AI-Driven Skill Dilution in Education and Its Implications for Teacher Competence and Authentic Learning Practices

Mr. Yelguri Sandeep Kumar[1]

[1] *MBA Student, Department of Management studies, Vardhaman College of Engineering, Shamshabad, Hyderabad. Telangana*

Article Info	Abstract:
	The rapid integration of Artificial Intelligence (AI) in higher education has significantly transformed teaching, assessment, and instructional practices. While AI-enabled tools enhance efficiency, personalization, and administrative support, concerns are emerging regarding their potential to dilute essential pedagogical skills and weaken authentic learning experiences. This study examines the extent of AI integration in teaching and instructional processes and analyzes its impact on teacher competence and authentic learning practices in autonomous engineering colleges in Hyderabad City. Adopting a descriptive and analytical research design, primary data were collected from faculty members using a structured questionnaire. Statistical analyses, including descriptive statistics and reliability testing, were employed to assess faculty perceptions. The findings indicate a moderate to low level of AI integration, with greater use in assessment and instructional management than in lesson planning and content creation. Results further reveal that while AI contributes to instructional efficiency and supports pedagogical decision-making, excessive reliance may lead to reduced pedagogical creativity, critical engagement, and authentic, experience-based learning. The study concludes that AI should function as a complementary tool rather than a substitute for human judgment in education. It emphasizes the need for a balanced, human-centered AI integration framework that enhances educational quality while preserving teacher competence and authentic learning practices. ***Keywords:*** Artificial Intelligence in Education; Teacher Competence; Skill Dilution; Authentic Learning Practices; Higher Education; Autonomous Engineering Colleges

1. Introduction and Background of the Study

The integration of Artificial Intelligence (AI) into education has quickly changed teaching, learning, and assessment processes in higher education. AI tools, like automated grading systems, content generators, adaptive learning platforms, and smart tutoring systems, are now widely used to improve efficiency, personalization, and instructional support. Recent studies show that when used thoughtfully, AI can help teachers with lesson planning, assessments, and classroom management. This can enhance operational efficiency and increase instructional reach (Mostafavi, 2024; Ibojo, 2025; Gurion et al., 2025). However, there are growing concerns among scholars about the unintended

effects of relying too much on AI. It may weaken core teaching skills and diminish genuine learning experiences (Khlaif, 2025; Waluyo & Pratiwi, 2025).

Emerging research suggests that overreliance on AI might limit teachers' ability to make independent decisions, think critically, be creative, and reflect on their practice. It can also lead students to rely on AI for cognitive offloading and shallow learning (Sharma, 2025; Karamuk, 2025; Salazar, 2025). While there have been several studies on AI adoption, readiness, and efficiency gains, few have looked at teacher competence and authentic learning practices together, especially in autonomous engineering institutions. Therefore, this study aims to explore how AI is being used in higher education, assess its impact on teacher competence, and examine its effects on genuine learning. The goal is to identify balanced strategies for sustainable AI integration.

2. Literature Review

Extant research consistently highlights AI's role in enhancing instructional efficiency, assessment accuracy, and administrative productivity. Studies report that AI supports teachers in lesson planning, content creation, feedback generation, and classroom management, enabling educators to focus more on student engagement and differentiated instruction (Mostafavi, 2024; Ibojo, 2025; Thomas, 2025; Gerlich, 2025). Teacher competence is positively influenced when AI adoption is accompanied by adequate training, institutional support, digital literacy, and ethical awareness (Ngongpah & Oni, 2025; Hassen, 2025; Shoreamanis, 2024). These studies position AI as a complementary tool that enhances pedagogical effectiveness when aligned with professional judgment.

Conversely, a substantial body of literature warns against the risks of excessive AI reliance. Scholars argue that over-automation can gradually erode teachers' pedagogical creativity, assessment literacy, and professional autonomy (Waluyo & Pratiwi, 2025; Ayeni, 2025; Luckin, 2017). Research further indicates that AI-generated content and automated assessments may compromise the authenticity of student work, reduce originality, and weaken critical thinking skills (Sharma, 2025). From the learner perspective, excessive AI use is associated with cognitive offloading, reduced problem-solving capacity, and diminished confidence in independent academic tasks (Karamuk, 2025).

In terms of authentic learning practices, prior studies emphasize that while AI can enable personalization, adaptive feedback, and flexible learning pathways, meaningful learning depends heavily on human interaction, reflection, and experiential engagement (Khapaeva, 2022; Vivian & Boateng, 2025). Several authors advocate a human-centered, ethical, and balanced integration model where AI functions as a "co-pilot" rather than a replacement for educators (Fitria, 2021; Sagimbayeva, 2024). Collectively, the literature underscores a paradox: AI enhances efficiency and accessibility, yet poses risks to teacher competence and learning authenticity when reliance becomes excessive.

3. Research Gap

Although existing studies extensively examine AI adoption, teacher readiness, efficiency gains, and ethical concerns, there is a notable lack of integrated empirical research that simultaneously investigates AI-driven skill dilution, teacher competence, and authentic learning practices within autonomous engineering colleges. Most prior studies address these constructs in isolation, without empirically examining the relational dynamics between the extent of AI reliance, specific dimensions of teacher competence, and the authenticity of student learning outcomes. Furthermore, contextual

evidence from Indian higher education—particularly autonomous engineering institutions in urban settings—is limited, leaving a critical gap in understanding how balanced AI integration can be operationalized without compromising pedagogical quality.

4. Research Objectives

1. To examine the extent of AI integration in teaching, assessment, and instructional processes among faculty members in autonomous engineering colleges.

2. To analyze the impact of AI reliance on teacher competence, including pedagogical skills, critical thinking, subject mastery, and instructional creativity.

3. To assess the influence of AI-driven practices on authentic learning practices among students.

4. To propose a balanced AI integration framework that supports educational quality without causing skill dilution.

5. Research Questions

1. What is the extent of AI usage in teaching and instructional processes among faculty members?

2. How does reliance on AI tools influence various dimensions of teacher competence?

3. What relationship exists between AI-driven instruction and authentic learning practices?

4. How can AI be integrated effectively to balance efficiency and educational quality?

6. Research Hypotheses

H_0: AI-driven educational practices have no significant impact on teacher competence or authentic learning practices.

H_1: AI-driven educational practices significantly influence teacher competence and authentic learning practices.

H_2: Excessive reliance on AI tools leads to measurable dilution of pedagogical skills and learning authenticity.

7. Scope and Significance of the Research

This study is confined to faculty members of autonomous engineering colleges in Hyderabad City and focuses on AI integration in teaching and learning processes. The findings are expected to contribute theoretically by integrating teacher competence and authentic learning within a unified AI framework, and practically by informing institutional policies, faculty development programs, and ethical AI adoption strategies. The research will aid educators, administrators, and policymakers in designing balanced AI-enabled pedagogical models that enhance educational quality while preserving core human teaching competencies.

8. Conceptual Framework

The conceptual framework proposes that the **Extent of AI Integration** (independent variable) influences **Teacher Competence** and **Authentic Learning Practices** (dependent variables). Teacher

competence also acts as a mediating factor affecting learning authenticity. Balanced AI usage moderates these relationships by reducing skill dilution.
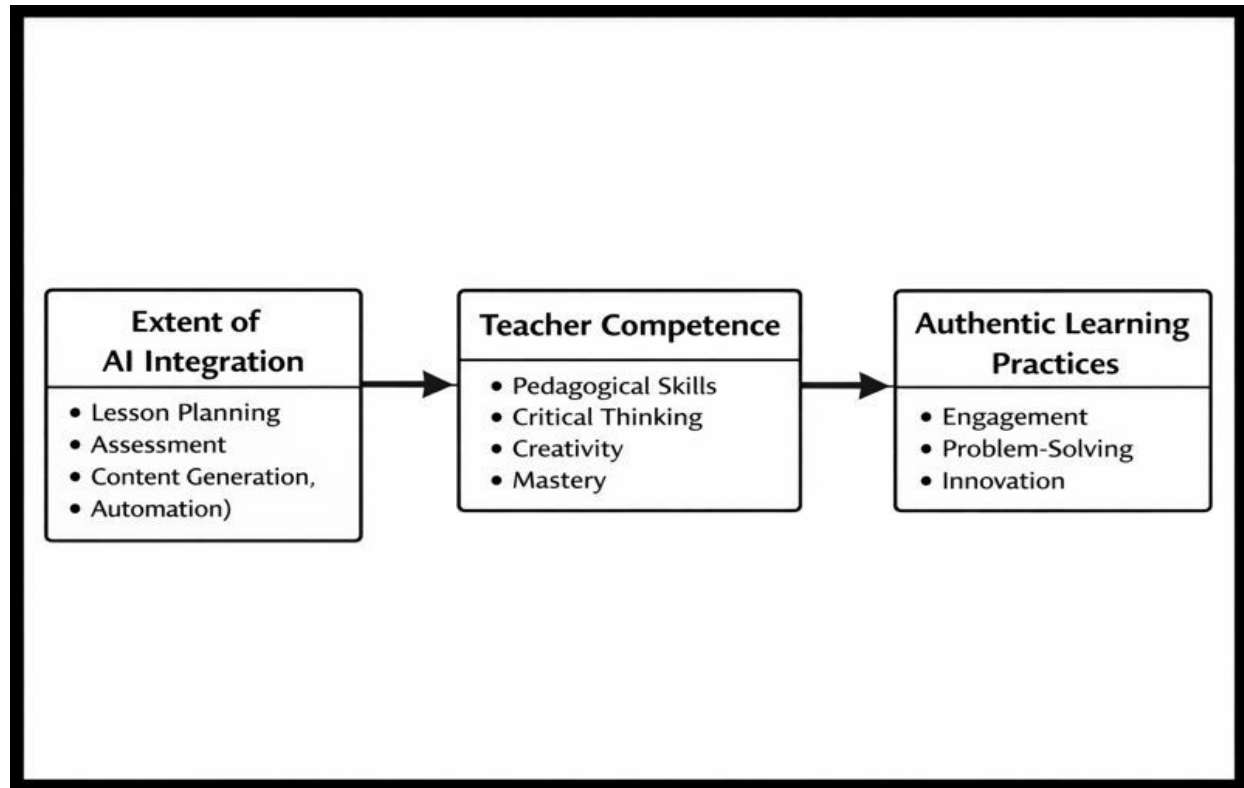
9. Research Methodology

The study will adopt a descriptive and analytical research design. The population comprises faculty members working in autonomous engineering colleges located in Hyderabad City. A structured questionnaire will be used as the primary data collection instrument, designed to measure AI usage, teacher competence, and authentic learning practices. The questionnaire will employ a five-point Likert scale and will be validated through a pilot study to ensure reliability and content validity.

A stratified random sampling technique will be employed to select an appropriate sample size of faculty members across disciplines. Data analysis will be conducted using statistical tools such as descriptive statistics, correlation analysis, multiple regression, and structural equation modeling (SEM) to examine relationships among variables in line with the research objectives. Statistical software such as SPSS and AMOS will be utilized to ensure robust and reliable findings.

Data Analysis

The analysis of data in the present study was carried out in a **systematic three-stage process** in accordance with the research objectives. First, **descriptive statistics** were employed to summarize the respondents' perceptions regarding AI integration, teacher competence, and authentic learning practices. Second, a **reliability analysis** was conducted using **Cronbach's Alpha** to examine the internal consistency of the measurement scales. Finally, **inferential statistical techniques** were

planned to examine relationships and predictive effects among the study variables. This structured approach ensured both clarity in data interpretation and robustness in statistical conclusions.

Descriptive Statistic

Descriptive statistics were used to analyze responses from 79 faculty members regarding the extent of AI integration in teaching, its influence on teacher competence, and its role in shaping authentic learning practices. Mean scores and standard deviations were computed to understand the overall tendency and variability of faculty perceptions across the three constructs.

Descriptive Statistics (N=79)		Mean	Std. Deviation
Extent of AI Integration in Teaching and Instructional Processes	AI tools are routinely integrated into my lesson planning and content preparation processes.	2.14	1.308
	AI technologies aid me in evaluating student performance and managing assessments	2.29	1.064
	AI platforms support the creation of instructional materials and learning examples.	2.13	1.055
	AI technologies support the efficient organization and management of instructional tasks.	2.28	1.085
	I employ AI technologies to adapt learning materials to students' diverse learning requirements	2.34	1.142
Teacher Competence	The integration of AI tools is associated with enhanced effectiveness in subject content delivery	2.24	1.303
	The use of AI tools appears to contribute to the development of pedagogical creativity.	2.30	1.170
	AI-generated outputs are subjected to critical review prior to their use in instructional settings	2.22	1.034
	The extent of reliance on AI tools for instructional tasks has undergone noticeable change	2.27	0.970
	AI systems play a role in shaping instructional decision-making processes	2.35	1.291
AI-Driven Instruction and Authentic Learning Practices	AI-driven instructional practices support the use of real-world, meaningful learning tasks	2.41	1.204
	The integration of AI tools encourages learning activities that promote critical thinking and problem-solving	2.51	1.061
	AI-supported instruction facilitates student engagement in authentic, experience-based learning	2.22	1.046

The use of AI tools aligns with instructional approaches that emphasize active and participatory learning	2.20	1.079
Excessive reliance on AI tools may limit the development of authentic learning experiences	2.33	1.258

Interpretation

The results indicate a generally moderate to low level of AI integration across instructional practices, with mean values ranging from 2.13 to 2.51. Faculty reported limited routine use of AI tools in lesson planning, content preparation, and instructional material development, while slightly higher usage was observed in assessment-related and organizational tasks. Perceptions of teacher competence suggest a cautious acknowledgment of AI's role in enhancing instructional effectiveness and pedagogical creativity, accompanied by a strong tendency to critically review AI-generated outputs. With respect to authentic learning practices, respondents moderately agreed that AI supports real-world learning and critical thinking; however, concerns were also evident regarding excessive reliance on AI potentially limiting authentic, experience-based learning. Overall, the findings reflect selective adoption of AI technologies coupled with awareness of their implications for professional competence and authentic pedagogy.

Section 2 Reliability analysis

Reliability analysis was conducted to examine the internal consistency of the measurement scales used in the study. Cronbach's Alpha coefficients were computed for each construct to ensure that the questionnaire items reliably measure the intended dimensions.

S.NO	VARIABLE	ITEMS	Cronbach's Alpha	Interpretation
1	**Extent of AI Integration in Teaching and Instructional Processes**	5	0.897	Very Good
2	**Teacher Competence**	5	0.892	Very Good
3	**AI-Driven Instruction and Authentic Learning Practices**	5	0.875	Very Good

Interpretation

The reliability results demonstrate very good internal consistency across all constructs. The Cronbach's Alpha values for the extent of AI integration ($\alpha = 0.897$), teacher competence ($\alpha = 0.892$), and AI-driven authentic learning practices ($\alpha = 0.875$) exceed the recommended threshold of 0.70. These findings confirm the reliability of the measurement scales and indicate that the items are consistent and appropriate for further inferential statistical analysis.

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