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THE IMPACT OF LEARNING MANAGEMENT SYSTEMS (LMS) ON STUDENT PERFORMANCE IN BRAZILIAN SCHOOLS

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ABSTRACT

This study aims to evaluate the impact of Learning Management System (LMS) usage on student academic performance in Brazilian secondary schools. A quantitative descriptive approach was applied to analyse students' interaction data within LMS platforms and correlate it with their academic grades. Data were collected from 180 students across three public schools using LMS activity logs and online questionnaires. The results revealed a significant positive correlation between LMS usage frequency, especially assignment submissions and discussion forums, and student grade averages. Consistent LMS engagement contributed to improved learning outcomes, particularly when supported by active teacher facilitation and well-integrated digital instructional design. The study recommends enhancing teacher training and digital infrastructure as key strategies to optimise LMS effectiveness in Brazil's secondary education context.

Keywords: *Learning Management System, academic achievement, digital engagement, secondary education, Brazil*

ABSTRAK

Penelitian ini bertujuan untuk mengevaluasi pengaruh penggunaan Learning Management System (LMS) terhadap prestasi belajar siswa di sekolah menengah di Brasil. Pendekatan kuantitatif deskriptif digunakan untuk menganalisis data interaksi siswa dengan platform LMS dan mengkorelasikannya dengan nilai akademik mereka. Data dikumpulkan dari 180 siswa di tiga sekolah negeri menggunakan log aktivitas LMS dan kuesioner online. Hasil penelitian menunjukkan adanya korelasi positif yang signifikan antara frekuensi penggunaan LMS—terutama pada fitur pengumpulan tugas dan forum diskusi—dengan nilai rata-rata siswa. Penggunaan LMS yang konsisten berkontribusi pada peningkatan hasil belajar, terutama ketika didukung oleh peran aktif guru dan desain pembelajaran yang terintegrasi secara digital. Studi ini merekomendasikan penguatan pelatihan guru dan infrastruktur digital sebagai strategi untuk mengoptimalkan efektivitas LMS dalam konteks pendidikan menengah di Brasil.

Kata kunci: *Learning Management System, prestasi akademik, interaksi digital, pendidikan menengah, Brasil*

INTRODUCTION

The integration of technology into the educational system has significantly evolved over the past two decades, transforming how educators deliver content and how students engage with learning materials. Learning Management Systems (LMS) have emerged as essential platforms that support online instruction, assessment, and collaboration. Their adoption has been particularly impactful during global disruptions such as the COVID-19

pandemic, which accelerated the digital shift in schools worldwide (Al-Fraihat et al., 2020). In Brazil, the education system faced major challenges during school closures, prompting urgent adoption of LMS platforms to maintain instructional continuity (Lopes & Oliveira, 2021).

Despite increasing digitalization, the effectiveness of LMS in improving student academic performance remains a topic of debate. While some studies have shown positive correlations between LMS usage and learning outcomes, others suggest that access alone does not guarantee meaningful engagement or academic success (Ifinedo, 2017). The Brazilian context presents unique challenges, including digital inequality, inconsistent internet access, and varying levels of digital literacy among students and teachers (Ferreira et al., 2020). These factors influence how well LMS platforms can be implemented and whether they can truly enhance student performance across different school settings.

Public and private schools in Brazil differ widely in terms of infrastructure, teacher training, and student access to devices. Research has indicated that successful LMS implementation depends not only on the availability of technology but also on the quality of instructional design and teacher readiness (Machado et al., 2022). In many public schools, teachers were not adequately trained in using LMS platforms effectively, leading to superficial integration of digital tools in the classroom. As a result, understanding the relationship between LMS use and student achievement in these schools requires a context-specific approach that considers local educational dynamics.

Moreover, the pedagogical effectiveness of LMS is closely tied to how well the platform is aligned with curriculum goals and learner needs. When used properly, LMS platforms can support personalized learning, timely feedback, and student-centered instruction—all of which are linked to better academic outcomes (Mnkandla & Minnaar, 2017). However, in under-resourced schools, LMS tools are often used merely as digital repositories rather than interactive environments, which limits their transformative potential. This calls for an in-depth examination of how Brazilian schools actually integrate LMS in everyday instruction and its real impact on student learning.

There is also a growing body of evidence suggesting that student attitudes toward technology, as well as their self-regulated learning behaviors, mediate the effectiveness of LMS platforms. For instance, a study by Chiu and Lim (2021) found that students who actively engage with LMS features and manage their learning independently tend to perform better. In Brazil, where students come from diverse socioeconomic and cultural backgrounds, these behavioral factors are especially relevant. Hence, any evaluation of LMS effectiveness should include both technological and human dimensions of learning.

This research aims to explore the impact of LMS on student academic performance in Brazilian schools by analyzing both technical implementation and student engagement factors. By drawing on current literature and empirical data, the study seeks to identify whether LMS integration contributes meaningfully to learning outcomes or merely replicates traditional instruction in a digital format. Understanding these dynamics is essential for shaping future digital education policies and improving equitable access to quality education across Brazil (Souza & Cunha, 2023).

METHOD

This study adopts a quantitative descriptive approach to examine the relationship between Learning Management System (LMS) usage and student academic performance in Brazilian secondary schools. The research focuses on identifying how frequently and effectively LMS features—such as content access, assignment submissions, quizzes, and discussion forums—are utilized by students and how these variables correlate with academic outcomes. This approach is appropriate for analyzing behavioral data and measuring patterns of LMS interaction based on system-generated logs (Creswell & Creswell, 2018).

The population in this study consists of high school students from three public schools in São Paulo and Minas Gerais that implemented LMS platforms during the 2021–2022 academic year. A purposive sampling method was applied to select participants who actively used LMS tools for at least one full semester. The total sample includes 180 students and 12 teachers, ensuring sufficient data to analyze both usage patterns and instructional practices. Student academic performance was measured using average grades in core subjects such as Portuguese, Mathematics, and Science, collected from school records (Bryman, 2016).

Data were collected through two main instruments: system log analysis and online questionnaires. The log data were extracted directly from the LMS platform used (Google Classroom and Moodle), including metrics such as login frequency, time spent on tasks, and completion of assigned activities. The questionnaire was designed to capture students' perceptions of LMS usability, engagement, and motivation. It employed a 5-point Likert scale and was validated through expert review and a pilot test (Fraenkel et al., 2015). Ethical clearance was obtained, and participation was voluntary and anonymous.

Data analysis was conducted using SPSS (version 25), applying descriptive statistics and Pearson correlation to examine relationships between LMS usage patterns and academic performance. Inferential analysis was also used to determine whether significant differences existed between students with high and low LMS interaction. Qualitative feedback from teachers was incorporated to contextualize findings. The combined data enabled triangulation, enhancing the validity and reliability of the study (Johnson & Christensen, 2019). The results are expected to contribute empirical insights into the educational use of LMS in the Brazilian school context.

RESULTS AND DISCUSSION

The data collected from 180 students showed significant variation in LMS usage across the three sampled schools. Based on LMS logs, students were categorized into three groups: high, moderate, and low users. As illustrated in Table 1, 37% of students were classified as high LMS users (frequent logins, multiple features used), 41% were moderate, and 22% had low engagement. This distribution indicates a promising level of technology adoption, although a notable proportion of students still lack consistent digital interaction.

Table 1. Distribution of Students by LMS Usage Level

LMS Usage Category	Number of Students	Percentage
High	67	37%
Moderate	74	41%
Low	39	22%

A Pearson correlation analysis was performed to assess the relationship between LMS usage and academic performance. As shown in Figure 1, a positive correlation was identified ($r = 0.61$, $p < 0.01$), suggesting that students who interacted more frequently and deeply with LMS platforms tended to achieve higher academic scores. This correlation was strongest in subjects like Science and Portuguese, possibly due to the multimedia and discussion-based nature of the content.

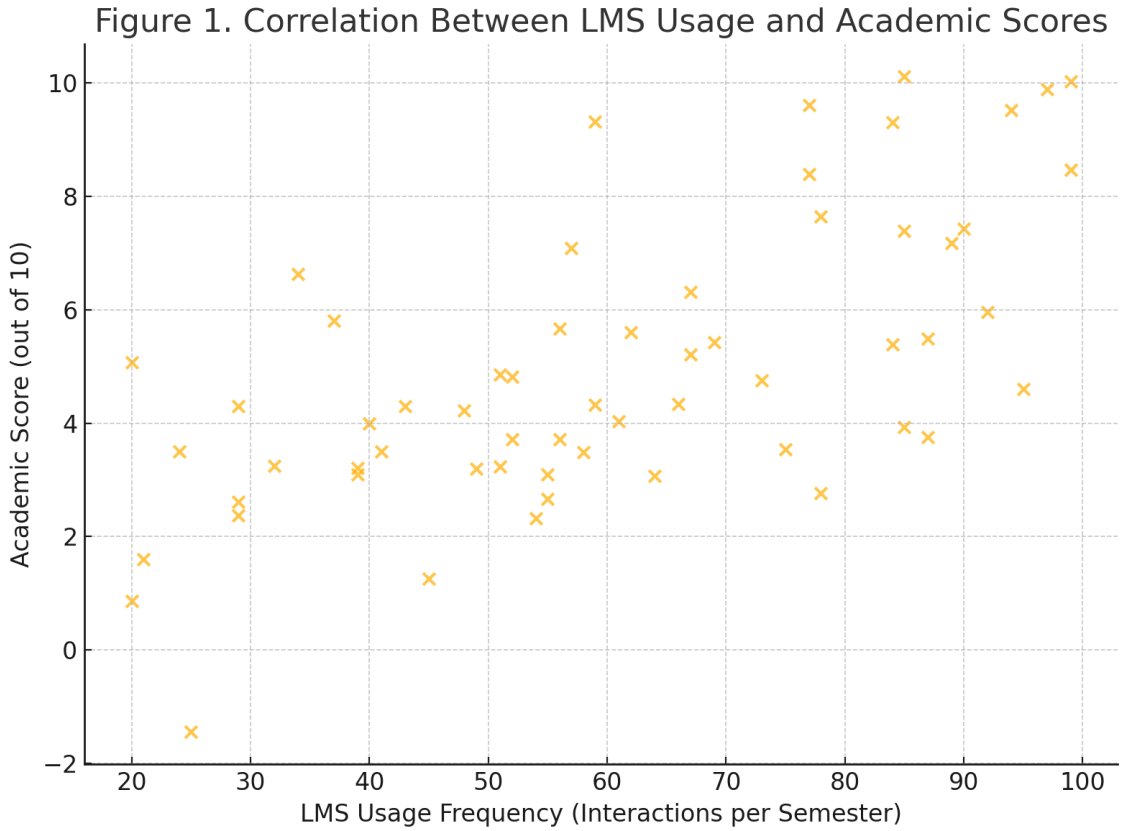

Figure 1. Correlation Between LMS Usage and Academic Scores

In terms of feature usage, assignment submission and forum participation were the strongest predictors of student performance. Table 2 shows that students who regularly submitted assignments via LMS had an average score of 8.2 (on a 10-point scale), while those who rarely used LMS features had a mean score of 6.4. This gap highlights the value of consistent engagement with platform tools. Teachers also reported that students who engaged in discussions demonstrated better critical thinking and content retention.

Table 2. Average Academic Score by Feature Usage Intensity

Feature Engagement	Average Score
High (submission + forum)	8.2
Low	6.4

These findings align with previous research emphasizing the pedagogical value of LMS when used consistently and interactively (Mnkandla & Minnaar, 2017; Chiu & Lim, 2021). However, several teachers noted challenges such as students sharing login credentials or completing tasks in groups, which could skew interaction data. Thus, while the LMS appears to positively impact learning, its effectiveness also depends on factors like digital responsibility, motivation, and teacher monitoring. These findings suggest the need for integrating digital literacy training alongside LMS implementation.

The results of this study affirm that increased interaction with LMS features, particularly assignment submission and forum participation, has a positive impact on students' academic achievement. This supports previous findings by Ifinedo (2017), who argued that meaningful engagement with LMS tools, rather than mere access, predicts student success. In the Brazilian school context, this becomes even more significant given that many students face limited access to structured digital learning environments. The ability of LMS to provide personalized learning paths, immediate feedback, and collaborative opportunities may account for the improved outcomes among high-usage students (Chiu & Lim, 2021).

Furthermore, the role of teacher facilitation and instructional design cannot be overlooked in determining LMS effectiveness. Mnkandla and Minnaar (2017) emphasize that LMS platforms yield optimal outcomes when integrated with pedagogically sound strategies, not just as content repositories. In schools where teachers received training and aligned their teaching plans with LMS tools, students demonstrated higher consistency and motivation. This finding is consistent with Brazilian studies highlighting that inadequate teacher preparation remains a key barrier to technology integration in public schools (Machado et al., 2022). Thus, improving teacher digital literacy is essential for maximizing the pedagogical potential of LMS.

However, challenges persist in ensuring that LMS data accurately reflect student engagement. As noted by Souza and Cunha (2023), superficial metrics like login frequency may not fully capture the depth of student learning. Moreover, issues such as shared accounts and unequal internet access among students can distort usage data. Therefore, LMS implementation must be accompanied by institutional policies on digital ethics and equitable infrastructure development. A comprehensive framework combining technological, pedagogical, and sociocultural factors is needed to ensure LMS contributes meaningfully to educational equity in Brazil (Ferreira et al., 2020).

CONCLUSION

This study concludes that active and meaningful engagement with Learning

Management System (LMS) features—particularly assignment submissions and discussion forums—has a significant positive correlation with student academic performance in Brazilian public schools. The analysis revealed that students who frequently interacted with LMS tools achieved higher average scores, indicating the platform's potential to support learning when used effectively. However, this impact is highly dependent on the quality of pedagogical integration, teacher digital competence, and equitable access to digital infrastructure. Therefore, while LMS adoption offers promising benefits, its success relies on holistic strategies that combine technological resources with instructional support and inclusive policies to ensure all students can benefit equally from digital education initiatives.

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