



# AI-DRIVEN LEARNING OUTCOMES: A STUDY OF FACULTY ADAPTATION AND STUDENT ENGAGEMENT IN HIGHER EDUCATION

✚ <sup>1</sup>Niveditha N, <sup>2</sup>Sudher Jain M S

✚ <sup>1</sup>Assistant Professor, <sup>2</sup>Assistant Professor

✚ <sup>1</sup>Department of Commerce , <sup>2</sup>Department of Commerce

✚ <sup>1</sup>Government First Grade College and Post Graduation Center, Hebri, Udupi District

✚ <sup>2</sup>Government First Grade College and Post Graduation Center, Hebri, Udupi District

## ABSTRACT

The rapid integration of Generative Artificial Intelligence (AI) in higher education has necessitated a paradigm shift in pedagogical strategies, particularly within the Commerce stream where data analysis and automation are becoming industry standards.

The study highlights how AI-enabled personalized learning can bridge the urban-rural divide by providing equitable access to advanced educational resources for marginalized learners. However, significant challenges such as the digital divide and institutional limitations are analyzed as barriers to fully inclusive implementation. Preliminary findings suggest that while faculty adaptation is increasing, structured policy interventions are required to ensure technological inclusivity.

This case study investigates the dynamic relationship between faculty adaptation and student engagement within the evolving landscape of higher education. As educational paradigms shift toward student-centric models, the ability of educators to recalibrate their pedagogical strategies is paramount. Through a mixed-methods approach—incorporating faculty interviews and student surveys—this research explores how instructional flexibility, technological integration, and modified communication styles influence student participation and learning outcomes.

The findings reveal that while faculty members demonstrate significant resilience in adapting to new institutional mandates and diverse student needs, challenges such as resource constraints and "digital fatigue" persist. These insights provide a roadmap for academic leaders and policymakers to foster an environment where both educators and learners can thrive in a changing academic climate.

**Keywords:** Generative AI, Commerce Education, Faculty Adaptation, Student Engagement, Inclusive Higher Education.

## INTRODUCTION

The rapid advancement of technology has significantly transformed the landscape of higher education, with Artificial Intelligence (AI) emerging as a key driver of innovation in teaching and learning processes. In recent years, AI-driven tools such as adaptive learning systems, intelligent tutoring platforms, and automated assessment mechanisms have gained prominence for their ability to enhance learning outcomes and personalize educational experiences. In the field of commerce education, where analytical skills, problem-solving abilities, and data interpretation are crucial, the integration of AI has the potential to improve both the quality and effectiveness of instruction.

Higher education institutions are increasingly adopting digital technologies to create interactive and student-centered learning environments. However, the success of such technological integration largely depends on the ability of faculty members to adapt to new teaching methodologies and effectively utilize AI-based tools. Faculty adaptation involves not only technical competence but also a willingness to embrace change, redesign course delivery, and engage with innovative pedagogical approaches. Without adequate training and institutional support, the adoption of AI in teaching may remain limited and ineffective.

At the same time, student engagement has become a central concern in higher education, as it directly influences academic performance and learning outcomes. AI-driven learning platforms offer opportunities for increased engagement by providing personalized content, instant feedback, and interactive learning experiences. Nevertheless, the level of student engagement is influenced by factors such as digital literacy, access to technology, and socio-economic background, which vary across institutions and student groups.

Higher education institutions present a diverse and dynamic environment for examining the impact of AI in education. While many institutions are gradually incorporating digital tools, challenges such as inadequate infrastructure, limited funding, and varying levels of technological readiness among faculty and students persist. This creates a gap between the potential benefits of AI and its actual implementation in the teaching-learning process.

In this context, the present study aims to analyze AI-driven learning outcomes in commerce education by focusing on two critical dimensions: faculty adaptation and student engagement. By adopting a case study approach, the research seeks to provide an in-depth understanding of how AI technologies are being utilized in higher education and how they influence educational outcomes. The study also attempts to identify the challenges associated with AI integration and suggest measures to enhance its effectiveness in higher education.

## Review of Literature

**Chukwuedo et al. (2022)** explored the **intrinsic** link between faculty behavior and student outcomes, specifically focusing on the concept of "perceived faculty caring." Their research suggests that student engagement is not merely a product of curriculum design but is significantly driven by the emotional and interpersonal adaptations made by educators. By modifying communication styles—such as using more accessible digital platforms and providing personalized, empathetic feedback—faculty members foster a sense of belonging. The study concludes that these adaptations are primary predictors of student "vigour" and long-term dedication to the learning process.

In a more recent analysis, **Hollister et al. (2024)** conducted a case study regarding undergraduate perceptions during periods of rapid institutional transition. The findings emphasize that student engagement is highest when faculty members demonstrate high levels of "pedagogical flexibility." This involves moving beyond standard lecture formats to incorporate real-world applications and empathetic course adjustments. The study highlights that the successful adaptation of faculty to virtual and hybrid environments directly correlates with reduced student attrition and increased cognitive participation, provided the technology is used to enhance, rather than replace, human connection.

The relationship between faculty willingness and institutional capability is examined in the **DigitalCommons/UNL Case Study (2023)**. This research identifies a critical gap: while many educators are willing to adapt to student-centric models, their efforts are often hampered by "innovation fatigue" and a lack of structured professional development. The literature suggests that faculty adaptation is not a solo endeavor but a systemic one. Without institutional support—such as reduced administrative loads or targeted technical training—the transition to engaging, modern pedagogy often leads to burnout rather than improved student outcomes.

The work of **Hasanah et al. (2026)** provides a contemporary statistical framework ( $R^2 = 0.968$ ) connecting academic resilience to engagement levels. This study argues that faculty members serve as "resilience models" for their students. When instructors adapt their teaching strategies to mitigate student anxiety and "digital fatigue," they create a safer psychological environment for learning. The research indicates that almost 97% of the variance in student engagement can be explained by the presence of a resilient and adaptive teaching environment, making faculty adaptability a cornerstone of modern higher education success.

Finally, **Zepke (2025)** synthesizes diverse literature to argue for "agentic engagement," where faculty adapt their roles from "lecturers" to "facilitators." This review emphasizes that in diverse higher education settings, faculty must adapt their socio-cultural lenses to make content relevant to a wide demographic of students. By allowing students to co-create certain elements of the curriculum and adapting language to be more inclusive, faculty can bridge the gap between institutional requirements and student lived experiences. This shift is presented as essential for fostering active, rather than passive, participation in the classroom.

## OBJECTIVES OF THE STUDY

- To analyze the impact of Artificial Intelligence (AI) on learning outcomes in commerce education in higher education.
- To examine the level of faculty adaptation to AI-based teaching tools and technologies.
- To evaluate the readiness and effectiveness of faculty members in integrating AI into teaching practices.
- To identify the challenges faced by faculty and students in adopting AI technologies.
- To suggest measures for improving the effective implementation of AI in higher education.

## STATEMENT OF THE PROBLEM

The integration of Artificial Intelligence (AI) in higher education has the potential to transform teaching-learning processes and improve academic outcomes. However, its implementation across higher education institutions remains uneven and faces several challenges. Faculty members often lack adequate training, technical expertise, and institutional support to effectively adopt AI-driven teaching tools. Resistance to change and limited awareness further hinder the integration process. At the same time, student engagement with AI-based learning platforms varies significantly due to differences in digital literacy, accessibility to technology, and socio-economic background. These issues create a gap between the potential benefits of AI and its actual impact on learning outcomes in commerce education. Therefore, there is a need to systematically examine how faculty adaptation and student engagement influence AI-driven learning outcomes in higher education.

## METHODOLOGY

The present study adopts a descriptive and case study research design to examine the impact of Artificial Intelligence (AI) on learning outcomes in commerce education within higher education. The study is based on both primary and secondary data. Primary data are collected using two methods: interviews and questionnaires. Semi-structured interviews are conducted with faculty members to gain in-depth insights into their adaptation to AI-based teaching tools, challenges faced, and readiness to integrate such technologies. Structured questionnaires are administered to students to assess their level of engagement with AI-driven learning platforms and its influence on their academic performance and understanding. Secondary data are collected from books, research journals, articles, and institutional reports to provide theoretical support to the study. A purposive sampling technique is used to select respondents, including faculty members who are familiar with AI tools and students who have exposure to AI-based learning. The collected data are analyzed using percentage analysis and descriptive statistical techniques to identify patterns and draw meaningful conclusions.

## ANALYSIS OF FACULTY RESPONSES

### 1. Awareness and Usage of AI Tools

The responses indicate that faculty members possess a moderate to high level of awareness regarding Artificial Intelligence (AI) tools used in education. Most respondents are familiar with basic technologies such as online learning platforms, automated assessment systems, and digital teaching aids. However, the actual usage of advanced AI tools remains limited. While some faculty members actively incorporate AI into their teaching practices, many are still in the initial stages of adoption. This suggests that awareness does not always translate into effective implementation, highlighting the need for practical exposure and hands-on experience.

### 2. Faculty Adaptation and Digital Competence

Faculty adaptation to AI tools is significantly influenced by their level of digital competence. The analysis reveals that faculty members with prior training or technological expertise demonstrate greater confidence and willingness to adopt AI-based teaching methods. In contrast, those with limited digital skills face challenges in understanding and applying these tools effectively. This variation in adaptation levels indicates the importance of continuous skill development and capacity-building initiatives for faculty.

### 3. Challenges in Adoption of AI

The study identifies several challenges faced by faculty in integrating AI into teaching. A major concern is the lack of adequate training and technical support. Many respondents reported difficulties in learning and using new technologies due to insufficient guidance. Additionally, infrastructural limitations such as poor internet connectivity and lack of access to advanced tools hinder effective implementation. Resistance to change and preference for traditional teaching methods also act as barriers to adoption.

### 4. Impact on Teaching Effectiveness

Faculty members generally perceive AI as a valuable tool for enhancing teaching effectiveness. The use of AI enables interactive and engaging learning experiences, improves conceptual clarity among students, and provides instant feedback. Respondents also noted that AI helps in simplifying complex concepts through visual and analytical tools. Furthermore, automation of routine tasks such as grading and attendance allows faculty to focus more on teaching and student interaction.

### 5. Role of Institutional Support

Institutional support emerges as a critical factor influencing faculty adaptation to AI. Faculty members emphasized the importance of training programs, workshops, and technical assistance in improving their ability to use AI tools effectively. Institutions that provide adequate infrastructure and encourage digital innovation tend to have higher levels of AI adoption among faculty. Lack of such support, however, restricts the potential benefits of AI integration.

## 6. Attitude Towards AI Integration

The overall attitude of faculty members towards AI integration is positive, though cautious. While most respondents acknowledge the benefits of AI in improving teaching and learning outcomes, they also express concerns about over-reliance on technology and the potential loss of human interaction in education. Faculty members believe that AI should complement rather than replace traditional teaching methods.

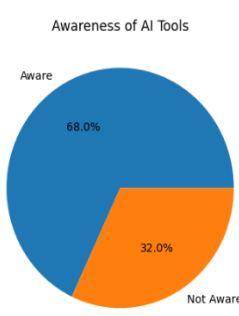
### ANALYSIS OF STUDENT RESPONSES

A survey was conducted among 100 rural Commerce students pursuing undergraduate and postgraduate studies to understand their engagement with AI-driven learning tools and its impact on learning outcomes. The data collected through questionnaires were analyzed using percentage method and presented in tables and chart interpretations.

#### 1. Awareness of AI in Education

**Table 1: Awareness of AI Tools**

Response	Number of Students	Percentage
Aware	68	68%
Not Aware	32	32%
<b>Total</b>	<b>100</b>	<b>100%</b>

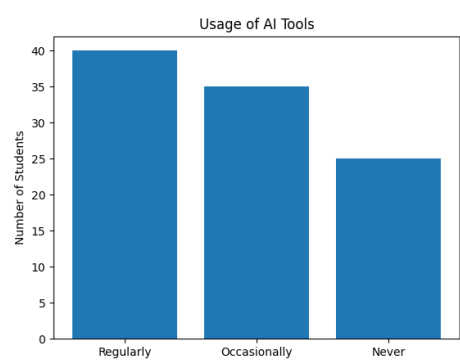


A pie chart titled "Awareness of AI Tools" is displayed to the right of the table. It shows two segments: a blue segment representing "Aware" at 68.0% and an orange segment representing "Not Aware" at 32.0%.

#### 2. Usage of AI-Based Learning Tools

**Table 2: Usage of AI Tools**

Response	Number of Students	Percentage
Regularly Use	40	40%
Occasionally	35	35%
Never Use	25	25%
<b>Total</b>	<b>100</b>	<b>100%</b>

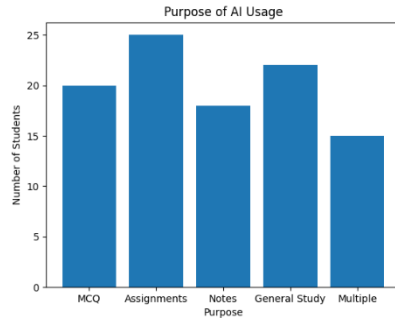


A bar chart titled "Usage of AI Tools" is displayed to the right of the table. The y-axis is labeled "Number of Students" and ranges from 0 to 40. The x-axis is labeled "Usage Type" and has three categories: "Regularly", "Occasionally", and "Never". The bars show 40 students for "Regularly", 35 for "Occasionally", and 25 for "Never".

### 3. Purpose of Using AI Tools

**Table 3: Purpose of AI Usage**

Purpose	Number of Students	Percentage
MCQ Preparation	20	20%
Assignments	25	25%
Notes Preparation	18	18%
General Study	22	22%
Multiple Uses	15	15%
<b>Total</b>	100	100%



### 4. Level of Student Engagement

**Table 4: Engagement with AI Learning**

Level of Engagement	Number of Students	Percentage
High	38	38%
Moderate	42	42%
Low	20	20%
<b>Total</b>	100	100%

### 5. Impact on Learning Outcomes

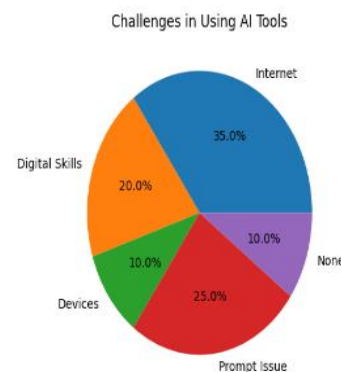
**Table 5: Improvement in Understanding**

Response	Number of Students	Percentage
Improved	60	60%
No Change	25	25%
Not Improved	15	15%
<b>Total</b>	100	100%

### 6. Challenges Faced by Students

**Table 6: Challenges in Using AI Tools**

Challenge	Number of Students	Percentage
Poor Internet Access	35	35%
Lack of Digital Skills	20	20%
Lack of Devices	10	10%
Difficulty in Giving Proper Prompts	25	25%
No Challenges	10	10%
<b>Total</b>	100	100%



## 7. Student Attitude Towards AI

**Table 7: Attitude Towards AI Learning**

Response	Number of Students	Percentage
Positive	70	70%
Neutral	20	20%
Negative	10	10%
<b>Total</b>	100	100%

### FINDINGS AND CONCLUSION

The findings reveal that while a majority of rural students are aware of AI tools, their actual usage remains moderate due to infrastructural and skill-based challenges. AI is primarily used for academic purposes such as assignments and general study, indicating its growing role in learning support. However, issues such as poor internet connectivity and lack of prompt formulation skills hinder optimal utilization. Despite these challenges, students exhibit a positive attitude towards AI, suggesting strong future potential if proper training and infrastructure are provided.

The overall interpretation of the study, based on faculty interviews and student questionnaire responses, indicates that Artificial Intelligence (AI) is gradually transforming the teaching-learning process in higher education. Faculty responses reveal a positive inclination towards AI adoption, recognizing its potential to enhance teaching effectiveness, improve student understanding, and reduce workload through automation; however, their adaptation is constrained by limited technical skills, inadequate training, and infrastructural challenges. On the other hand, student responses demonstrate a relatively higher level of acceptance, with the majority showing awareness, moderate to high engagement, and a positive perception of AI's impact on learning outcomes, particularly in areas such as assignments and general study. Nevertheless, students face significant barriers including poor internet connectivity, lack of digital skills, and difficulty in framing effective prompts while using AI tools. The combined findings suggest that while both faculty and students acknowledge the benefits of AI in education, its optimal utilization is hindered by gaps in digital literacy and institutional support. Therefore, the study concludes that successful integration of AI in higher education requires a balanced approach involving improved infrastructure, targeted training programs for both faculty and students, and the development of AI usage skills, particularly in prompt formulation, to fully realize its potential in enhancing academic performance and engagement.

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