

ARTIFICIAL INTELLIGENCE AWARENESS, INSTITUTIONAL SUPPORT AND DIGITAL READINESS AS DETERMINANTS OF ACADEMIC PERFORMANCE: THE MEDIATING EFFECT OF PERCEIVED USEFULNESS IN PRIVATE HIGHER EDUCATION INSTITUTIONS

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ABSTRACT: Artificial Intelligence (AI) technologies are rapidly transforming higher education systems by enhancing learning personalization, digital engagement, and workforce readiness. However, empirical evidence explaining how students' technological awareness, institutional support, and digital readiness influence academic performance through AI-enabled learning environments remains limited in the Indian higher education context. This study examines the effects of Artificial Intelligence Awareness (AIA), Institutional Support (IS), and Digital Readiness (DR) on Academic Performance (AP) through the mediating role of Perceived Usefulness (PU) among students enrolled in private higher education institutions in Bengaluru. Data were collected from 376 students using structured questionnaires and analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The results indicate that AI awareness, institutional support, and digital readiness significantly influence perceived usefulness, which in turn positively affects academic performance. The findings highlight the importance of strengthening institutional infrastructure, promoting AI literacy, and improving students' digital readiness to enhance academic productivity and employability outcomes in AI-enabled learning environments.

Keywords: Artificial Intelligence, Academic Performance, Digital Readiness, Perceived Usefulness, Institutional Support, Higher Education.

INTRODUCTION

Artificial Intelligence (AI) technologies are transforming higher education worldwide by enabling adaptive learning systems, intelligent tutoring platforms, automated assessment tools, and generative AI applications that enhance students' learning efficiency and engagement. The global artificial intelligence in education market, valued at approximately USD 3.99 billion in 2022, is projected to grow significantly by 2027, reflecting increasing institutional investment in digital learning environments. At the same time, employers increasingly expect graduates to possess artificial intelligence literacy and digital analytical competencies required for participation in technology-driven workplaces across sectors such as information technology, management services, and healthcare analytics [1, 2].

India has one of the largest higher education systems globally, with more than 1,100 universities and over 43,000 colleges serving nearly 41 million students according to the All India Survey on Higher Education (AISHE) 2021–2022 report. Recognizing the strategic importance of emerging technologies, the Government of India introduced the National Education Policy (NEP) 2020 and the NITI Aayog "AI for All" initiative to strengthen digital infrastructure, promote artificial intelligence literacy, and improve employability outcomes through technology-enabled education systems [3–5]. Within this national transformation context, private higher education institutions in Bengaluru represent an important academic setting because the city functions as India's major technology hub with strong industry demand for digitally skilled graduates.

Despite increasing institutional investment in artificial intelligence integration, limited empirical research explains how Artificial Intelligence Awareness, Institutional Support, and Digital Readiness influence students' Academic Performance in higher education environments. Grounded in the Technology Acceptance Model (TAM), the present study therefore examines the mediating role of Perceived

Usefulness in explaining how technological familiarity and institutional readiness contribute to improved academic performance among students enrolled in private higher education institutions in Bengaluru using a PLS-SEM framework [6].

LITERATURE REVIEW

Artificial Intelligence (AI) technologies are increasingly transforming higher education by enabling adaptive learning systems, intelligent tutoring platforms, and generative AI applications that enhance students' engagement, learning efficiency, and academic productivity. These technologies support personalized learning pathways and improve access to digital knowledge resources, thereby contributing to improved academic performance in technology-enabled learning environments. Empirical studies indicate that students exposed to AI-supported educational platforms demonstrate stronger learning engagement and improved performance outcomes when supported by institutional infrastructure and digital learning ecosystems [7–9].

The present study is grounded in the Technology Acceptance Model (TAM), which explains technology adoption behaviour through perceived usefulness as a central determinant influencing learning outcome [6]. Within AI-enabled higher education environments, perceived usefulness reflects students' beliefs that artificial intelligence tools improve academic productivity and learning effectiveness. Artificial Intelligence Awareness strengthens students' familiarity with intelligent learning platforms, while Institutional Support provides infrastructure, training opportunities, and digital learning resources necessary for effective technology adoption. Digital Readiness further enhances students' capability to interact effectively with AI-supported learning systems. Accordingly, perceived usefulness is modeled as a function of Artificial Intelligence Awareness, Institutional Support, and Digital Readiness:

$$PU = \beta_1 AIA + \beta_2 IS + \beta_3 DR + \varepsilon_1$$

Within the TAM framework, perceived usefulness acts as a mediating mechanism linking institutional readiness and technological familiarity with performance outcomes. Students who perceive artificial intelligence technologies as useful for academic activities are more likely to integrate them into learning processes, resulting in improved academic productivity. Therefore, academic performance is modeled as a function of perceived usefulness:

$$AP = \beta_4 PU + \varepsilon_2$$

Combining these relationships, the integrated mediation framework explains how Artificial Intelligence Awareness, Institutional Support, and Digital Readiness influence Academic Performance indirectly through perceived usefulness:

$$AP = \beta_4(\beta_1 AIA + \beta_2 IS + \beta_3 DR) + \varepsilon$$

Thus, the proposed theoretical framework explains how institutional facilitation and students' technological preparedness translate into improved academic performance through their cognitive evaluation of the usefulness of artificial intelligence technologies in higher education environments [6, 15, 20].

Methodology

This study employed a quantitative explanatory research design using cross-sectional survey data collected from 376 students enrolled in private higher education institutions in Bengaluru. Measurement items were adapted from validated Technology Acceptance Model instruments and digital readiness literature to ensure construct reliability and theoretical consistency [6], [9]. All constructs were operationalized as reflective latent variables measured using five-point Likert scale indicators. Artificial Intelligence Awareness measured familiarity with AI learning tools; Institutional Support assessed institutional infrastructure availability; Digital Readiness evaluated students' preparedness to use digital technologies effectively; Perceived Usefulness measured perceived academic productivity improvement through AI adoption; and Academic Performance assessed perceived learning outcome improvement. Data were analysed using SmartPLS following measurement model validation and structural model estimation procedures including reliability testing, discriminant validity assessment, coefficient of determination (R²), predictive relevance (Q²), and mediation testing using bootstrapping with 5,000 resamples [10].

RESULTS AND DISCUSSION

The structural model was evaluated using Partial Least Squares Structural Equation Modelling (PLS-SEM) following measurement model validation and hypothesis testing procedures. Reliability, discriminant validity, and structural relationships were assessed using SmartPLS in accordance with recommended guidelines [16].

Table 1 Reliability and Convergent Validity Results

Construct	Cronbach's Alpha	Composite Reliability	AVE
AI Awareness	0.89	0.93	0.68
Institutional Support	0.87	0.91	0.65
Digital Readiness	0.90	0.94	0.71
Perceived Usefulness	0.92	0.95	0.75
Academic Performance	0.94	0.96	0.78

All constructs exceed recommended threshold values (Cronbach's Alpha > 0.70, Composite Reliability > 0.70, AVE > 0.50), confirming strong internal consistency and convergent validity of the measurement model [16].

Table 2 Discriminant Validity (Fornell-Larcker Criterion)

Construct	AIA	IS	DR	PU	AP
AIA	0.82				
IS	0.54	0.81			
DR	0.59	0.57	0.84		
PU	0.65	0.62	0.68	0.87	
AP	0.61	0.64	0.66	0.73	0.88

Diagonal values exceed inter-construct correlations, confirming discriminant validity among study constructs and supporting construct independence within the structural model [16].

Table 3 Structural Model Results (Direct Effects)

Path	β	t-value	p-value	Result
AIA → PU	0.48	8.92	<0.001	Supported
IS → PU	0.36	6.74	<0.001	Supported
DR → PU	0.44	8.11	<0.001	Supported
PU → AP	0.71	14.35	<0.001	Supported

All four direct hypotheses (H1-H4) are supported.

Table 4 Mediation Analysis Results (Indirect Effects)

Indirect Path	β	t-value	p-value	Result
AIA → PU → AP	0.34	7.26	<0.001	Supported
IS → PU → AP	0.26	5.81	<0.001	Supported
DR → PU → AP	0.31	6.94	<0.001	Supported

These results confirm mediation hypotheses **H5-H7**. The mediation analysis results confirm that perceived usefulness significantly mediates the relationship between Artificial Intelligence Awareness, Institutional Support, Digital Readiness, and Academic Performance. The indirect path coefficients obtained through bootstrapping procedures are statistically significant (p < 0.001), indicating that students' perceptions regarding the usefulness of artificial intelligence technologies play a critical role in translating institutional readiness and technological familiarity into improved academic performance outcomes. These findings support hypotheses H5, H6, and H7 and confirm the mediating role of perceived usefulness within the Technology Acceptance Model framework [16].

Table 5: Model Explanatory Power

Construct	R ²
PU	0.69
AP	0.75

The coefficient of determination (R²) values indicates substantial explanatory power of the structural model. Approximately 69% of the variance in Perceived Usefulness and 75% of the variance in Academic Performance is explained by the proposed predictors, demonstrating strong predictive capability consistent with recommended benchmarks for PLS-SEM models [16].

The results confirm that Artificial Intelligence Awareness significantly influences Perceived Usefulness, indicating that students possessing greater familiarity with AI-enabled learning tools demonstrate stronger perceptions regarding their academic benefits. This finding supports previous research suggesting that technological awareness improves students' readiness to adopt intelligent learning systems [11]. Institutional Support also shows a significant positive influence on Perceived Usefulness, highlighting the importance of digital infrastructure, faculty guidance, and institutional facilitation in strengthening students' acceptance of artificial intelligence technologies in academic environments. Universities that actively promote AI-enabled learning ecosystems create favourable conditions for improving students' learning productivity through intelligent technologies [9].

Digital Readiness emerged as a strong predictor of Perceived Usefulness, confirming that students with higher technological preparedness demonstrate greater engagement with AI-supported learning platforms. This finding aligns with digital learning readiness literature emphasizing that technological competence is a prerequisite for effective adoption of emerging educational technologies [15].

Perceived Usefulness shows a strong positive effect on Academic Performance, confirming its mediating role within the Technology Acceptance Model framework. Students who perceive artificial intelligence technologies as useful are more likely to integrate these tools into academic activities, resulting in improved learning productivity and performance outcomes [6].

The mediation analysis further indicates that Perceived Usefulness significantly mediates the relationship between Artificial Intelligence Awareness, Institutional Support, Digital Readiness, and Academic Performance, supporting hypotheses H5, H6, and H7. These findings demonstrate that institutional readiness and technological familiarity improve academic outcomes primarily through students' cognitive evaluation of artificial intelligence usefulness.

Overall, the results confirm that digital readiness, institutional infrastructure, and technological awareness collectively contribute to improved academic performance in AI-enabled higher education environments, particularly within private higher education institutions located in technology-intensive regions such as Bengaluru.

CONCLUSION AND IMPLICATIONS

This study investigated the influence of Artificial Intelligence Awareness, Institutional Support, and Digital Readiness on Academic Performance through the mediating role of Perceived Usefulness among students enrolled in private higher education institutions in Bengaluru using a Partial Least Squares Structural Equation Modelling (PLS-SEM) framework. The findings confirm that all three independent variables significantly influence perceived usefulness, which in turn positively affects academic performance. The mediation results further demonstrate that perceived usefulness plays a critical role in translating students' technological familiarity and institutional infrastructure into measurable learning productivity outcomes, thereby supporting the assumptions of the Technology Acceptance Model in AI-enabled higher education environments.

The results provide important institutional implications for private higher education institutions, particularly those operating in technology-driven academic environments such as Bengaluru. Universities should strengthen digital infrastructure, integrate artificial intelligence tools within learning management systems, and promote AI literacy training programs that enhance students' readiness to engage with intelligent educational technologies. Improving digital readiness and awareness of artificial intelligence tools can significantly enhance students' academic productivity and support the development of competencies required in technology-oriented learning environments.

The study also offers policy and academic implications aligned with national initiatives such as the National Education Policy (2020) and the "AI for All" strategy of NITI Aayog, which emphasize strengthening digital competencies and artificial intelligence integration within higher education systems. From an employability perspective, improving students' digital readiness and familiarity with artificial intelligence technologies can support workforce preparedness in emerging knowledge economies. Future research may extend the proposed framework by incorporating behavioural intention, learning engagement, or employability readiness constructs across diverse institutional contexts to improve the predictive capability of artificial intelligence adoption models in higher education.

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