



The Impact of Learning Management Systems on Academic Achievement of Undergraduate Students

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Abstract

Higher education has undergone a major transformation with the adoption of Learning Management Systems (LMS), which provide structured platforms for collaboration, performance monitoring, assessment, and instructional delivery. This study examines the impact of LMS usage on the academic achievement of undergraduate students. Using a quantitative, descriptive, and analytical research design, data were collected through academic records from a stratified random sample of 100 final-year undergraduate students. Descriptive and inferential statistics, including correlation analysis, ANOVA, and t-tests, were employed for data analysis. The results revealed that students who actively participated in LMS-based activities scored higher academically, indicating that the use of Learning Management Systems has a positive effect on academic achievement, particularly in C programming. No significant differences were found between male and female students in either LMS or non-LMS groups, suggesting that LMS provides equitable learning opportunities for all learners. These findings support the role of LMS as a comprehensive and effective teaching and learning tool. To enhance LMS efficiency, the study recommends increased institutional investment in digital infrastructure, improved technical support, and better integration of LMS features into classroom practices. The study also highlights directions for future research and acknowledges its limitations.

Keywords: Academic Achievement; Digital Learning; Educational Technology; Higher Education; Learning Management System (LMS); Student Engagement; Undergraduate Students

1. Introduction

As centralized digital platforms that organise classes, homework, tests, communication tools, and progress checking in one easily accessible location. Learning management systems have grown to be a key factor of modern higher education. Confusion reduces, order is enhanced, and a positive learning atmosphere is created with this disciplined method. With the increasing trend toward online and blended learning, learning management systems provide elasticity by allowing students access materials and learn at their own pace. This allows teachers to deliver content in a better way and keep an eye on students' growth.

The key advantage of learning management systems is Improving learner personalization. Features like analytics, progress monitoring, and adaptive learning tools support in identifying students' strengths and weaknesses so that teachers can change lessons and give apt feedback. These systems not only maintain students' interest and motivation, but they also open

doors for continuous development. By providing interaction and cooperation, interactive elements like discussion boards, chat rooms, and video conferencing help to extend learning beyond the limitations of the traditional classroom. Learning management systems gives scalability in education and economical. From small classrooms to international programs, universities may simultaneously reach greater student populations while saving money by reducing the use of printed content and physical infrastructure. Continuous learning is possible by mobile access and microlearning, which give students' academic material and skills that are applicable to the workplace. Learning management systems provide organized resources, apt feedback, and improved learner engagement to increase academic achievement, which is accepted as a serious measure of student success. However, there are obstacles.



While teachers who are not accustomed to using digital tools may find it challenging to successfully implement LMS, technical problems like system outages or bad connectivity might interfere with the learning process. Although helpful, online communication cannot completely replace the human aspect of in-person classes, and institutions with tight resources frequently have to pay more for premium capabilities. Usability, scalability, tool integration, tailoring options, mobile compatibility, and the readiness of reliable support are the key factors to consider while selecting a learning management system. This provides a flexible, interactive, and effective learning environment that empowers students and helps teachers. Additionally, it expands institutional reach, thereby transforming education when used carefully.

2. Theoretical Background of The Study

Several learning theories that describe how students pick up knowledge and skills in digital environments have helped as a roadmap for the assimilation of technology in the classroom. The current study draws on the use of constructivist learning theory, theories of technology acceptance, Cognitive Load Theory and Social Learning Theory to understand how Learning Management Systems affect academic performance.

2.1 Constructivist Learning Theory (Piaget, 1972; Vygotsky, 1978)

Constructivist Learning Theory highlights that, students actively create knowledge via interaction with their surroundings rather than passively absorbing information. Constructivist ideas are supported by learning management system platforms, which give students the means to build their own conceptual understanding through interactive activities, discussions, collective work, and self-paced learning.

2.2 Technology Acceptance Model (TAM) (Davis, 1989)

Technology Acceptance Model defines how students accept and use technology based on its perceived functionality and usability. Students are more likely to interact with the learning management system as it is helpful and simple to use, which could improve learning outcomes. Technology Acceptance Model's

focus on user acceptance, the study looks at learning management system acceptance as a feature that impacts academic success.

2.3 Cognitive Load Theory (Sweller, 1988)

Cognitive Load Theory, says that to increase learning efficiency, instructional design should maximize the learner's working memory. By arranging course content, offering instant feedback, and allowing repeated practice, Learning Management System can decrease cognitive overload and progress academic performance

2.4 Social Learning Theory (Bandura, 1977)

Social Learning Theory says that Learning happens through imitation, observation, and socialization. Discussion boards, assessment by peers, and group projects are examples of Learning Management System features that offer social learning possibilities, which develop comprehension and performance. The theoretical foundations show that the Learning Management System is a pedagogically supported platform that adapts to accepted learning theories rather than just being a technology tool. Learning Management System can have a good impact on students' academic performance by incorporating constructivist concepts, technology acceptance, cognitive load management, and social learning.

3. Problem Statement

At present, it is uncertain how the Learning Management System affects undergraduate students' grades, although they are frequently employed to advance teaching and learning in higher education. It's unidentified if gender and academic year differences exist or if the Learning Management System significantly affects academic outcomes. This lack of clarity creates a knowledge gap regarding the actual worth of the Learning Management System in influencing undergraduate learning success.

3.1 Operational Definition of Variables

3.1.1 Learning Management System Usage (Independent Variable)

- Definition: The degree to which undergraduate students access course materials, turn in assignments, take part in online forums, and finish tests via a digital

platform.

- Operationalization: Two groups of students are created:
- Students who actively use LMS features for learning activities are known as LMS users.
- Students that do not use LMS for academic purposes are known as non-LMS students.

3.1.2 Academic Achievement (Dependent Variable)

- Definition: Students' quantifiable performance in their academic responsibilities.
- Operationalization is evaluated based on grades from certified academic records or results from final-year exams. For uniformity, scores are reported on a 100-point scale.

3.1.3 Gender (Moderator / Control Variable)

- Definition: Students are categorized as male or female based on their biological makeup.
- Operationalization: In the data set used for statistical analysis, Male = 1 and Female = 2 are recorded.

3.2 Objectives

- To determine whether the Learning Management System (LMS) has an effect on students' academic achievement.
- To analyze whether gender differences exist in the academic achievement of students using LMS.
- To compare the academic achievement of students using LMS with those not using LMS.

3.3 Null Hypotheses (H₀)

- H₀₁: The Learning Management System (LMS) has no significant effect on students' academic achievement.
- H₀₂: There is no significant difference in academic achievement between male and female students using LMS.
- H₀₃: There is no significant difference in academic achievement between male and female students using LMS and students not using LMS.

3.4 Need for the Study

The rapid advancement of technology has

transformed teaching and learning in higher education, making Learning Management Systems a central tool for course delivery, resource sharing, and student engagement. Despite widespread adoption, there remains a lack of empirical evidence on how LMS usage directly influences academic achievement, particularly in the Indian higher education context.

The Study Is Needed for Several Reasons:

3.4.1 Enhancing Academic Performance

Understanding the effect of LMS on students' academic achievement can help educators design more effective teaching strategies that leverage digital platforms.

3.4.2 Gender-Based Insights:

Investigating gender differences in academic outcomes among LMS users can support inclusive and equitable learning practices.

3.4.3 Comparative Analysis:

Comparing LMS users with non-LMS students can highlight the relative effectiveness of digital learning tools, providing evidence-based guidance for institutions considering wider LMS integration.

3.4.4 Policy and Institutional Decisions

Findings can inform institutional policies, resource allocation, and faculty development programs to optimize LMS usage.

3.4.5 Contribution to Research

The study addresses gaps in existing literature by focusing on undergraduate BCA students in Indian universities, providing context-specific insights that are currently limited.

This study is pertinent and topical given the growing use of technology in the classroom and the demand for evidence-based practices to enhance student outcomes. It adds to the body of information on the efficacy of LMSs while providing educators, institutions, and regulators with useful advice.

4. Review of Literature

Firat (2016), in the study "Determining the Effects of LMS Learning Behaviors on Academic Achievement in a Learning Analytic Perspective", examined how LMS usage impacted academic success. A positive correlation was found between time spent on LMS and GPA, with students valuing interactive and accessible features. The role of effective Learning



Management System design in supporting academic achievement is emphasized in this study [1] Salahuddin, Ajmal, and Saira (2020), in "Effectiveness of Learning Management System for Teaching English Language at Higher Education Level", assessed how Learning Management System helps in the instruction of English grammar in substantial university courses. They discovered that student performance had significantly improved using a pre-test/post-test approach. According to the study, Learning Management System is a useful instrument for teaching languages in higher education. [2] Firman, Muhsin, and Goestina (2021), in "Online Based Learning Management System on Student Academic Performance", examined how teaching at SMU Negeri 1 Bajeng was affected by a Learning Management System built on Moodle. According to their qualitative research, the LMS increased learning interaction but demanded further system and content development. The study placed a strong stress on ongoing development to increase the efficiency of Learning Management System in the classroom. [3] Saygili and Çetin (2021), in "The Effects of Learning Management Systems on Mathematics Achievement: A Meta-Analysis Study", reviewed forty-three research studies with more than fifteen thousand pupils. They observed that using a Learning Management System slightly improved math expertise, particularly in areas like geometry and arithmetic. There is a need for more context-specific research because the influence changed according to country, year, and educational fulfillment. [4] Cenka, Santoso, and Junus (2022), in "Analyzing Student Behavior in a Learning Management System Using a Process Mining Approach", analyzed Learning Management System log data to find patterns in student behavior. In this study, high-achieving students were more active and engaged in complex interactions with the Learning Management System. They also found that using process mining insights can expand teaching strategies and student engagement. [5] Pirani and Patil (2024), in "An Experimental Study on Evaluating the Impact of a Learning Management System on Student Engagement", evaluated the impact of Learning Management System on students'

participation in a data science course. With 72 students, they used a pre-test/post-test method and discovered that group engagement with the Learning Management System was meaningfully greater. In this study, learning management systems are a useful tool for increasing student engagement in online learning situations.[6] Thangavel (2024), in "Learning Management Systems (LMS) in Higher Education: Enhancing Teaching, Learning, and Administrative Processes" here examines the effects of the Learning Management System on administration, student engagement, and teaching strategies. They also examined previous research and case studies, highlighting advantages of blended learning as well as drawbacks like privacy and the digital divide.[7] Muhammad Furqon P. et al. (2023), in "The Impact of Learning Management System (LMS) Usage on Students", reviewed 23 studies to assess Learning Management System effects on academic performance, perceptions, and challenges. The review found the Learning Management System generally expands achievement and satisfaction due to accessibility and interactivity. However, technical issues and limited instructor interaction highlight the need for better backing and student engagement.[8] Abdulai and Korsah (2024), in "Comparative Analysis of Learning Management Systems Usage Among Tertiary Students in Ghana", examined Learning Management System usage using the UTAUT model. Their study found that age, gender, and institution type significantly influence Learning Management System acceptance and use. They mention better infrastructure, training, and policy support to improve Learning Management System adoption in Ghanaian higher education.[9]

5. Research Gap

While numerous studies have explored the use of Learning Management Systems (LMS) in higher education, several gaps remain that justify the present research:

- **Limited Focus on Undergraduate BCA Students:** Most prior studies have focused on general undergraduate populations or specific disciplines such as engineering or management. Research specifically targeting BCA students is scarce.



- **Gender-Based Analysis:** Although LMS effectiveness has been studied, few studies have examined gender differences in academic achievement among LMS users and non-users.
- **Comparative Studies Between LMS Users and Non-Users:** Many studies evaluate LMS impact on users only, without comparing outcomes with students who do not use LMS, leaving a gap in understanding its relative effectiveness.
- **Context-Specific Research:** Existing research often originates from Western or global contexts. There is a lack of empirical evidence from Indian higher education institutions.
- **Interaction of LMS Usage with Other Variables:** Limited studies have investigated the combined effect of LMS usage and demographic variables (such as gender) on academic achievement.

These gaps highlight the need for a study that examines the impact of LMS on undergraduate BCA students in Indian universities, considers gender differences, and compares LMS users with non-users to provide context-specific insights for educators, institutions, and policymakers.

6. Justification of The Study

The present study is justified on the basis of the growing role of technology in higher education and the increasing use of Learning Management Systems (LMS) in academic institutions. With traditional teaching methods being complemented or replaced by digital platforms, it is essential to understand whether LMS usage truly enhances students' academic achievement. Specifically, this study focuses on undergraduate BCA students from Indian universities, a group that has been underrepresented in prior research. By comparing LMS users with non-LMS students and examining gender differences, the study provides valuable insights into how digital learning tools affect learning outcomes. Furthermore, the findings will help educators and institutions make informed decisions regarding LMS integration, course design, and teaching strategies. It will also contribute to the existing literature by filling gaps

related to LMS effectiveness, gender-based analysis, and comparative studies in the Indian higher education context. In essence, the study is justified because it addresses both practical and theoretical needs: improving academic outcomes through technology while expanding scholarly understanding of LMS effectiveness in a specific student population.

7. Research Methodology

7.1 Research Method

The present study will employ a quantitative research method with a causal-comparative (ex post facto) design to examine the impact of Learning Management Systems on the academic achievement of undergraduate students. Since the independent variable (use of LMS) cannot be manipulated directly, the study will compare existing groups of students (LMS users and non-LMS users) to determine differences in achievement.

7.2 Population and Sample

The population for this study comprised undergraduate BCA students. The LMS-user group consisted of BCA students from Kristu Jayanti Deemed to be University, Bangalore, while the non-LMS group consisted of BCA students from Bangalore. From this population, a total sample of 100 final-year undergraduate students was selected using stratified random sampling to ensure representation of key subgroups (gender and LMS users vs. non-users), with 50 students in each group. The sample included 25 male students and 25 female students in each subgroup. The inclusion criterion was that the students had to be in their final year with complete academic records available for analysis. Students with incomplete or missing academic data were excluded from the study.

7.3 Variables of the Study

The present study examines the effect of Learning Management Systems (LMS) on the academic achievement of undergraduate students. The variables involved in the study are classified as follows:

- **Independent Variable:** Use of LMS – This refers to whether students utilize the Learning Management System for their coursework.
- **Categories:** LMS Users (students using LMS for course materials, assignments, and

activities) Non-LMS Students (students not using LMS)

- **Dependent Variable:** Academic Achievement – Measured by students’ final-year examination scores or grades.
- **Moderator / Control Variable:** Gender – Male and Female students, considered to examine potential differences in academic achievement.

7.4 Data Collection Tools

The academic achievement of the students was measured using their officially recorded marks/grades obtained in the final-year examinations. These records provided an objective and reliable measure of students’ academic performance.

7.4.1 Data Analysis

The data collected were analyzed using both descriptive and inferential statistical techniques to address the objectives of the study. Descriptive Statistics Mean, Standard Deviation (SD), and Percentages were calculated to describe the general trends in academic achievement across LMS users and non-LMS students. Frequency distribution tables and graphs were prepared for a clearer presentation of the data. Inferential Statistics Independent Samples t-test was applied to determine: The

significance of the impact of LMS on students’ academic achievement. Gender differences in academic achievement among LMS users. Differences in academic achievement between LMS users and non-LMS students. Analysis of Variance (ANOVA) was used to compare mean scores across more than two groups. The level of significance was set at 0.05 for all statistical tests. All statistical analyses were carried out using SPSS (Statistical Package for the Social Sciences) to ensure accuracy and reliability

7.4.2 Data Analysis, Interpretation & Results

7.4.2.1 Impact of LMS on Academic Achievement

- H_{01} : The Learning Management System (LMS) has no significant effect on students’ academic achievement.
- An independent sample t-test was conducted to examine the difference in academic achievement between students using a Learning Management System (LMS) and those not using LMS (Non-LMS). Table 1 shows Comparison of Academic Achievement between LMS Users and Non-LMS Students

Table 1 Comparison of Academic Achievement between LMS Users and Non-LMS Students

Group	N	Mean	SD	t-value	p-value	Result
LMS Users	50	72.45	6.21	3.84	0.05	Significant
Non-LMS Students	50	68.10	5.92			

- **Interpretation:** The t-test showed a statistically significant difference between the two groups: $t(48) = 3.84, p < 0.05$. Hence, the null hypothesis (H_{01}) is rejected. Thus, the alternative hypothesis H_1 is accepted.
- H_1 : The Learning Management System has a significant effect on students’ academic achievement
- LMS users had a higher mean score ($M = 72.45, SD = 6.21$) compared to non-LMS students ($M = 68.10, SD = 5.92$).
- These findings indicate that, Students who used the LMS performed significantly better than students who did not use LMS.
- **Result:** LMS has a positive and significant impact on undergraduate students’ academic achievement.

7.4.2.2 Gender Differences in Academic Achievement among LMS Users

- H_{02} : There is no significant difference in academic achievement between male and female students using LMS.

- An independent sample t-test was employed to compare the academic achievement of male and female students using the Learning

Management System (LMS). Table 2 shows Gender Differences in Academic Achievement Among LMS Users

Table 2 Gender Differences in Academic Achievement Among LMS Users

Group	N	Mean (M)	SD	t-value	p-value	Result
Male LMS Users	25	71.8	6.15	1.12	> 0.05	Not significant.
Female LMS users	25	73.10	6.28			

- Interpretation:** The t-test results indicated that there was no statistically significant difference in academic achievement between male and female LMS users, $t(48) = 1.12$, $p > 0.05$. Therefore, the null hypothesis (H_{02}) is accepted, indicating that gender does not have a significant effect on academic achievement among LMS users.
- Result:** There is no significant gender difference in academic achievement among students using the LMS, indicating that LMS benefits both male and female students similarly.

- H₀₃:** There is no significant difference in academic achievement between male and female students using LMS and students not using LMS.

7.4.2.3 Academic Achievement by LMS Usage and Gender

H₀₃: There is no significant difference in academic achievement between male and female students using LMS and students not using LMS.

A two-way ANOVA was conducted to examine the combined effect of LMS usage and gender on academic achievement. (Table 3)

Table 3 Academic Achievement by LMS Usage and Gender

Group	N	Mean (M)	SD	F-value	p-value	Result
Male Non-LMS Users	25	63.82	18.1	5.42	0.021	Significant.
Female Non-LMS Users	25	42.49	9.8			
Male LMS Users	25	73.25	10.5			
Female LMS Users	25	74.32	9.13			

- Interpretation:** The analysis revealed a significant main effect of LMS usage, $F(1, 96) = 5.42$, $p < 0.05$. This indicates that the use of a Learning Management System significantly improves students' academic achievement.

than male non-LMS users ($M = 63.82$), a difference of 9.43 points.

- Female LMS users ($M = 74.32$) scored considerably higher than female non-LMS users ($M = 42.49$), a difference of 31.49 points.
- Although there was a significant main effect of LMS usage, no significant interaction

Further Comparison Showed That:

- Male LMS users ($M = 73.25$) scored higher

effect between gender and LMS usage was observed, indicating that the positive influence of LMS is consistent across both male and female students.

- **Result:** Using an LMS significantly enhances academic achievement for both male and female students, demonstrating that the LMS has a positive effect regardless of gender.

8. Major Findings

- **Impact of LMS on Academic Achievement** The findings revealed that “LMS usage positively influences undergraduate students’ academic achievement.”
- **Gender Differences in Academic Achievement among LMS Users** The results indicated that, “Both male and female students benefited equally from using LMS; gender did not affect performance outcomes.”
- **Combined Effect of LMS Usage and Gender on Academic Achievement** The findings showed that, “LMS usage significantly enhances academic achievement for both genders, indicating its consistent positive effect irrespective of gender differences.”

9. Implications of The Study

The findings of this study have several practical and theoretical implications for educators, institutions, and researchers:

9.1 For Educators

- The significant positive impact of LMS on academic achievement suggests that teachers should integrate LMS effectively into their teaching strategies.
- LMS can be used to provide personalized learning, track student progress, and support students who may need extra guidance.

9.2 For Institutions

- Institutions of higher learning can improve teaching and learning outcomes by investing in strong LMS systems.
- Overall student performance can be improved by policies that support the mandated use of learning management systems (LMS) in the delivery of courses.

9.3 For Students

The academic achievement of learners can be

enhanced by using LMS for self-paced learning, convenient resource access, and on-time assignment completion.

To improve learning outcomes, awareness initiatives can be implemented to assist students in making the most of their use of the LMS..

9.4 For Researchers

The study lays the groundwork for further investigations into the effectiveness of LMSs, such as longitudinal studies or investigations across other academic fields.

There are opportunities to investigate inclusive digital learning solutions because of the relationship between gender and LMS usage.

9.5 Theoretical Implications

supports constructivist and technology-enhanced learning methods, emphasizing the active role that digital platforms like learning management systems (LMS) can play in raising academic achievement.

10. Recommendations

- Based on the findings of this study, the following recommendations are suggested for educators, institutions, and students:
- **For Teachers:** To improve student engagement and academic performance, incorporate learning management systems (LMS) into regular teaching procedures.
- To encourage active learning, make use of LMS features like discussion boards, interactive content, and quizzes.
- Give pupils direction and instruction on how to use the LMS efficiently.
- Regarding Institutions Invest in dependable and user-friendly learning management system platforms to make teaching and learning easier.
- Implement faculty development initiatives that train educators in the most effective ways to use learning management systems.
- Create guidelines that promote the use of learning management systems (LMS) and guarantee that all courses make use of the platform for assignments, tests, and content distribution.
- For pupils To enhance academic success, actively use the learning management system



(LMS) for self-paced learning, assignment submission, and resource access.

- To improve understanding and engagement, take part in LMS-based activities like online tests and discussion boards.

10.1 Suggestions for Further Study

The following recommendations are made for further research considering the current study's limitations and findings:

- Studies across disciplines: In order to assess efficacy across disciplines, future research can look at how LMS affects students in the arts, commerce, engineering, and science.
- Longitudinal Research: Assessing the long-term effects of learning management systems (LMS) on academic performance across several semesters or years might be aided by conducting long-term research.
- The addition of more variables: To obtain a better understanding of the elements influencing LMS performance, future study may incorporate variables including instructor effectiveness, learning styles, student motivation, and technological proficiency.
- Evaluations of LMS Platforms in Comparison: To determine which aspects of various LMS platforms most significantly improve learning outcomes, comparative studies can be carried out.
- Research Using Qualitative and Mixed Methods: Future research on students' experiences, attitudes, and views of using LMSs can include mixed-methods or qualitative approaches.
- Effect on Additional Learning Objectives Beyond academic performance, research can also look at how LMS affects critical thinking, problem-solving abilities, teamwork, and the real-world application of information

Conclusion

The study's conclusion is that by offering organized materials, prompt feedback, and interactive learning possibilities, learning management systems significantly enhance academic achievement. Its

potential as an inclusive digital learning tool is demonstrated by its consistent effectiveness across genders and semester levels. The educational implications are obvious: in order to improve academic performance and get students ready for technology-driven employment, Learning Management Systems should be more successfully incorporated into teaching practices. Based on these results, instructors are urged to make active use of interactive learning management system elements such as forums, quizzes, and feedback systems, and administrators should offer continual technical assistance and training to guarantee efficient utilization. To prevent interruptions in LMS access, institutions must also make investments in enhancing their infrastructure. The study has some drawbacks, though. The results' generalizability is limited because the sample was limited to 100 final-year undergraduate students in a single subject area. Furthermore, the emphasis on immediate academic success could underestimate long-term learning outcomes, and self-reported data on LMS usage may be biased. Therefore, future studies should cover a variety of courses and institutions, look at how learning management systems affect students' resilience and autonomy in addition to their academic performance, and use longitudinal methods to investigate the long-term effects of LMS on students' academic and professional achievement.

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