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Adoption of Artificial Intelligence in Learning Management Systems and Its Impact on Student Learning Outcomes

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Abstract
This study will explore the idea of incorporating Artificial Intelligence (AI) into LMS and how it might affect the results of higher education learning. Intelligent solutions providing personalized learning, automated evaluation, and data-driven decisions are now available on LMS platforms thanks to the growing use of artificial intelligence in NLP, ML, and predictive analytics. This study employs the quantitative method and compiles primary data collected on 200 learners of the Delhi NCR region by means of a structured questionnaire. The connections between AI-enabled LMS tools, perceived utility, and perceived ease of use, customized learning, automated feedback, and student learning outcomes were investigated with the help of statistical methods, i.e., descriptive analysis, correlation, and regression in SPSS and MS Excel. According to the results, AI-powered LMS solutions significantly improve the learning outcomes of students, but with a low explanatory power. Further, the perceived utility and perceived ease of use have a significant relationship with the learning efficacy, and perceived usefulness is a stronger predictor. Furthermore, personalized learning using AI and automated feedbacks have a profound effect on the academic performance of students, which is why they play a crucial role in enhancing academic performance of students. The study concludes that AI applications in LMS systems lead to the development of flexible, student-centered, and efficient learning environments. The results have interesting implications to educational institutions, policymakers, and technology designers in the enhancement of successful adoption and implementation of AI-based learning systems to enhance student outcomes.

Keywords: Artificial Intelligence (AI), Learning Management Systems (LMS), Student Learning Outcomes, Personalized Learning, Automated Feedback and Learning Effectiveness

I. Introduction

The use of "Artificial Intelligence (AI)" in the "Learning Management System (LMS)" has dramatically altered how educational content is delivered, administered and assessed in contemporary educational systems. Learning Management Systems emerged as digital platforms earlier to create order among course materials, communication between instructors and students, and to administer assignments and exams (Cabrera, et al., 2025). Nevertheless, in the context of the fast development of technologies and the necessity to create flexible and efficient learning conditions, LMS platforms have become more complex systems. These platforms have also improved with the incorporation of Artificial Intelligence that provides these platforms with intelligent data analytics, automation, and adaptive capabilities of learning (Sharifov, et al., 2021). Machine learning, natural language processing, and predictive analytics are some of the AI technologies that LMS platforms can use to observe the behavior of students, monitor learning, and give feedback in real-time to enhance the overall learning process (Qazi, et al., 2024).

The introduction of AI into Learning Management Systems is also significant in terms of improving the level of learning among students. The AI-powered systems facilitate personalized learning by adjusting learning material to the needs and learning speed of individual students as well as their performance threshold (Saifullah, et al., 2024). Such systems are able to suggest the right learning materials, areas that the students might be performing poorly, and offer immediate assistance to enable them to enhance their academic achievements. Also, AI-based analytics assist teachers to track student activity and determine the efficacy of instructional methods. With the ongoing integration of digital learning solutions in educational institutions, AI-enabled systems are becoming vital instruments in enhancing the efficiency of the teaching process, aiding in the process of making decisions grounded in data, and improving the academic performance of students. The

implementation of Artificial Intelligence in Learning Management Systems is therefore a major move to developing more intelligent, responsive and learner-centered learning settings (Bressane, et al., 2024).S

1.1Evolution of Learning Management Systems

Learning Management Systems (LMS) are now an inseparable part of the educational setting in the modern world, which they facilitate, organize, and assess the learning process. Primarily, the first iterations of LMS started developing during the late 1990s and the early 2000s when educational institutions started to adopt digital platforms in order to deliver course materials and organize communication between the teachers and learners (Bradley, 2021). The most common attributes of these early systems were to serve as a place that teachers would post lecture notes, assignments, and announcements. The Blackboard and Moodle platforms were instrumental in designing the early evolution of the LMS technologies. Learning Management Systems have over time developed as being mere content management tools to becoming elaborate digital learning environments (Mfikoyi, 2022). The contemporary LMS systems have evolved to enable a wide range of activities such as discussion groups, exams, live tests, collaborative learning applications, and performance management. Due to the development of online and blended learning, LMSs platforms have become indispensable to universities and learning organizations. The development has resulted in the possibility of accommodating cutting-edge technologies like Artificial Intelligence to further streamline the learning process and make the education process more efficient (Veluvali & Surisetti, 2022).

1.2Integration of Artificial Intelligence in Education

"Artificial Intelligence" (AI) has been on the rise and impact on the teaching and learning sector with new innovative tools that have improved the processes. "The educational systems can be used through AI technologies like machine learning, natural language processing, and intelligent data analytics to analyze large volumes of data and deliver insights into learning behavior by students". Such abilities allow teachers to learn and comprehend the performance patterns of the students, anticipate academic difficulties, and build more efficient learning plans (Demartini et al., 2024). "The introduction of AI in the educational platforms has also seen the birth of intelligent tutoring systems, automated grading systems, and virtual learning assistants". The technologies make the administrative task of the educator lightened, and students have direct feedback and academic assistance at the same time. Therefore, AI has found its role in the transformation of the traditional digital learning platforms to a set of intelligent systems that can support more adaptive and responsive learning environments (Hemachandran, et al., 2022).

1.3Role of AI-enabled LMS in Personalized Learning

Among the greatest benefits of introducing AI into the LMS, there is the possibility to embrace individual learning. At the conventional level classroom, teachers tend to experience problems in meeting individual needs of each student on the basis of time and huge classrooms. The LMS systems based on AI overcome this drawback by examining the learning patterns, academic success and interaction patterns of students (Kovalchuk, et al., 2025). With such analyses, AI systems would be able to suggest tailored learning materials, change the challenge of tests and offer personalized feedback. This is an adaptive method of learning that enables a student to learn at his/her own pace but with special help where necessary. The personalized learning environment is also capable of enhancing knowledge retention as well as enhancing student motivation and engagement. In turn, AI-based LMSs play a major role in the development of a learner-centered learning experience (Gm, et al., 2024).

1.4Importance of Student Learning Outcomes and Institutional Need for AI-enabled Learning Systems

Student learning outcomes are those measureable knowledge skills attitudes and competencies students develop through the learning process and they have been a key emphasis in modern education systems. As the role of outcome-based education in education continues to grow, more and more educational institutions assess the effectiveness of teaching methods, the organization of the curriculum, and educational technologies in terms of their contribution to student achievement and academic success (Vitchenko and Nikolayenko, 2022). In this regard, Learning Management Systems in combination with Artificial Intelligence are important in improving the process of monitoring and evaluation of learning outcomes. The LMS platforms which are AI-enabled and provide detailed learning analytics through the tracking of student activity, grades, interactions and overall academic achievement. These understandings can help teachers to diagnose the learning gaps, learner's needs and apply early teaching interventions to enhance performance. On the institutional level, the necessity of AI-enabled learning systems has increased as educational institutions and universities have been confronted with the issue of rising student enrollments, varying learner needs, and the need to have flexible learning environments (Wang, 2025). AI-based LMS systems assist in institutions in processing voluminous amounts of academic data, automating administrative functions, and preventing at-risk students with the help of predictive analytics, enabling their early academic intervention and guidance. As a result, AI-based LMS technologies do not only enhance the capability of measuring and improving outcomes of student learning but also upscale the capacity of institutions to provide efficient, scalable and student-centered learning (Janahi & Obeidat, 2025).

1.5Aim and Significance of the Study

The purpose of this proposed study is to examine how modern educational settings are using LMS that include

AI and how this is influencing the learning results of students. The project's overarching goal is to find out how well learning management systems (LMS) powered by artificial intelligence (AI) can improve classroom instruction via personalized lessons, immediate feedback, and data analysis. Student engagement, academic accomplishment, and instructional effectiveness may be improved using AI-powered learning management system solutions, according to the study. Additionally, it offers educational institutions practical suggestions for enhancing the learning process via the integration of intelligent learning technologies that promote outcome-based education.

1.6Statement of the Problem

Even though the use of Learning Management system is common in most academic institutions, most of these traditional LMS systems are primarily content delivery systems, and they do not support high learning requirements by students. The growing student enrollments, diversity of learning styles, and the need to have flexible learning facilities present challenges in terms of tracking student progress and enhancing the results of learning. Although AI can be used to improve LMS platforms in terms of adaptive learning and predictive analytics, it is not used extensively in most institutions. Thus, the question of whether AI-enhanced Learning Management Systems can be used to facilitate personalized learning and help to enhance student learning should be studied.

2.Literature Review

The authors discovered that LMS systems such as Moodle and Canvas were primarily used by students to obtain materials and discussions, and they did not seem to engage more in the area of informal learning. It recommended the inclusion of non-formal learning exercises to enhance the interest and effective adoption of LMS among the students (Mpungose & Khoza, 2022). On the same note, Raza, et al., (2021) explored the acceptance and use of Learning Management Systems by students during the COVID-19 pandemic through an extended UTAUT model. Those findings demonstrated that anticipated level of efficiency, expectations for initiative, social influence, and social isolation were important factors that positively affected the intention and actual use of LMS by students. Similarly, Mohammadi, et al., (2021) examined the issues and influencing conditions of the Higher Education Learning Management System (HELMS) use during the COVID-19 pandemic at Afghan higher education institutions. The study conducted qualitative interviews with 100 individuals to define the major issues that influenced the LMS implementation and offered an explanation of how it could be used successfully in higher learning (Akwene, 2024; Allam, et al., 2024).

The study presented the enhancement of the application of Artificial Intelligence in education, including adaptive learning, teaching assessment, and distance learning (Huang, et al., 2021). It highlighted that AI enhanced the effectiveness of teaching and the quality of student learning, while also noting how AI posed future challenges in the implementation process in the education sector. Likewise, Kamalov, et al., (2023) and Ouyang and Jiao (2021) discussed how Artificial Intelligence, particularly ChatGPT technology, contributed to the education sector. It mentioned AI applications such as intelligent tutoring, automated assessment, and personalized learning, and discussed the benefits, issues, and ethical concerns that accompanied AI in education (Holmes, 2020).

The study examined how AI-based personalized learning could be used in management education by incorporating the principles of the Self-Determination Theory (SDT). The findings indicated that AI-based personal learning proved to be more effective in motivating, engaging, and enhancing the academic performance of students, as it promoted autonomy, competence, and relatedness in the learning process (Ellikkal and Rajamohan, 2025; Yekollu, et al., 2024). The study suggested an AI-powered system that predicted and applied adaptable algorithms to develop customizable learning experiences. The results indicated a positive effect of AI-enhanced personalization on the engagement levels, knowledge acquisition, and academic outcomes of the students, in contrast to traditional education (Amoako, et al., 2024; Babu, et al, 2025). The application of AI-based personalized learning in management education incorporated principles of Self-Determination Theory (SDT). The results indicated that Autonomy, Competence, and Relatedness were boosted, which increased student motivation, engagement, and academic performance as a result of AI-based personalized learning (Ellikkal & Rajamohan, 2025).

Mahajan & Singh, (2017) examined the fact that education in Asian countries had been transformed to independent learning (as opposed to guided learning) where students were allowed to select courses according to their interest. Learning outcomes allowed them to understand the skills and knowledge they acquired in a programme. Similarly, E-learning and blended learning gained relevance in higher learning. Study indicated that not only the format a teacher used to instruct learners but also such factors as teacher presence, student interaction, and the relationship between online and offline learning activities influenced the learning outcomes (Nortvig, et al., 2018; Kumpas-Lenk, et al., 2018). A study conducted by Harefa and Hulu in 2023 explored the association between students' learning interest and their learning outcomes in Integrated Science. The findings presented through a quantitative correlation design with a sample of 65 students revealed that learning interest and academic performance had a significant and positive relationship, implying that the greater the learning interest, the better the learning outcomes of students (Rahmah & Lubis, 2024).

Rahate Sarg, et al., (2025) reviewed that AI-based Learning Management Systems (LMS) enhanced education through the automation of administration, personalization of learning, and data-driven tools that maximized student engagement and academic performance. Similarly, a study indicated that AI-based LMS enhanced institutional efficiency and improved the learning processes of students in contemporary digital education. Personalized learning, predictive analytics, and learning management systems were enhanced with the help of Artificial Intelligence (AI) in higher education. It promoted student participation, study, and administration efficiency as well as outcome-based education (Banerjee and Bhattacharya, 2023; Badgami and Dwa, 2026). On the same note, a study by Cabrera, et al., (2025) examined the study trends of Artificial Intelligence (AI) in Learning Management Systems (LMS). It demonstrated the fast development of this area but indicated the study gaps of the effectiveness and acceptance of AI devices in education.

3.Research Gap

Despite the fact that some studies have been conducted on the utilization and adoption of Learning Management Systems (LMS) in higher education, the majority of them concentrate on the acceptance, adoption patterns, and issues surrounding the LMS implementation instead of its effects on student learning outcomes (Mpungose and Khoza, 2022; Raza, et al., 2021; Mohammadi, et al., 2021). In the same vein, the existing study on the topic of Artificial Intelligence in education primarily mentions the applications of AI, including adaptive learning, intelligent tutoring systems, and automated assessment, as well as the related advantages and ethical issues (Huang, et al., 2021; Kamalov, et al., 2023; Ouyang and Jiao, 2021; Holmes, 2020). Despite the fact that there are some studies that investigate AI-oriented personalized learning and its impact on student motivation and academic achievement (Ellikkal and Rajamohan, 2025; Yekollu, et al., 2024; Amoako, et al., 2024; Babu, et al., 2025), not many studies have explored the specifics of implementing Artificial Intelligence in Learning Management Systems and its direct impact on enhancing student learning outcomes in higher education. Thus, more studies should be conducted to comprehend how AI-intelligent LMS systems can improve custom learning and lead to improvement in academic performance and learning efficiency.

4.Research Objectives

- To analyze the effect of AI-enabled LMS tools on students' learning outcomes such as academic performance, engagement, and knowledge retention.
- To investigate the relationship between students' perceived usefulness and ease of use of AI-based LMS and their learning effectiveness.
- To evaluate the role of AI-driven personalized learning and automated feedback in improving students' academic achievements.

5.Research Methodology

The research design adopted in this study is the quantitative research methodology as it seeks to determine the effects of the adoption of Artificial Intelligence-powered Learning Management Systems (AI-powered LMS) and its influence on student learning in higher educational institutions. The quantitative approach is deemed appropriate to the study because it will enable the authors to collect and statistically test numerical data to identify the trend, correlation, and the influence of some variables on the learning outcomes of students. The study was conducted in Delhi NCR which is a major educational hub in India which is marked by the multiplicity of universities, colleges and institutions of higher learning which extensively utilize internet based learning resources and new technology. The proposed study population is those students who study in institutions of higher education and make use of Learning Management Systems along with Artificial Intelligence tools to complete their academic tasks, including reading course material, completing assignments, discussing, and getting feedback in an automated format. Purposive sampling technique selected respondents who had prior experience and knowledge of the AI-based LMS systems, and therefore guaranteed the relevance of the responses to the objectives of the study. The research method applied in the study involves a descriptive form of study to gain an insight into the current applications and perceptions of AI-enabled Learning Management Systems among students, whereas exploratory research design seeks to establish the relationship between AI-based learning aids and student learning outcomes.

"The study makes use of secondary and primary information. Primary data were collected using a structured questionnaire consisting of 30 questions that were given to 200 higher learning students in the Delhi NCR region to obtain the data on their experiences with AI-enabled Learning Management System. Mostly, data was sourced via papers and books as well as the internet. Artificial intelligence-based LMS tools, perceived utility, and personalized learning with automated feedback are the independent variables analyzed in the study, and the way they influence the outcomes of learning, ease of use, and achievement. Data were analyzed using the MS Excel and SPSS with statistical analysis methods such as standard deviation, mean, correlation, and regression analysis".

6.Conceptual Framework

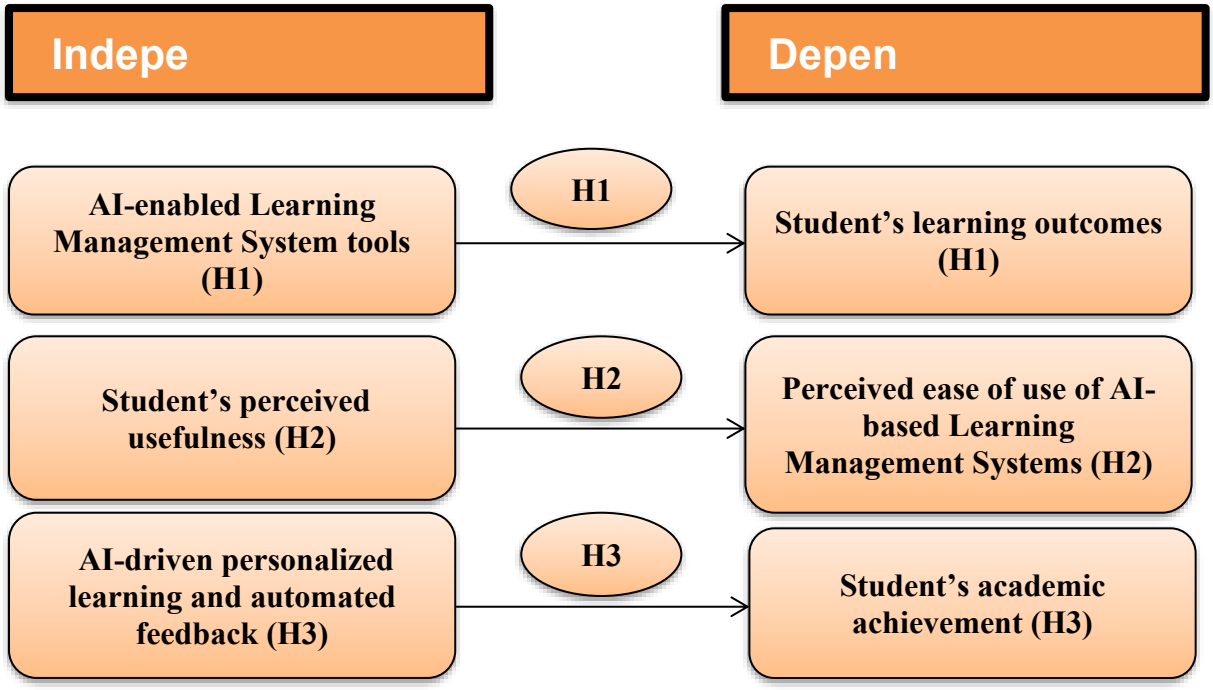

Figure 1.1: Conceptual framework

Source: Author's Own Compilation

7.Results And Interpretations

Table 1: Demographic Profile of the Respondents

S.NO.	Demographic Characteristics		N	%
1	Gender	Male	108	54.0%
		Female	92	46.0%
2	Age Group	Below 18 years	47	23.5%
		18–20 years	43	21.5%
		21–23 years	51	25.5%
		24 years and above	59	29.5%
3	Educational Qualification	Diploma/Certificate	50	25.0%
		Doctoral	50	25.0%
		Postgraduate	52	26.0%
		Undergraduate	48	24.0%
4	Field of Study	Arts & Humanities	42	21.0%
		Commerce/Management	38	19.0%
		Engineering/Technology	45	22.5%
		Science	39	19.5%
		Other	36	18.0%
5	Type of Institution	Deemed/Autonomous	77	38.5%
		Government	59	29.5%
		Private	64	32.0%
6	Experience with Learning Management Systems (LMS)	Less than 6 months	48	24.0%
		6 months – 1 year	50	25.0%
		1–2 years	59	29.5%

		More than 2 years	43	21.5%
7	Frequency of Using AI-based Features in LMS (e.g., chatbots, recommendations)	Always	42	21.0%
		Never	40	20.0%
		Often	35	17.5%
		Rarely	30	15.0%
		Sometimes	53	26.5%

The demographic characteristics of the respondents reflect a rather balanced and representative sample. When it comes to gender, there was a very slight majority among men (54.0) over women (46.0). Most of the respondents were fairly mature, with the largest percentage of 29.5 representing the age group of 24 years and above, 25.5 years 21 years and above, below 18 years and 21 years respectively. The distribution of educational qualification was even with postgraduate students (26.0 percent) having the highest number, followed by diploma/certificate, and doctoral (25.0 percent each) students, and undergraduates (24.0 percent). In terms of the field of study, engineering/technology (22.56) and arts and humanities (21.00) had a slight lead over science (19.50), commerce/management (19.00), and other (18.00) disciplines. Regarding the type of the institution, a greater number of respondents described themselves as working in deemed/autonomous institutions (38.5%), then in the private (32.0%), and government institutions (29.5%). The experience using Learning Management Systems (LMS) demonstrates a moderate level of familiarity, with the majority of respondents having 1 2 years of experience (29.5%), others having 6 months to 1 year of experience (25.0%), less than 6 months of experience (24.0%), and 2 years or more of experience (21.5%). Lastly, the frequency of AI-based LMS distinguishes usage that may indicate different levels of engagement with the majority of respondents stating that they use it sometimes (26.5%), always (21.0%), never (20.0%), often (17.5%), and rarely (15.0%), which implies that the use of AI-enabled solutions in learning settings is mixed, though increasing in number.

H1: AI-enabled Learning Management System tools have a significant positive effect on students' learning outcomes, including academic performance, engagement, and knowledge retention.

Table 2: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.385a	.148	.144	2.31797
a. Predictors: (Constant), AI-enabled Learning Management System (LMS) tools				

The model summary reveals a small association between AI-driven LMS systems and student learning outcomes. The correlation coefficient (R = 0.385) shows that there is a positive correlation between dependent and independent variables. The coefficient of determination (R Square = 0.148) indicates that AI-based LMS technologies can explain a truly insignificant indicator of student learning outcomes, which is approximately 14.8 percent, and the model has a poor explanatory power. Adjusted R square is relatively small (0.144), which proves that the sample size has been taken into account and the model is 3 stable and does not shrink drastically. The standard error of the estimate (2.31797) suggests the mean difference between the actual values and the regression line that shows a good average error rate in predictions. According to the findings, the statistically significant positive influence of AI-based LMS tools on the learning outcomes is observed; however, a significant percentage of the variance is influenced by other variables that were not incorporated into the model.

Table 3: ANOVA

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	184.933	1	184.933	34.419	.000b
	Residual	1063.847	198	5.373		
	Total	1248.780	199			
a. Dependent Variable: Students' learning outcomes						
b. Predictors: (Constant), AI-enabled Learning Management System (LMS) tools						

The results of the ANOVA test indicate that the regression framework considerably explains the effects of AI-based LMS technologies on student education results. The methodology is relatively huge as shown by a value

of 34.419 of F-value and zero significance level ($p < 0.05$). It means that independent parameter (AI-enabled LMS tools) is relevant to the dependent parameter (learning outcomes of students). The regression sum of squares (184.933) in relation to the residual sum of squares (1063.847) suggests that the model adequately captures a portion of the variability in the learning outcomes. The significance level is less than 0.05, hence rejects the null hypotheses and approving an alternative hypothesis (H1). Thus, it may be inferred that AI-driven Learning Management System (LMS) solutions substantially improve students' academic outcomes.

Table 4: Coefficients

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.128	.711		8.614	.000
	AI-enabled Learning Management System (LMS) tools	.374	.064	.385	5.867	.000
a. Dependent Variable: Students' learning outcomes						

The coefficients table indicates that AI-driven LMS (Learning Management System) solutions may significantly improve student learning results. The unstandardized coefficient (B = 0.374) signifies that a one-unit increase in the use of AI-enabling LMS technology leads to an improvement in student learning outcomes by 0.374, provided that other variables stay constant. The beneficial impact size (Beta = 0.385) is moderate, thus indicating that the variable that is independent is significant inside the model. The t-value of 5.867 and a level of statistical significance of 0.000 ($p < 0.05$) indicate that the predictor is statistically significant. The constant figure (6.128) represents the amount of the learning outcomes at the condition of the independent variable to be zero. The statistics confirm the fact that the alternative hypothesis (H1) should be accepted and it reveals that AI-controlled LMS tools have a significant positive effect on the learning outcomes of students.

H2: There is a significant positive relationship between students' perceived usefulness and perceived ease of use of AI-based Learning Management Systems and their learning effectiveness.

Table 5: Descriptive Statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
Perceived Usefulness	9.3550	2.98219	200
Perceived Ease of Use	9.4900	2.41434	200
Learning Effectiveness	9.8050	2.62898	200

The size of the descriptive statistics show that the mean of perceived usefulness, perceived ease of use, and learning effectiveness are rather high, which means that respondents are generally positive about API-based Learning Management Systems. The highest learning score is the mean one (M = 9.8050, SD = 2.62898), indicating that students consider the significance of the AI-enabled technology in their academic process as high. The perceived ease of use has mean of 9.4900 and standard deviation of 2.41434, indicating that the respondents perceive that these systems are very user-friendly with a relatively low variation rate. The average perceived usefulness (M = 9.3550, SD = 2.98219) is also large, but with high diversity as it indicates the differences in the opinion of AI-based LMS systems by students. The mean standard deviations of variables often indicate a satisfactory degree of response variation, while also representing varied viewpoints within the sample.

Table 6: Correlations

Correlations				
		Perceived Usefulness	Perceived Ease of Use	Learning Effectiveness
Perceived Usefulness	Pearson Correlation	1	.522**	.392**
	Sig. (2-tailed)		.000	.000
	N	200	200	200
Perceived Ease of Use	Pearson Correlation	.522**	1	.344**
	Sig. (2-tailed)	.000		.000
	N	200	200	200
Learning Effectiveness	Pearson Correlation	.392**	.344**	1
	Sig. (2-tailed)	.000	.000	

	N	200	200	200
**. Correlation is significant at the 0.01 level (2-tailed).				

The correlation analysis demonstrates strong positive relationships between perceived usefulness, perceived simplicity of use, and learning efficacy. Perceived utility has a moderate positive connection with perceived ease of use ($r = 0.522$, $p < 0.01$), suggesting that learners who see AI-based LMS solutions as advantageous are similarly predisposed to consider them user-friendly. Moreover, a moderate positive correlation exists between perceived usefulness and learning effectiveness ($r = 0.392$, $p < 0.01$), indicating that heightened perceived usefulness is associated with improved learning outcomes. The perceived ease of use has a substantial correlation with learning efficacy ($r = 0.344$, $p < 0.01$), however this relationship is considerably less than that of perceived usefulness. All correlations are statistically significant at the 0.01 level, indicating the strength of these connections. The results confirm H2, demonstrating that perceived utility and perceived ease of use are positively associated with students' learning efficiency.

H3: AI-driven personalized learning and automated feedback significantly improves students' academic achievement.

Table 7: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.642a	.412	.406	2.22145
a. Predictors: (Constant), Automated Feedback, AI-driven Personalized Learning				

As illustrated in the model summary, AI-driven personalized studying, automatic feedback, and AI-led personalized teaching relate strongly to the success that students achieve in their academic lives. The correlation coefficient ($R = 0.642$) shows that there is a significant interrelation between the independent variables and the variable which is the dependent one. According to the value of the coefficient of determination ($R^2 = 0.412$), personalized learning through AI and automated feedback explains approximately 41.2 percent of the change in the academic performance of students, which is a strong explanatory power of the model. The value of Adjusted R Square (.406) is relatively small, which indicates the model is quite stable and does not change significantly when any of the predictors are removed. The standard error of the prediction (2.22145) reveals that the appropriate level of predictive accuracy on the academic performance was achieved. These findings show that individualized learning and automated feedback created by AI contribute significantly to better academic achievements of students.

Table 8: ANOVAa

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	680.231	2	340.116	68.921	.000b
	Residual	972.164	197	4.935		
	Total	1652.395	199			
a. Dependent Variable: Academic Achievement						
b. Predictors: (Constant), Automated Feedback, AI-driven Personalized Learning						

The results of ANOVA indicate that the regression equation that examines the impact of AI-controlled customized learning and autonomic feedback on the academic results of learners is statistically significant. When the significance level is 0.000 ($p < 0.05$), it indicates that the value of F (68.921) is very significant, thus the overall relevance of the model. This implies that academic performance is significantly affected by the influence of numerous independent variables. The model explains a considerable amount of variance in academic achievement as the regression sum of squares (680.231) is lower than the residual sum of squares (972.164). The significance value of 0.05 is less than the zero value and the null hypothesis is rejected and the alternative hypothesis is accepted. It can therefore be inferred that personalized learning made possible by AI and computer-assisted feedback have a significant positive effect on the academic performance of students.

Table 9: Coefficientsa

Coefficientsa					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	2.140	.725		2.952	.004
	AI-driven Personalized Learning	.454	.062	.456	7.302	.000
	Automated Feedback	.357	.079	.281	4.498	.000
a. Dependent Variable: Academic Achievement						

The coefficients table demonstrates that AI-driven personalized learning and automated input substantially improve students' academic performance. The individualized AI-generated individual learning coefficient (B = 0.454) signifies that a one-unit increase in personalized learning would provide a 0.454 unit enhancement in academic performance, if all other variables are held constant. In this context, automated feedback (B = 0.357) also favorably influences academic advancement, but to a lesser degree. The standardised coefficients (Beta = 0.456 for personalised learning and Beta = 0.281 for automated feedback) demonstrate that the impact of AI-driven personalized learning surpasses that of AI-driven automated feedback. Moreover, the two variables have statistical significance, shown by their t-values (7.302 and 4.498, respectively) and p-values (0.000 < 0.05). The constant value (2.140) signifies the level of academic achievement when both predictors are zero. In conclusion, our findings demonstrate that both predictors substantially improve academic achievement, hence supporting the acceptance of the alternative hypothesis (H3).

8.Findings and Discussion

The results of the current study have high empirical basis in favor of the increasing role of Artificial Intelligence (AI) in the complementary role of Learning Management Systems (LMS) and the positive learning results of students (Bressane et al., 2024). H1 outcomes show that AI enabled LMS tools influence the learning outcomes of students (especially academic performance, engagement and retention) in a statistically significant positive way. The explanatory power of the model (R 2 = 0.148) is moderate but the significant relationship indicates that AI tools like intelligent tutoring systems, chatbots, and recommendation systems can play an important role in enhancing the learning process (Bressane et al., 2024). Such results are aligned with the recent findings that emphasize the idea that AI-infused LMS systems increase student engagement and improve their academic achievement by providing real-time feedback and adjusting learning processes (Qazi et al., 2024).

The findings also underscore the fact that AI-based LMS tools are not determinants of learning outcomes but facilitators of learning outcomes, implying that other elements, like student motivational levels, institutional support, and instructional design, are equally important. This is consistent with the study conducted by (Demartini et al. 2024), who concluded that although AI increases the efficiency of learning; its efficacy was determined by its application to pedagogical practices. As such, organizations should use a comprehensive strategy in adopting AI-based systems to ensure that they get the most out of them (Hemachandran et al., 2022).

As per H2, the study exhibits strong positive associations among perceived usefulness, perceived ease of use and learning effects. The correlation findings indicate that perceived usefulness is better related to learning effectiveness than perceived ease of use, indicating that students see the practical use of AI-based LMS as a priority over usability factors (Ouyang and Jiao, 2021). This result is consistent with the Technology Acceptance Model (TAM) that anticipated that perceived usefulness is a key factor in predicting technology use and success (Venkatesh et al., 2021). This observation can also be supported by recent study, which reveals that students are more inclined to use AI-enabled learning systems when they report a sense of physically noticeable positive change to their academic results and learning effectiveness (Raza et al., 2021).

Moreover, the finding that ease of use and the perceived ease of use are positively correlated with the effectiveness of learning implies that easy-to-use AI systems can increase student motivation and ease learning. The comparatively lower correlation coefficient; however, means that ease of use may not be enough to influence learning outcomes unless there are meaningful academic benefits. This conclusion supports the thesis that usability and functionality should be proportioned when creating AI-based LMS platforms (Kamalov et al., 2023).

The strongest evidence of the role of AI in education is associated with the findings connected with H3, which indicate that AI-based personalized learning and automated feedback has a strong effect on the academic performance of students (R 2= 0.412). The greater explanatory ability of this model suggests that individualization and feedback systems are essential elements of a successful AI-based learning environment (Ellikkal and Rajamohan, 2025). Specifically, AI-based individualized learning was found to be the most influential predictor, indicating that individualized learning trajectories based on the needs of particular students can help to boost academic performance significantly. These findings align with the recent studies that highlight the importance of individualized learning conditions as effective in motivating, engaging, and retaining knowledge in students (Amoako et al., 2024).

Moreover, automated feedback was discovered to influence the learning process in a positive way, emphasizing the need to receive feedback in time and properly (Saifullah et al., 2024). Intelligent feedback systems help students to recognize their errors and correct them during the process of learning, thus increasing academic performance. This result is in line with other studies that highlight the importance of immediate feedback in

enhancing the learning outcomes and self-regulated learning (Huang et al., 2021).
On the whole, the study will make a contribution to the body of literature by offering empirical data on how AI-based LMS tools, perceptions, and strategies based on a personal approach to learning can influence the outcomes among students. The results imply that general AI tools have a moderate effect on learning outcomes, whereas more advanced functions, like personalization and automatic feedback can affect learning outcomes much more strongly. This signifies that the use of the traditional LMS has been changed to intelligent, adaptive learning systems which are based on personalized learning experiences.
Significant practical implications in educational institutions are also brought out in the study. Institutions are encouraged to focus on the incorporation of AI-supported personalization and feedback functions in the LMS to improve academic performance (Janahi and Obeidat, 2025). Besides that, there is a need to enhance the perception of usefulness and the ease of use of the students by training and improving the design of the system. AI will keep developing and more institutions will need innovative and data-oriented solutions to learning, so institutions must consider the adoption of AI in education (Wang, 2025).

9.Conclusion

The current study has focused on understanding the use of Artificial Intelligence (AI) in Learning Management Systems (LMS) and its effect on student learning in higher education. The results strongly indicate that AI-based LMS tools can improve the academic achievements, interaction, and retention of knowledge of students, and thus confirm the hypothesis of the first scenario. Even though the explanatory power of AI tools is moderate only, their beneficial contribution to the learning outcomes is clear. In addition, the study affirms that the perception of students especially the perceived usefulness and perceived ease of use is very important in determining the effectiveness of learning. Perceived usefulness was found to be a stronger predictor among them, and it is essential to note that it is the functional benefits that matter, not the usability.
The study also confirms that the AI-based personalized learning and automated feedback influence academic success to a significant degree, and personalization is the strongest among all predictors. This shows that adaptive learning systems and prompt feedback systems are significant elements in effective AI-based learning systems. Overall, the study demonstrates that the incorporation of AI into the LMS platforms can not only enhance the quality of the learning process but also prompt the transition to student-centered, data-driven, and adaptive learning environments. The outcomes of this study show that the educational facilities should strategize to utilize and apply AI technologies to maximize student learning.

- **Implication of the Study**

The impacts of the present study are of great importance in the educational institutions, policy makers and in the developers of technology. The results highlight the importance of including the AI-driven features in LMS applications such as personalized education and automated feedback in enhancing student performance and engagement. Institutions can use such insights to establish better student-centered and adaptive online environments to meet the needs of diverse students. Furthermore, the study gives the significance of increasing the perceptions of usefulness and ease of use amongst students in regards to receiving proper training as well as system design to ensure that AI-based tools are well embraced. The findings will provide the policy makers with evidence to invest in AI-based educational technologies, and to the developers, provide them with a guideline in the creation of user-friendly and functionality-specific LMS platforms in accordance with learner expectations and learning requirements.

- **Limitation of the Study**

The study has its limitations which must be noted in spite of the contributions it has made. The study is localized geographically in the Delhi NCR area only and thus might limit the applicability of the study to other geographical areas or educational settings with varying technological infrastructures and learning environments. A purposive sampling method can also pose a sampling bias because respondents were picked due to their previous experience on the use of AI-enabled LMS platforms. The study is also founded on the self-reported data which can be biased in terms of response as well as not complete to represent the actual behavioral patterns. Another signifier that other factors that could have contributed to the results were not covered in the analysis is the medium explanatory ability of some of the models, which could be institutional support, teaching methods, and personal learning styles.

- **Future Research Direction**

Further future research can be achieved by incorporating more and diverse sample in different geographical and learning conditions to augment extraction of findings. The longitudinal study could be established to conduct the research on the impact of AI-powered LMS on learners and academic success on a long-term basis. Further research is also possible, as more variables can be examined, such as student motivation, digital literacy, and instructor support to get a more comprehensive view of AI implementation on the educational sphere. Comparison between traditional LMS and the AI-integrated LMS can help gain a better insight into the efficiency between them. Moreover, qualitative research can be deployed in the follow-up research to get better to understand the experiences and perceptions of the students which will give a more in-depth view of the part played by AI in the current education system.

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