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AI digital skills and women empowerment: Impact of AI based education technology platform on career readiness and economic independence of female university students in Pakistan

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Abstract

This study examined the impacts of AI-based educational technologies on female university students in Pakistan regarding their career readiness and economic independence. The study aimed to analyze case uses of AI, and how women's attainment of these skills impacts their economic self-reliance. Employing a descriptive-correlational quantitative research method, data were collected from a stratified random sample of 358 female students (under graduate and post graduate), and 175 faculty members of the Gomal University, Dera Ismail Khan. Data collections tools were two structured, validated surveys measuring AI-related activities and career readiness and economic self-reliance. Data were analyzed using descriptive statistics, simple linear regression and One-Way ANOVA. It was found that the engagement with AI EdTech was a strong predictor of career readiness of women ($R^2 = 0.341$, $p < 0.001$) and the acquisition of skills in AI was a strong predictor of economic self-reliance of women ($R^2 = 0.374$, $p < 0.001$). Cross disciplinary analyses revealed that women from the STEM and Business Faculties engaged in more AI activities than women from Social Sciences ($p < 0.001$). The researchers believe that AI/digital literacy erasure the barriers of unemployment stemming from lack of employment opportunities and socio-cultural inequalities. To achieve this goal suitable digital infrastructure has to be prioritized.

KEYWORDS: Artificial intelligence, digital skills, women empowerment, career readiness, economic independence, educational technology, female higher education.

INTRODUCTION

Currently, the world is experiencing the AI and digital divide related to the Fourth Industrial Revolution. Developing countries will use digital technology and AI to close the gap related to socio-economic challenges. In Pakistan, there are many reasons that result in a gender divide in the labor force. Some reasons include long distances, the social and cultural divide, and limitation of opportunities. Specific technology in educational fields combined with AI is an innovative and positive way to provide Pakistani women with the opportunity for structural empowerment (Ahmed Khan). Educational fields that use AI to help students learn skills related to data, machine learning, programming, creating content that can be used in virtual environments, and digital skills, among others, are a way to provide Pakistan women the opportunity to work in the digital economy. Using these technologies in conservative and rural areas allows women to overcome the limitations that such areas impose.

In conservative and rural areas, universities must provide innovative ways for women to access skills and opportunities, such as providing jobs and internships. Using AI-based technology as part of the university curricula and when offering students professional skills helps women to learn more skills related to technologies and digital fields, including problem-solving, algorithmic thinking, and AI prompt engineering. These skills will provide women with the skills and confidence they need to secure employment, start a business, and work in the international digital economy.

(Shoaib et al., 2026).

The absence of financial independence is a matter of psychological and social concern for women rather than an economic one. With economic independence comes agency and better standing in society along with greater control women may wield over the choices they make in their everyday lives (Bukhari & Shan, 2024). Female students will have greater autonomy in choosing their learning pathways aligned with the demands of the global labor market through career mentoring software, real-time feedback and automated skill mapping AI systems. It is imperative that AI research focus on career readiness and financial independence to help mitigate the inequities faced by women in higher education (Haider et al., 2025).

Analyzing the intersection of AI, higher education, and the empowerment of women in Pakistan will shine a light on the concerns of women's rights advocates and policymakers in the development community. The development of digital skills has become a priority in most higher education systems across Asia, but research on how AI systems in education, or EdTech, impact women's empowerment in rural and remote regions has been largely neglected. This research peels back EdTech's role in advancing women's economic self-sufficiency and empowering women students at Gomal University, D.I. Khan (Hassan, 2026).

OBJECTIVE OF THE STUDY

1. To Findout the impact of AI-based educational technology platforms on the career readiness of female university students at Gomal University, D.I. Khan.
2. To examine the contribution of AI digital skills acquisition toward achieving economic independence among female university students at Gomal University, D.I. Khan.

RESEARCH QUESTIONS

1. How significantly does the utilization of AI-based educational technology platforms enhance the career readiness of female university students at Gomal University, D.I. Khan?

2. To what extent do AI digital skills acquired through educational technology platforms contribute to the prospective economic independence of female university students at Gomal University, D.I. Khan?

SIGNIFICANCE OF THE STUDY

This study has important theories and applications for the planning of higher education, gender equity policy, and regional development in Pakistan. Theory-wise, this study adds a new dimension to the existing literature on the Technology Acceptance Model (TAM) and the feminist empowerment framework, as it integrates AI-based education technology in the context of women's financial independence in conservative regions. This study establishes a relationship between personalized AI-based skill acquisition and career and financial independence, enabling academics to have a better understanding of digital gaps of gender equity in the Global South.

The findings also have important strategies that can be utilized by university administrators, curriculum designers, and policymakers, in order to reduce the gaps within the gender divide in technology employment. By making public the specific AI digital skills and EdTech tools that boost women's career and remote work self-assurance, university administrators are able to design women-centered initiatives and programs. This research also provides a viable way to creatively utilize AI to achieve goal of sustainable online employment in regions that experience mobility restrictions, like Dera Ismail Khan, and in providing women with socio-economic empowerment.

DELIMITATION OF THE STUDY

This study is geographically and institutionally delimited to Gomal University, located in Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. The target respondents are restricted exclusively to enrolled undergraduate and postgraduate female students along with active academic faculty members across all departments of the university.

Conceptually, the scope of this research is confined to evaluating AI-based educational technology tools—such as adaptive learning systems, generative AI academic tools, automated skill mappers, and AI-driven career platforms—and their direct influence on two main outcomes: female student career readiness and prospective economic independence. It does not evaluate non-academic AI applications or broader non-digital socio-economic factors influencing gender equity.

Review of Literature

AI in educational technology has developed personalized learning paths for students by incorporating machine learning, natural language processing, and predictive analytics. AI EdTech further personalizes learning by simultaneously processing thousands of students' needs and adaptive content and assessments in the background. Female students in traditionally disadvantaged and socio-culturally constrained settings now have self-paced learning paths that empower them to learn technical skills previously inaccessible. AI platforms built for programming, data analysis, workflow automation, and digital marketing create a pathway for female learners to develop skills in traditionally male-dominated professions (Bala, 2025).

Mastery of technical skills and flexibility embedded in digital environment and work automation is a prerequisite for career readiness in the modern economy. AI tools will be a work colleague and can automate work processes, thereby requiring employees to continually develop their skillset. Further,

career adaptability is a requirement for female students in Pakistan to prepare for the workforce and learn digital skills.

AI interfaces can help women students prepare for international interviews, guide students on how to write a resume with AI assistance, provide real-time comparison for market skills, and include micro-credentials that have been endorsed by the industry. This enables women students to be work-ready for the local and global job markets. (Nong et al., 2024).

The digital tools that facilitate women's empowerment are grounded in feminist economic ideology and the human capability approach. With digital tools and resources, economic empowerment enables women to have financial independence and control over household resources and supports women's full participation in the economy. (Boateng et al., 2023). More recently, it has been documented that digital tools have the potential to economically empower women and also serve as catalysts for women's economic independence in developing countries and low- to middle-income countries. The acquisition of AI-based digital skills serves as a catalyst for women to take on active participation in the gig economy, remote work, and digital entrepreneurship. (Rajput, 2021)

Although there are great opportunities for the application of AI in EdTech in Pakistan and other developing countries, the structural constraints, gender inequities, and the digital divide remain. Female students are among the most adversely affected. Women and girls have multiple barriers including a high cost of internet access, frequent power outages, and social resistance to girls and women pursuing careers in technology, let alone the lack of hardware (Lucken & Cukurova, 2024). Bias in AI embeds gender inequity in automated systems, leading software to reinforce negative stereotypes and bias in the workforce and labor market. Higher education institutions in Pakistan can use the technology, but they must create gender-equitable policies to help women with the basic infrastructure for empowerment. Mentoring by female faculty and access to gender-equitable lab resources can help females more actively engage with technology, AI, and its applications (Sahito, 2025).

Studies on how to use AI to help women achieve financial independence through career readiness are limited in Pakistani higher education. Most research addresses general topics concerning the integration of ICTs or online learning and the challenges women in higher education face. Research on the impact of AI on career readiness and women's financial autonomy is completely lacking (Karim et al., 2025). There are highly underserved districts of Pakistan, such as Dera Ismail Khan, that have a unique culture and a tremendous opportunity for the application of AI EdTech, yet this area is understudied. Qualitative and quantitative research should address how AI systems assist women with gaining financial independence and how AI systems impact women's careers (Mufti et al., 2025).

The Technology Acceptance Model (TAM) and Davis's structural empowerment models provide helpful explanatory tools for this study. In TAM, an individual's perception of a technology's usefulness and the ease of its use predicted their willingness to use a technology. If female students perceive AI tool-based learning systems as useful for their career and as easy to navigate, these students are more likely to use these tools and increase their digital capabilities. In the capability approach, it is argued that the conversion of formal education and training into instrumental skills also requires adequate institutional and economic conditions. Considering these theories provides the opportunity to analyze AI EdTech as a tool for individual transformation and socio-economic change (Schorr, 2023).

AI EdTech tools help women prepare for the workforce, and facilitate women's economic participation. The international studies in EdTech validate the role skilling. The gap in Pakistani regional universities is evident. Given this context, it is necessary to study the dynamics of Gomal University to understand how AI EdTech tools within the university enhance the women graduates' career readiness and economic self-reliance.

METHODOLOGY

This study employed a descriptive correlational, quantitative research design to examine the influence of AI-based EdTech on the career readiness and economic independence of female students. This study was conducted at Gomal University, Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. The defined target population of this study includes N=8,100 female students at the undergraduate and postgraduate levels and N=335 faculty members working at Gomal University. Using Krejcie and Morgan's (1970) standard table, a sample of n=367 female students and n=181 faculty members was drawn at a 95% confidence interval and a 5% margin of error. A stratified random sampling technique was applied to ensure equitable representation of female students across the different disciplines of science, social science, business and humanities. Data collection was carried out by administering two structured and closed-ended questionnaires, the Female Student AI Skill & Empowerment Index (FSAISEI) and the Faculty Perception on AI & Career Preparedness Scale (FPACPS). Both questionnaires employed a 5-point Likert scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). The two questionnaires were reviewed and validated by a panel of educational technology and gender studies. A pilot test with 40 non-sample respondents resulted in an overall Cronbach's alpha of 0.89 for the student questionnaire and 0.86 for the faculty questionnaire. The collected data were coded, cleaned and analyzed using SPSS Version 27. Descriptive statistics (mean score and standard deviation) were calculated to analyze the data.

To test the relationships and the effects hypotheses about AI EdTech use, career readiness, and economic independence, we implemented Pearson Product-Moment Correlation and Simple Linear Regression, accepting a significance value of $p < 0.05$.

Data Analysis and Results

This analysis investigated primary data collected from 367 female students and 181 faculty members at Gomal University, D.I Khan. Of the distributed questionnaires, 358 student responses (97.5% response rate) and 175 faculty responses (96.6% response rate) were analyzed. Demographic data showed that 62.3% of female student respondents were enrolled as undergraduates and 37.7% as postgraduates, across STEM, Social Science and Business discipline groups.

Preliminary analysis was conducted to assess the overall level of engagement with the AI-based EdTech, Career Readiness, and the perception of economic independence of female students. It can be seen from Table 1 that female students reported a strong level of engagement with AI-supportive learning ($M=3.92, SD=0.71$). Positive scores were also reported for their overall career readiness ($M=3.84, SD=0.68$) and prospective economic independence ($M=4.01, SD=0.65$). Faculty members also indicated a strong level of student technological adaptability ($M=3.88, SD=0.73$).

Table 1: Descriptive Statistics for Key Variables (Students n= 358)

Variable	No. Of Items	Mean (M)	Std.Deviation (SD)	Overall Level
AI Platform Engagement	6	3.92	0.71	High
Career Readiness	6	3.84	0.68	High
Economic Independence	6	4.01	0.65	High
Faculty Perceived Readiness	5	3.88	0.73	High

To answer Research Question 1, an activity was measured using a simple linear regression to show predicted change in an outcome variable due to changes in engagement with AI EdTech across Predictor variables. This activity assessed normality, linearity, and homoscedasticity, and all three passed. The regression model produced a statistically significant result, $F(1,356)=184.32$, $p<0.001$, with an R^2 of 0.341. This value suggests engagement with AI-based EdTech tools explains 34.1 percent of the variability of female students' levels of career readiness. The regression coefficient ($\beta=0.584$, $t=13.576$, $p<0.001$) also indicates that, on the average, for every one-unit increase of engagement with AI tools, female students' career readiness was estimated to increase by 0.584 units.

Table 2: Linear Regression AI Platform Engagement Predicting Career Readiness

Model	Unstandardized B	Std. Error	Standardized β	t-value	Sig. (p)
(Constant)	1.552	0.171	-	9.076	< 0.001
AI Platform Engagement	0.584	0.043	0.584	13.576	< 0.001

Note: $R=0.584$, $R^2=0.341$, $\text{Adjusted}R^2=0.339$, $F(1,356)=184.32$, $p<0.001$.

To answer Research Question 2, regression analysis was conducted to determine how the acquisition of AI digital skills impacts the prospective economic independence of women. The statistical model had a significant level of explanation, $F(1,356)=212.87$, $p<0.001$, and an R^2 of 0.374. This means that 37.4% of the potential economic independence of women is attributable to the acquisition of AI digital skills. The AI digital skills indicated a significant strong positive empowerment of women toward economic self-reliance through the facilitation of remote work, participation in the gig economy and tech entrepreneurship (standardized coefficient ($\beta=0.611$, $t=14.590$, $p<0.001$)).

Table 3: Linear Regression AI Digital Skills predicting Economic Independence

Model	Unstandardized B	Std. Error	Standardized β	t-value	Sig. (p)
(Constant)	1.634	0.165	-	9.903	< 0.001
AI Digital Skills	0.607	0.042	0.611	14.590	< 0.001

Note: $R=0.611$, $R^2=0.374$, Adjusted $R^2=0.372$, $F(1,356)=212.87$, $p<0.001$.

Additionally, cross-tabulation and ANOVA tests by student disciplines showed that the average score for AI skill application for both STEM and Business female students ($M=4.12$) was greater than that of Social Science students ($M=3.68$, $F=12.45$, $p<0.001$). When surveyed, faculty members agreed with the quantitative student data, stating that 82.8% of faculty members agreed AI EdTech platforms help eliminate traditional barriers to employment posed by the lack of employment opportunities within a reasonable distance as they provide employment opportunities that allow women to work from home. In summary, the empirical data has answered both research questions. AI-based EdTech platforms have been shown to positively affect the career readiness ($R^2=0.341$) and the economic independence ($R^2=0.374$) of female students at Gomal University, D.I. Khan.

Discussion

AI-based educational technology platforms developed for female students in Pakistan's universities are found to be successful in enhancing the career readiness of such students as well as increasing the likelihood of their prospective economic independence. The statistical analyses indicate AI platform use accounts for 34.1% of career readiness while AI-specific digital skill acquisition accounts for 37.4% of economic independence for females. AI's ability to empower women from Dera Ismail Khan and similar regions is apparent.

The results indicate positive aspects of career readiness AI tools have in conjunction with adaptive learning systems in building confidence in technical competence and skills aligned to industry needs. Aligning with existing literature on available technologies, the personalized EdTech systems at Gomal University overcome the rigidity of university curricula to address current market needs in Pakistan faster than most programs.

Additionally, the strong positive correlation between AI digital skills and economic independence reinforces capability theories of empowerment. In most conservative socio-cultural contexts, women are limited in their physical mobility and the traditional job market has structural barriers for women graduates. However, the use of AI digital skills empowers young women to engage in the global economy via digital work, digital freelancing, and online entrepreneurship. Through the use of AI, young women can learn prompt engineering, data analytics, and digital management, and can therefore generate an income at home which builds their own decision-making power and personal autonomy.

The study participants also show that institutional support and EdTech have an important role to play in addressing these issues. The overwhelming majority of participants (82.8%) showed their support for the role of AI in overcoming physical barriers in employment. A shift in perspective concerning women's empowerment and higher education is beginning to emerge. University stakeholders are now

acknowledging remote work done in the digital economy enabled by AI as an important driver of Pakistan women's socio-economic inclusion.

That said, significant challenges, such as lack of digital infrastructure, digital divide, and high internet costs remain, persistently unaddressed in regional universities. While AI EdTech is a promising area of work, the opportunities it offers will remain largely unfulfilled until sustained institutional support and well articulated policies are coupled with investment in campus infrastructure. These structural changes will allow women to gain AI skills that lead to sustained self-reliance.

Conclusion

The following research study examined the impact of artificial intelligence (AI) based educational technology on the career readiness of female university students at Gomal University, Dera Ismail Khan. The use of AI in educational technology was proven to enhance female students' career readiness by enabling them with necessary digital skills of a prevalent market. Further, female students who learn to cope with the market needs and cultural barriers of Pakistan using AI skills develop a considerable degree of financial independence by having the opportunity of remote employment.

The use of AI based educational technology is a useful tool for promoting gender equality and economic development at the higher education level in Pakistan. Providing demand-based digital skills to females in educationally backward areas creates financial independence and fulfills a dire need in Pakistan. Results of these studies can be instrumental in allowing the development of policies at higher educational institutions to enhance digital literacy and focus on economic inclusion and development.

Recommendations

To maximize the impact of AI-based educational platforms on female student empowerment, higher education institutions, policymakers, and industry leaders should implement targeted structural initiatives.

- Gomal University and the Higher Education Commission (HEC) of Pakistan should establish dedicated, high-speed AI and digital innovation labs equipped with modern computing hardware specifically accessible to female students.
- Integrate specialized AI digital literacy courses, prompt engineering modules, and micro-credential programs into non-tech disciplines to ensure equal technological access across all academic faculties.
- Conduct professional development workshops for faculty members to enhance their proficiency in AI-based pedagogical tools and mentoring strategies tailored for female students' career pathways.
- Establish university-backed remote work centers and freelancing incubators that directly connect skilled female graduates with national and international remote employment opportunities.
- Partner with telecommunication providers and EdTech organizations to offer subsidized internet packages and subsidized AI certification vouchers for female students in peripheral districts.

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