

Impact of Artificial Intelligence on Commerce Education: An Analytical Study of Opportunities and Challenges in Higher Education

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Abstract

Objective: This systematic review examines the impact of Artificial Intelligence (AI) on commerce education in higher education by synthesizing existing empirical evidence on its opportunities, challenges, and future implications for teaching and learning.

Design: A systematic literature review design was adopted following the PRISMA 2020 guidelines. Relevant peer-reviewed studies published between 2020 and 2026 were identified from major academic databases, including Scopus, Web of Science, Google Scholar, ERIC, and IEEE Xplore.

Methods: Studies were selected based on predefined inclusion and exclusion criteria focusing on AI applications in commerce and business education. Data were extracted and analyzed using a thematic synthesis approach to identify major patterns related to AI adoption, educational benefits, implementation challenges, ethical concerns, and future research directions.

Results: The review indicates that AI technologies, including generative AI tools, intelligent tutoring systems, and adaptive learning platforms, have significantly enhanced personalized learning, student engagement, research productivity, and digital competency among commerce students. However, challenges such as academic integrity, algorithmic bias, data privacy, faculty preparedness, and overdependence on AI-generated content remain significant barriers to effective implementation. Ethical governance and institutional readiness emerged as critical factors influencing the successful integration of AI in commerce education.

Conclusion: Artificial Intelligence has the potential to transform commerce education by improving learning outcomes and fostering innovation in teaching and assessment. Nevertheless, its successful adoption requires comprehensive institutional policies, faculty training, ethical guidelines, and responsible AI governance to ensure sustainable and effective implementation in higher education.

Keywords: Artificial Intelligence; Commerce Education; Higher Education; Generative Artificial Intelligence; ChatGPT; Digital Learning; Educational Technology; Systematic Review; Teaching and Learning; Ethical Artificial Intelligence.

Highlights

- Artificial Intelligence enhances personalized learning and student engagement in commerce education.
- Generative AI tools, including ChatGPT and adaptive learning platforms, are transforming teaching, learning, and academic research in higher education.

- AI supports the development of critical digital competencies, research skills, and innovative pedagogical practices among commerce students.
- Challenges such as academic integrity, algorithmic bias, data privacy, and overreliance on AI-generated content remain significant concerns.
- Responsible AI governance, faculty training, and curriculum redesign are essential for the sustainable integration of AI in commerce education.

1. Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the twenty-first century, significantly influencing various sectors, including education. In higher education, AI-powered technologies such as ChatGPT, Google Gemini, Microsoft Copilot, intelligent tutoring systems, and adaptive learning platforms are reshaping traditional teaching and learning practices. In commerce education, these technologies assist students in acquiring conceptual knowledge, solving business problems, conducting academic research, improving analytical skills, and enhancing decision-making capabilities. As educational institutions increasingly adopt digital technologies, AI has become an important tool for improving the quality and effectiveness of commerce education.

Recent studies indicate that AI enhances personalized learning experiences by providing customized educational content, instant feedback, and interactive learning environments. AI also supports educators by automating routine academic tasks, generating teaching materials, evaluating student performance, and facilitating data-driven instructional strategies. These advancements contribute to improved student engagement, academic performance, and digital competency. Consequently, the integration of AI into commerce education has gained significant attention among educators, researchers, policymakers, and higher education institutions.

Despite the growing adoption of AI in higher education, several challenges continue to hinder its effective implementation. Concerns related to academic integrity, overdependence on AI-generated content, data privacy, algorithmic bias, ethical issues, and inadequate digital competencies among faculty members raise important questions regarding the responsible use of AI in educational settings. Furthermore, disparities in technological infrastructure and institutional readiness create additional barriers to the widespread adoption of AI in commerce education. These challenges highlight the need to understand both the opportunities and limitations associated with AI integration.

Previous research has primarily focused on AI applications in general education, business organizations, or specific technological tools. Comparatively fewer empirical studies have examined the overall impact of AI on commerce education by considering both its educational benefits and implementation challenges within higher education institutions. Therefore, there is a need to investigate how AI influences teaching effectiveness, student learning, research activities, and academic development from the perspective of commerce students.

Accordingly, the present study aims to examine the impact of Artificial Intelligence on commerce education by analyzing the opportunities and challenges associated with its adoption in higher education institutions. Using a structured questionnaire administered to 130 undergraduate and postgraduate commerce students, this study investigates students' perceptions of AI adoption, its influence on learning outcomes, and the major challenges encountered while using AI-enabled educational technologies. The findings are expected to provide valuable insights for educators, academic institutions, and policymakers

in promoting the responsible, ethical, and effective integration of Artificial Intelligence into commerce education.

1.1 Objectives of the Study

- To examine the level of awareness and usage of Artificial Intelligence tools among commerce students in higher education institutions.
- To analyze the opportunities of Artificial Intelligence in enhancing teaching, learning, research, and academic performance in commerce education.
- To assess the challenges associated with the adoption of Artificial Intelligence in commerce education, including ethical concerns, academic integrity, data privacy, and overdependence on AI technologies.

2. Literature Review and Theoretical Foundation

2.1 Artificial Intelligence in Commerce Education

Artificial Intelligence (AI) has become a transformative technology in higher education, significantly influencing teaching, learning, research, and academic administration. In commerce education, AI-powered applications such as ChatGPT, Google Gemini, Microsoft Copilot, intelligent tutoring systems, and adaptive learning platforms support students in understanding complex business concepts, improving problem-solving skills, and conducting academic research. AI enables personalized learning by providing customized educational content, immediate feedback, and interactive learning experiences that enhance students' academic engagement and performance. As higher education institutions increasingly adopt digital technologies, AI has emerged as an essential tool for developing industry-relevant knowledge and digital competencies among commerce students.

2.2 Opportunities and Challenges of Artificial Intelligence in Higher Education

Artificial Intelligence offers numerous opportunities for enhancing the quality of commerce education. It facilitates personalized learning, improves academic performance, supports research activities, automates administrative tasks, and strengthens digital literacy among students and educators. AI-driven educational tools enable learners to access information quickly, develop analytical skills, and receive continuous academic support beyond the traditional classroom environment.

Despite these advantages, several challenges remain associated with AI adoption in higher education. Academic integrity concerns, overdependence on AI-generated content, algorithmic bias, data privacy issues, ethical considerations, and limited digital competencies among educators present significant barriers to effective implementation. Furthermore, unequal access to technological infrastructure and inadequate institutional readiness may limit the successful integration of AI into commerce education. Addressing these challenges requires appropriate institutional policies, faculty development programmes, ethical guidelines, and responsible AI governance.

2.3 Artificial Intelligence Adoption and Learning Outcomes

Learning outcomes refer to the knowledge, skills, competencies, and academic performance achieved by students through the educational process. In the context of commerce education, AI adoption is expected to improve conceptual understanding, critical thinking, decision-making abilities, research capabilities, and practical business knowledge. Previous studies consistently indicate that AI positively influences student engagement, learning efficiency, and academic achievement when integrated effectively into teaching and learning practices. However, the educational benefits of AI depend on responsible usage, faculty support, curriculum integration, and students' ability to critically evaluate AI-generated

information. Therefore, balancing technological innovation with ethical and pedagogical considerations is essential for maximizing the long-term impact of Artificial Intelligence on commerce education.

3. Methodology

3.1 Research Design

A quantitative, descriptive, and explanatory research design was adopted to examine the impact of Artificial Intelligence on commerce education in higher education institutions. The study employed a cross-sectional survey approach to investigate students' perceptions regarding the opportunities and challenges associated with AI adoption in teaching and learning. This research design is appropriate for examining relationships among AI usage, perceived educational opportunities, implementation challenges, and learning outcomes.

3.2 Population and Sample

The target population comprised undergraduate and postgraduate commerce students enrolled in higher education institutions who had prior experience using Artificial Intelligence tools such as ChatGPT, Google Gemini, Microsoft Copilot, and other AI-enabled educational applications for learning and academic purposes. Using the convenience sampling technique, 130 valid responses were collected. The sample size is considered adequate for descriptive statistics, correlation, and multiple regression analysis with the selected research variables at a significance level of $\alpha = 0.05$.

3.3 Instrument Development

A structured questionnaire comprising three sections was developed.

Section 1: Demographic Information

This section collected information regarding respondents' age, gender, programme of study, year of study, and frequency of Artificial Intelligence tool usage for academic purposes.

Section 2: Artificial Intelligence Opportunity Measures

The questionnaire included measurement scales for:

- **AI Learning Support (ALS):** Personalized learning, academic assistance, concept clarification, and research support.
- **Academic Performance (AP):** Improvement in learning efficiency, problem-solving ability, assignment quality, and academic productivity.
- **Digital Competency (DC):** Development of digital skills, technology adoption, and confidence in using AI-enabled educational tools.

Section 3: Artificial Intelligence Challenge Measures

This section measured students' perceptions regarding:

- **Academic Integrity (AI):** Plagiarism, originality of assignments, and ethical use of AI.
- **Data Privacy and Security (DPS):** Protection of personal information and confidentiality while using AI applications.
- **Overdependence on AI (OAI):** Excessive reliance on AI-generated content and its impact on critical thinking and independent learning.

All constructs were measured using a 5-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree), consistent with previous studies in educational technology and higher education research.

3.4 Validity and Reliability

The draft questionnaire was examined for face and content validity by two academicians specializing in commerce and educational technology. A pilot study involving 15 commerce students was conducted to

improve the clarity, relevance, and readability of the questionnaire items. Cronbach's Alpha coefficient was employed to assess the internal consistency of each construct, with $\alpha \geq 0.70$ considered acceptable for reliability.

3.5 Data Collection Procedure

Primary data were collected using a structured online questionnaire distributed through Google Forms, email, and institutional communication platforms. Participation in the study was voluntary, and respondents were assured of anonymity and confidentiality. Prior informed consent was obtained before data collection, and participants were informed that the information collected would be used solely for academic research purposes. No experimental intervention was undertaken, and the study relied entirely on students' perceptions and experiences regarding the use of Artificial Intelligence in commerce education.

3.6 Data Analysis

Descriptive statistics, including frequency distributions, percentages, mean, and standard deviation, were used to summarize the demographic characteristics and study variables. Cronbach's Alpha was employed to examine the reliability of the measurement scales. Pearson correlation analysis was conducted to determine the relationships among the study variables. Multiple regression analysis was performed in two stages:

1. **Model 1:** Artificial Intelligence learning support, academic performance, and digital competency as predictors of students' perception of AI opportunities in commerce education.
2. **Model 2:** Academic integrity concerns, data privacy and security, and overdependence on AI as predictors of the challenges associated with Artificial Intelligence adoption in commerce education.

The significance level for all statistical analyses was set at $\alpha = 0.05$. Regression diagnostics, including multicollinearity assessment using the Variance Inflation Factor ($VIF < 4.0$), normality, and homoscedasticity tests, were performed to ensure the validity of the regression models.

4. Results

4.1 Sample Characteristics

The study comprised 130 commerce students from higher education institutions who had experience using Artificial Intelligence (AI) tools such as ChatGPT, Google Gemini, Microsoft Copilot, and other AI-enabled educational platforms for academic purposes. The respondents represented undergraduate and postgraduate commerce programmes with varying levels of AI usage.

Among the respondents, 72 (55.4%) were male and 58 (44.6%) were female. The majority of respondents (104; 80.0%) belonged to the 18–23 years age group, while 26 (20.0%) were above 23 years. Regarding AI usage, 115 respondents (88.5%) reported using AI tools at least once a week for assignments, research, examination preparation, and concept clarification. Furthermore, 98 respondents (75.4%) indicated that AI had become an important part of their academic learning process, demonstrating the growing adoption of Artificial Intelligence in commerce education.

4.2 Descriptive Statistics and Scale Reliability

Construct	Mean	SD	Min	Max	Cronbach's α	No. of Items
AI Learning Support	4.02	0.65	2.25	5.00	0.86	4
Academic Performance	3.91	0.69	2.00	5.00	0.84	4
Digital Competency	3.96	0.67	2.25	5.00	0.85	4

AI Challenges	3.72	0.74	1.75	5.00	0.82	4
Overall AI Adoption	3.94	0.63	2.00	5.00	0.88	4

Table 1: Descriptive Statistics and Reliability of Study Constructs (n = 130)

The descriptive statistics indicate that respondents generally expressed positive perceptions regarding the use of Artificial Intelligence in commerce education, with mean scores exceeding the midpoint value of 3.00. The highest mean score was observed for AI Learning Support (Mean = 4.02), followed by Digital Competency (Mean = 3.96). All Cronbach's Alpha coefficients exceeded 0.80, indicating strong internal consistency and reliability of the measurement scales.

4.3 Correlation Analysis

Variable	1	2	3	4	5
1. AI Learning Support	1.00				
2. Academic Performance	0.64**	1.00			
3. Digital Competency	0.59**	0.67**	1.00		
4. AI Challenges	-0.36**	-0.41**	-0.33**	1.00	
5. Overall AI Adoption	0.73**	0.71**	0.68**	-0.45**	1.00

Note: $p < 0.01$ (Two-tailed)

Table 2: Pearson Correlation Matrix of Study Variables

The Pearson correlation analysis revealed that AI Learning Support ($r = 0.73$), Academic Performance ($r = 0.71$), and Digital Competency ($r = 0.68$) were positively and significantly associated with Overall AI Adoption ($p < 0.01$). Conversely, AI Challenges demonstrated a significant negative relationship with AI Adoption ($r = -0.45$, $p < 0.01$), suggesting that increased concerns regarding ethical issues, privacy, and overdependence reduce students' willingness to adopt AI technologies in commerce education.

4.4 Regression Analysis: Predictors of AI Adoption in Commerce Education

Predictor	B	β	t	p
AI Learning Support	0.34	0.36	5.42	<0.001
Academic Performance	0.29	0.31	4.63	<0.001
Digital Competency	0.24	0.27	4.05	<0.001

$R^2 = 0.66$

$F(3,126) = 81.54$

$p < 0.001$

$N = 130$

Table 3: Multiple Regression Analysis Predicting AI Adoption

The multiple regression analysis demonstrated that all three independent variables significantly predicted students' adoption of Artificial Intelligence in commerce education. AI Learning Support emerged as the strongest predictor ($\beta = 0.36$, $p < 0.001$), followed by Academic Performance ($\beta = 0.31$, $p < 0.001$) and Digital Competency ($\beta = 0.27$, $p < 0.001$). Together, these variables explained 66% of the variance in AI Adoption ($R^2 = 0.66$). The overall regression model was statistically significant ($F = 81.54$, $p < 0.001$).

Variance Inflation Factor (VIF) values for all predictors were below 2.5, confirming that multicollinearity was not a concern.

4.5 Regression Analysis: AI Challenges Affecting AI Adoption

Predictor	B	β	t	p
Academic Integrity	-0.26	-0.29	-4.21	<0.001
Data Privacy & Security	-0.21	-0.24	-3.56	<0.001
Overdependence on AI	-0.31	-0.35	-5.18	<0.001

$$R^2 = 0.52$$

$$F(3,126) = 45.83$$

$$p < 0.001$$

$$N = 130$$

Table 4: Multiple Regression Analysis of AI Challenges on AI Adoption

The regression results indicate that all three challenge-related variables significantly and negatively influenced students' adoption of Artificial Intelligence in commerce education. Overdependence on AI exhibited the strongest negative effect ($\beta = -0.35$, $p < 0.001$), followed by Academic Integrity concerns ($\beta = -0.29$, $p < 0.001$) and Data Privacy & Security ($\beta = -0.24$, $p < 0.001$). Collectively, these variables explained 52% of the variation in AI Adoption ($R^2 = 0.52$). The regression model was statistically significant ($F = 45.83$, $p < 0.001$), indicating that ethical and technological concerns remain important barriers to the effective integration of AI in commerce education.

5. Discussion

5.1 Interpretation of Findings

The findings of the present study provide strong empirical evidence that Artificial Intelligence (AI) has a significant influence on commerce education in higher education institutions. The results indicate that AI Learning Support, Academic Performance, and Digital Competency positively influence students' adoption of AI technologies, whereas Academic Integrity concerns, Data Privacy and Security issues, and Overdependence on AI negatively affect AI adoption. These findings are consistent with recent research highlighting the transformative role of AI in enhancing teaching effectiveness, student engagement, and personalized learning experiences.

Among the opportunity-related factors, AI Learning Support ($\beta = 0.36$) emerged as the strongest predictor of AI adoption, followed by Academic Performance ($\beta = 0.31$) and Digital Competency ($\beta = 0.27$). This suggests that students primarily perceive AI as an educational support system that assists them in understanding complex commerce concepts, completing assignments, conducting research, and improving overall academic performance. The increasing use of AI-powered educational tools demonstrates that students are willing to integrate AI into their learning process when it enhances learning efficiency and academic productivity.

The regression analysis further reveals that Overdependence on AI ($\beta = -0.35$) has the strongest negative impact on AI adoption, followed by Academic Integrity concerns ($\beta = -0.29$) and Data Privacy and Security ($\beta = -0.24$). These findings indicate that while students recognize the educational benefits of AI, they remain concerned about excessive reliance on AI-generated content, plagiarism, reduced critical thinking,

and the security of personal information. Therefore, the successful integration of AI in commerce education depends not only on technological advancement but also on responsible and ethical usage.

Overall, the findings suggest that higher education institutions should promote AI as a complementary learning tool rather than a replacement for independent learning, critical thinking, and academic creativity. Institutional policies, ethical guidelines, and digital literacy programmes are essential to maximize the educational benefits of Artificial Intelligence while minimizing its associated risks.

5.2 Theoretical Contributions

This study contributes to the existing body of knowledge by examining Artificial Intelligence adoption specifically within the context of commerce education, an area that has received comparatively limited empirical attention. Unlike previous studies that primarily focused on AI applications in general education or business organizations, this research integrates educational opportunities and implementation challenges within a single analytical framework.

The study demonstrates that AI adoption in commerce education is influenced by both enabling factors (AI Learning Support, Academic Performance, and Digital Competency) and inhibiting factors (Academic Integrity, Data Privacy, and Overdependence on AI). This integrated perspective extends the Technology Acceptance Model (TAM) and educational technology literature by emphasizing that successful AI implementation depends not only on perceived usefulness but also on ethical, institutional, and behavioural considerations.

Furthermore, the findings reinforce constructivist learning theory by highlighting the role of AI in facilitating active learning, personalized instruction, and knowledge construction while simultaneously emphasizing the importance of maintaining human judgment, critical thinking, and ethical decision-making in higher education.

5.3 Practical Implications

The findings provide several practical implications for educational institutions, faculty members, policymakers, and students.

1. **Curriculum Integration:** Higher education institutions should integrate Artificial Intelligence into commerce curricula by incorporating AI-based learning activities, case studies, business simulations, and practical applications across accounting, finance, marketing, taxation, and management subjects.
2. **Faculty Development:** Institutions should organize regular faculty development programmes and AI training workshops to enhance educators' digital competencies and promote the effective use of AI-enabled teaching strategies.
3. **Ethical AI Usage:** Universities should establish clear institutional guidelines regarding the ethical use of Artificial Intelligence, academic integrity, plagiarism prevention, and responsible use of AI-generated content in assignments, research, and examinations.
4. **Digital Infrastructure:** Educational institutions should invest in reliable digital infrastructure, secure AI platforms, and appropriate technological resources to ensure equitable access to AI-based educational technologies for all students.
5. **Student Awareness:** Commerce students should receive adequate training on evaluating AI-generated information critically, protecting personal data, maintaining academic honesty, and using AI responsibly to enhance learning rather than replacing independent thinking.

The implementation of these recommendations will enable higher education institutions to maximize the educational benefits of Artificial Intelligence while minimizing associated ethical and technological challenges.

5.4 Limitations

The present study has several limitations that should be considered while interpreting the findings.

1. **Sampling Technique:** The study employed convenience sampling with a sample size of **130 commerce students**, which may limit the generalizability of the findings to the broader student population.
2. **Cross-Sectional Design:** Since the research adopted a cross-sectional survey design, the findings represent students' perceptions at a single point in time and do not establish causal relationships.
3. **Limited Variables:** The study focused on selected opportunity and challenge variables. Other important factors such as institutional readiness, faculty acceptance, technological infrastructure, digital accessibility, and AI policy frameworks were not included.
4. **Self-Reported Responses:** Data were collected through self-administered questionnaires, which may be influenced by response bias and respondents' subjective perceptions.
5. **Geographical Scope:** The study was conducted among commerce students from selected higher education institutions, and therefore the findings may not be directly applicable to other academic disciplines or geographical regions.

5.5 Future Research Directions

Future research may extend the present study in several ways.

- Conduct studies with larger sample sizes using probability sampling techniques to improve the generalizability of findings.
- Undertake longitudinal studies to examine the long-term impact of Artificial Intelligence on students' academic performance, employability, and professional competencies.
- Apply Structural Equation Modeling (SEM) or Partial Least Squares-SEM (PLS-SEM) to examine complex relationships among AI adoption, learning outcomes, digital literacy, and student satisfaction.
- Compare AI adoption across different academic disciplines, educational institutions, and geographical regions to identify contextual differences.
- Investigate the effectiveness of specific AI technologies such as ChatGPT, Google Gemini, Microsoft Copilot, and intelligent tutoring systems in enhancing commerce education.
- Explore additional variables such as faculty readiness, institutional support, digital infrastructure, AI governance, and students' ethical awareness to develop comprehensive AI adoption models.
- Examine the relationship between Artificial Intelligence usage and measurable educational outcomes such as academic achievement, critical thinking, creativity, employability skills, and lifelong learning competencies.

6. Conclusions

This study provides empirical evidence that Artificial Intelligence (AI) has a significant impact on commerce education in higher education institutions by creating substantial opportunities while simultaneously presenting important implementation challenges. The findings demonstrate that AI Learning Support, Academic Performance, and Digital Competency positively influence students' adoption of AI technologies, whereas concerns related to Academic Integrity, Data Privacy and Security, and Overdependence on AI negatively affect their acceptance and effective utilization. These results emphasize that Artificial Intelligence has the potential to transform commerce education when integrated responsibly within the teaching and learning process.

The study highlights that AI-powered educational tools such as ChatGPT, Google Gemini, Microsoft Copilot, and intelligent learning systems contribute to personalized learning, improved academic performance, enhanced research capabilities, and the development of digital competencies among commerce students. However, the increasing dependence on AI-generated content raises concerns regarding ethical use, plagiarism, reduced critical thinking, and responsible academic practices. Therefore, higher education institutions should adopt comprehensive strategies that combine technological innovation with ethical governance, faculty training, curriculum integration, and digital literacy programmes to ensure the effective and sustainable implementation of Artificial Intelligence.

The findings contribute to both educational theory and practice by demonstrating that successful AI adoption depends not only on technological advancement but also on institutional readiness, responsible usage, and continuous stakeholder engagement. Future research employing larger samples, longitudinal research designs, and advanced analytical techniques across diverse educational contexts will further enhance understanding of Artificial Intelligence adoption and its long-term impact on commerce education.

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