were clustered into the sub-component Bias Reduction. Similarly, keywords such as capacity building, empowerment, and readiness were abstracted into the sub-component Capacity Building, and those related to leadership, governance, and representation were synthesized into Inclusive Governance.

Through this process of clustering and abstraction, sub-components were distilled to capture the essence of each group of related keywords, ensuring that they represented a coherent and meaningful construct. Finally, these sub-components were organised under the three overarching themes of the framework. The theme AI Capabilities and Tools encompassed sub-

components such as Intelligent Tutor, Intelligent Tutee, AI-based Policy Advisors, and Generative AI. The theme Empowerment and Support Mechanisms included Capacity Building, Inclusive Governance, Work-Life Balance, and Representation in Policy. The theme Gender Equality and Institutional Impact integrated Equal Access, Bias Reduction, Cultural and Policy Shifts, and Enhanced Women's Leadership. This analytic process demonstrates how the sub-components were not derived arbitrarily, but instead were systematically generated through the identification of patterns across related keywords, thereby grounding the framework in empirical evidence and thematic coherence.

AI Capabilities and Tools

An analysis of 11 articles highlights that AI tools, when strategically integrated into higher education, can serve as powerful enablers of gender equality and women's empowerment. One key capability lies in their potential to enhance awareness, learning, and digital literacy. This aligns with the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasize perceptions of usefulness, ease of use, and social influence in shaping adoption. For instance, Acosta-Enriquez et al. (2024) applied UTAUT2 to identify factors influencing AI uptake in academia, while Ahmad et al. (2024) found that awareness, perceived benefits, and satisfaction strongly affect engagement. Similarly, Shah (2024) stressed that digital literacy enables women to actively shape, rather than passively consume, AI applications. In Malaysia, Mat Yusoff et al. (2025) demonstrated that inclusive pedagogical integration of AI enhances student engagement and readiness, though gender-based gaps in access and skills persist. At the same time, a critical challenge lies in AI's capacity to perpetuate bias. Cowan et al. (2024) and Maurat et al.(2024) reported gendered disadvantages in AI-supported teaching and assessment, while UNESCO (2019) cautioned that unregulated AI risks reinforcing inequities. Liu and Murphy (2022) proposed trustworthy AI frameworks, and Albuquerque et al. (2024) showed that large language models can help detect bias if combined with human oversight and ethical safeguards. Another theme concerns gendered patterns of AI use. Møgelvang (2024) observed differences in frequency, purpose, and confidence between male and female students, suggesting that targeted support is essential to ensure equitable benefits. Bulathwela (2024) similarly warned against techno-solutionism, arguing that AI alone cannot democratize education without addressing structural inequities. Finally, AI offers pedagogical pathways for empowerment. Hwang et al. (2020) outlined the Intelligent Tutor and Intelligent Tutee models: the former provides adaptive teaching, feedback, and monitoring to close achievement gaps, while the latter fosters agency and confidence by

positioning students as teachers of AI. For women in underrepresented fields, these models can encourage participation and critical engagement with technology. Current research demonstrates AI's dual potential: it can foster empowerment by enhancing digital literacy, inclusivity, and agency, yet risks reproducing gendered inequities if adoption is uncritical. A notable shortcoming of existing studies is their limited theoretical integration and fragmented treatment of gendered experiences. This framework advances the field by linking technology adoption models, feminist perspectives, and organizational change theory, providing a holistic lens to assess both opportunities and risks. Rather than treating AI as a neutral tool, it positions AI capabilities within broader structures of power, pedagogy, and institutional transformation clarifying how equity outcomes can be systematically achieved.

Empowerment and Support Mechanisms

All of these studies point to the need for deliberate alignment of AI's capabilities from identifying bias and personalising learning to promoting equitable access with the broader goals of gender equality. This dimension is informed by feminist theory, which interrogates how power, agency, and gender norms shape women's participation in academia. Feminist perspectives emphasize that empowerment requires more than access to AI tools; it also depends on policies, leadership opportunities, and institutional practices that dismantle systemic hierarchies. As El Morr (2024) argues, feminist critiques are essential for uncovering algorithmic bias and ensuring AI adoption is embedded in struggles for equity and inclusion. Accordingly, the proposed conceptual framework views AI not as a neutral add-on, but as an active force in reimagining academia as an inclusive ecosystem. An analysis of nine studies underscores that empowerment through AI in higher education is inseparable from robust support mechanisms. Kalim et al. (2025) highlight barriers limiting women's participation in AI policy-making across Asia, while Mahmood et al. (2023) demonstrate how organizational culture, access to training, and technological readiness shape women's leadership opportunities in the UAE. Other studies point to AI's potential to support professional growth and improve work-life balance and offer adaptive mentoring through intelligent learning partners (Ebrahimi et al., 2024; Mehrunisa et al., 2024). Yet, as Rana et al. (2024) note, trust, privacy, and institutional readiness remain prerequisites for equitable AI integration, particularly in resource-constrained settings. Emerging applications, such as AI-based policymaking advisors, illustrate the potential for inclusive governance, though Voutyrako and Skordoulis (2025) caution that algorithmic governance may reproduce biases if not ethically designed. While the literature highlights both opportunities and risks, its limitations are clear.

Much of the research documents individual or institutional benefits without theorizing how empowerment unfolds across intersecting cultural, organizational, and technological domains. Ethical principles such as transparency and accountability are frequently noted (Roumate, 2023), but few studies embed these within a systematic framework of institutional change. This review advances knowledge by integrating feminist theory with organizational change literature, showing that AI can only empower women when coupled with supportive governance structures, cultural transformation, and intentional capacity building. The framework moves beyond fragmented accounts to position AI as a lever for reconfiguring power relations in academia, ensuring that women are not just users of AI, but active shapers of its future in higher education.

Gender Equality and Institutional Impact

The third component analysed ten studies linking AI adoption in higher education to institutional culture, governance, and gender equity dynamics. This theme resonates strongly with organizational change literature, which emphasizes that lasting transformation requires governance reform, cultural shifts, and an institution-wide sense of urgency (Cady et al., 2014). From this perspective, the long-term impact of AI on gender equality depends not only on the tools themselves but on how higher education institutions adapt structurally, foster inclusive leadership, and embed equity principles into governance systems. The reviewed studies highlight that institutional culture and leadership approaches strongly mediate AI's equity outcomes. Helmiatin et al. (2024) show that institutional attitudes shape inclusivity in Indonesian universities, while Kumar et al. (2022) caution that AI and robotics may simultaneously expand and restrict women's opportunities in developing contexts. At the same time, systemic bias remains a persistent challenge: Leavy (2018) and Kautsar et al. (2023) demonstrate how algorithmic training data and classroom practices can reinforce gender stereotypes, while Chauhan and Kaur (2022) frame algorithmic bias as a threat to human rights. Leadership and governance emerge as critical leverage points. Quaquebeke et al. (2023) and Najafi et al. (2025) argue that digital leadership can advance women's participation if supported by inclusive strategies, while Ehlers (2020) stresses aligning innovation with equity goals. Complementary work highlights the importance of fairness in marginalized contexts (Srinate et al., 2025) and the need for structural reforms beyond access, such as affirmative action, mentorship, and gender-sensitive pedagogy (Moges, 2019).

While these findings illustrate both risks and opportunities, the literature remains fragmented and largely descriptive. Most studies document how AI intersects with gender equality but stop short of theorizing the institutional mechanisms through which transformation occurs. There is

limited exploration of intersectionality (how gender interacts with class, race, or geography), or of how equity can be embedded into algorithm design, governance structures, and accountability systems. Ethical principles such as transparency, fairness, and inclusivity are widely noted, but rarely operationalized in a way that connects technology adoption with organizational transformation. The proposed conceptual framework advances this body of knowledge by bringing together feminist theory, technology adoption models, and organizational change perspectives. It reframes AI adoption as a driver of systemic reform, where governance, leadership, and policy are as central as technological design. This framework highlights that AI must not only widen access but also ensure equality of outcomes through equity-based HR systems, gender audits, and curriculum reform. In doing so, it bridges the current gap between fragmented, case-based insights and a holistic approach to institutional change, positioning AI as both a potential disruptor of bias and a catalyst for reconfiguring power relations in academia.

Conceptual Framework

This conceptual framework shows how the roles of AI in higher education can influence gender equality and women's empowerment in academia. Based on the three main identified components. Figure 2 illustrates the role of AI in advancing gender equality and women's empowerment in academia. The framework is organized into three components : (1) Pathways, representing the key areas through which AI contributes to change; (2) Measurable Indicators, outlining how progress can be assessed; and (3) Application Scenarios, highlighting practical implementations in academic contexts. This framework illustrates the interconnected pathways through which AI capabilities and tools can drive gender equality and women's empowerment in higher education, mediated by empowerment and support mechanisms and ultimately influencing institutional and societal impacts. The conceptual framework delineates the pathways through which Artificial Intelligence (AI) can advance gender equality and women's empowerment in academia. It integrates three interdependent components: (1) AI Capabilities and Tools, (2) Empowerment and Support Mechanisms, and (3) Gender Equality and Institutional Impact while embedding pathways, measurable indicators, and application scenarios that operationalise the linkages.

At the foundational level, AI capabilities and tools such as intelligent tutoring systems, intelligent tutees, generative AI, and AI-based policy advisors constitute the enabling infrastructure for academic innovation. The AI capabilities and tools component represents an enabling foundation of the framework, presenting the technological and functional features that AI brings into the educational and policy ecosystem. The sub-components include Intelligent Tutor and Intelligent Tutee, which are AI-driven platforms that act

as tutors, tutees, or collaborative learning partners (Hwang et al., 2020), providing adaptive learning, feedback, and mentoring opportunities. These technologies have the potential to facilitate personalized learning, automate decision-making, and provide data-driven insights for policy design and institutional governance. The integration of these capabilities is mediated through pathways, namely, access and participation, equity in teaching and learning, governance and policy, and capacity building and inclusion. These pathways function as the conduits that align AI deployment with equity-oriented objectives, ensuring that technological advancement is not divorced from the normative imperative of inclusivity. Building upon this foundation, the second component, empowerment and support mechanisms, captures the processes through which AI contributes to women's advancement in higher education.

These include capacity building initiatives, inclusive governance structures, work–life balance facilitation, and representation in policy-making. This component emphasises how AI can both dismantle systemic barriers and enhance institutional readiness to support women scholars and educators. The framework also embeds measurable indicators to provide an empirical basis for evaluation. Indicators such as representation in leadership and faculty roles, enrollment of women in AI and technology programs, narrowing of gender pay gaps, parity in promotion rates, improvements in digital literacy and AI training outcomes, bias detection and correction within systems, and women's authorship and access to research grants serve as benchmarks for assessing institutional progress and policy effectiveness. Complementing these are application scenarios, which translate conceptual pathways into tangible practices. Examples include AI-powered learning platforms, bias-free automated assessments, equity monitoring dashboards, AI-driven mentorship and leadership training, peer-review and evaluation tools, and AI-supported bias detection in hiring and publishing processes. These scenarios demonstrate the multiplicity of contexts in which AI can be mobilized to redress inequities in academic environments.

Finally, the third component, gender equality and institutional impact, represents the desired outcomes of this integration. The phase reflects the end-goal of these interactions, a more equitable and inclusive academic environment. These include equal access to academic opportunities, reduction of systemic and algorithmic bias, cultural and policy transformations toward inclusivity, and enhanced women's leadership across institutional hierarchies. The first sub-component is related to equal access to academic resources, promotions, and leadership roles as suggested by Moges (2019). Collectively, these impacts highlight the transformative potential of AI when embedded within equity-oriented governance frameworks. The framework demonstrates a progressive flow from AI capabilities to empowerment mechanisms and,

finally, to institutional outcomes, with pathways, indicators, and scenarios providing the critical linkages for conceptual clarity and empirical validation.

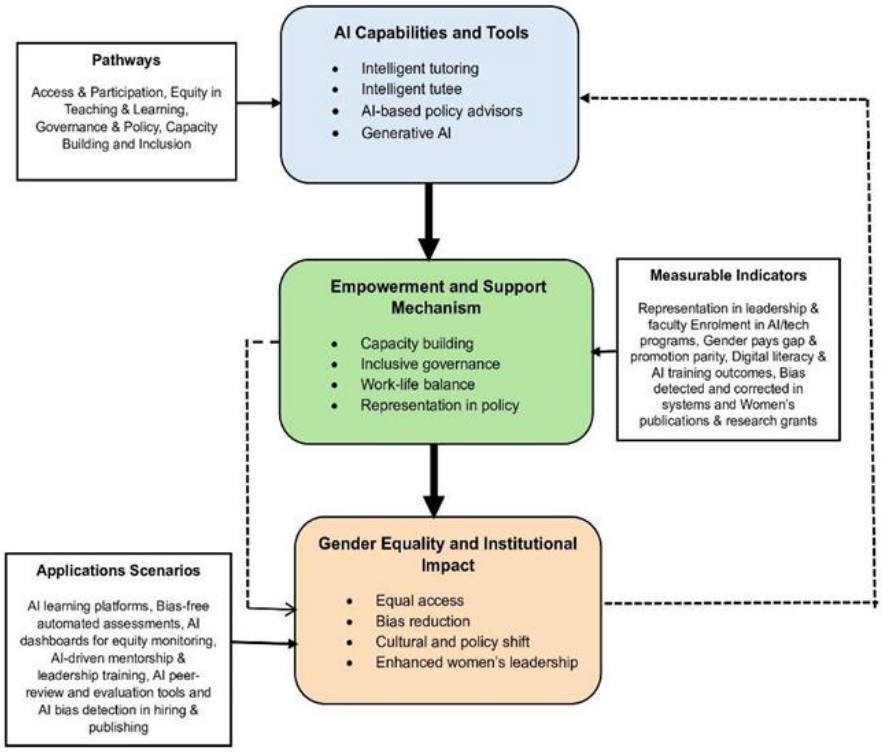

Figure 2. Conceptual Framework of the Role of Artificial Intelligence (AI) in Advancing Gender Equality and Women's Empowerment in Academia

In sum, this conceptual framework illustrates how AI, when strategically deployed, can serve as both a technological enabler and a social catalyst for advancing gender equality and women's empowerment in academia. By linking AI capabilities and tools with empowerment and support mechanisms, and ultimately leading to institutional impact, the model highlights the pathways through which equity can be embedded into higher education systems. The inclusion of measurable indicators ensures that progress is evidence-based, while application scenarios demonstrate practical opportunities for implementation. The framework underscores that the integration of AI in academia must be guided by inclusivity, governance, and accountability if it is to achieve lasting cultural and institutional transformation in favor of gender equity. Finally, the framework includes Sustainable Development Goals alignment to enhance women's leadership by ensuring AI implementation supports global equity and education goals (SDG 4 & 5).

Research Implications

Like other notable and remarkable studies conducted by other researchers, this study also has its own significance, which made the need to carry out this study very relevant. The discussion surrounding the framework's research implications reveals a critical, multi-faceted perspective on using AI for gender equality. While the model optimistically links AI tools to institutional change, it prompts a deeper conversation about the inherent promise and peril of these technologies. Research must not only validate the effectiveness of algorithms in reducing bias but also critically examine their potential to inadvertently perpetuate it, emphasizing the need for robust ethical oversight. Furthermore, the framework's success pivots on a crucial middle layer of Empowerment and Support Mechanisms, underscoring that AI is not a standalone solution but a tool that must be carefully integrated into a supportive socio-technical system designed with end-users in mind. This leads to the most significant challenge: achieving true institutional and cultural change, which requires a focus beyond simple metrics to explore how technology can genuinely shift norms and behaviors. Finally, any research must be mindful of global context and equity, ensuring that these AI-driven interventions are adaptable, accessible, and do not inadvertently widen existing inequalities across different societies and economies.

Conclusion

The literature review of 30 articles shows that the role of AI in promoting gender equality and women's empowerment among academia is greatly influenced by AI capabilities and tools, empowerment and support mechanisms, and gender equality and institutional impact components. The proposed framework integrates AI Capabilities and Tools, Empowerment and Support Mechanisms, and Gender Equality and Institutional Impact to guide the equitable adoption of AI in higher education. By combining intelligent tutors and intelligent tutees, AI-based policy advisors, and bias-detection systems with inclusive governance and representation policies, the model highlights how technology and institutional culture can reinforce each other in promoting women's participation and leadership. The framework's cyclical structure emphasises that advancements in AI must be matched with empowerment initiatives and fair governance to achieve sustainable gender equality. This approach offers a foundation for developing AI strategies that are both technologically robust and socially inclusive. Hence, this framework not only highlights how AI can support gender equality in higher education but also emphasises co-evolution as gender equality improves; it enhances AI tools' inclusivity and effectiveness, creating a virtuous cycle of empowerment and institutional transformation. To harness AI for gender equality in academia, researchers should develop robust, intersectional indicators and

apply diverse methodological approaches to assess impact. Policymakers need to mandate transparent audits, establish ethical data governance, fund equity-focused innovations, and create accountability mechanisms for AI misuse. Academic institutions should adopt AI responsibly by integrating bias-aware tools, investing in staff training, supporting women's leadership in AI, and embedding continuous monitoring of gender outcomes. Collectively, these actions ensure that AI not only enhances institutional efficiency but also actively contributes to empowerment, fairness, and the creation of more inclusive academic environments.

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