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Impact of the Learning Environment on the Academic Performance of Business Administration Students

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Abstract

A multiple linear regression model was developed with the aim of analyzing the impact of different dimensions of the learning environment on academic performance as perceived by university students. The sample consisted of 568 students from the Business Administration program at El Bosque University. The predictor variables included in the model were: learning strategies, technological challenges, effective technological platforms, and key competencies.The results showed that the model was statistically significant ($F(4, 563) = 256.317$, $p < .001$) and had high explanatory power, with a coefficient of determination of $R^2 = 0.646$, indicating that 64.6% of the variance in academic performance was explained by the learning environment variables. All predictor variables were statistically significant ($p < .001$).Among the factors analyzed, the effectiveness of technological platforms was the most influential predictor ($\beta = 0.425$), followed by learning strategies ($\beta = 0.387$), technological challenges ($\beta = 0.380$), and key competencies ($\beta = 0.366$). These results suggest that strengthening effective virtual environments, together with the development of digital skills and active learning strategies, contributes significantly to improving the perception of academic performance among university students.

Keywords: *Learning Environment, Academic Performance, Higher Education, Business Administration, University Students.*

Introduction

The influence of the educational environment on academic performance has been extensively studied from various perspectives, including physical, social, technological, and pedagogical factors. However, there are still gaps in research applied to specific contexts, such as business administration students at private universities, who face particular challenges related to academic workload, the incorporation of digital tools, and the transition to hybrid or virtual environments. Academic performance, also known as aptitude or school performance, is a complex concept whose differentiation is often semantic, since in teaching practice and educational texts, these terms are commonly used as synonyms (Edel Navarro, 2003). In this context, it is pertinent to analyze how the conditions of the learning environment influence the academic performance of these students, especially in the intermediate stages of their education.

Understanding this relationship is particularly relevant at a time when higher education institutions are seeking strategies that are increasingly student-centered and focused on active learning. Active teaching involves educators adopting methods that encourage student participation in the classroom, stimulating critical thinking and the practical application of knowledge (Bell Rodríguez et al., 2024). Identifying the environmental factors that most influence academic performance not only improves the educational experience, but also provides valuable input for pedagogical, curricular, and technological decision-making. Similarly, it contributes to the development of intervention models that are more closely aligned with the realities of the university population, particularly in areas of professional training with high performance requirements, such as administration.

Therefore, the objective of this study is to evaluate the relationship between the learning environment and the academic performance of fourth-semester students in the Business Administration program at a private university in Colombia. The aim is to identify which aspects of the environment—including teaching strategies, technological resources, challenges in the use of platforms, and digital skills—have the greatest

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impact on perceived performance, in order to propose recommendations that contribute to the continuous improvement of educational processes.

Framework Theory

The learning environment is a fundamental component of university students' academic education, as it directly influences their motivation, participation, performance, and well-being. In a context of educational transformation, this environment takes on a more complex dimension by incorporating digital technologies, active methodologies, and new forms of interaction between the actors involved in the educational process. This transformation process involves not only incorporating new technologies, but also rethinking pedagogical dynamics, the roles of teachers and students, and the physical and virtual spaces where learning takes place. As Cabero-Almenara and Llorente-Cejudo (2019) point out, the contemporary learning environment should be conceived as a flexible ecosystem, mediated by digital resources and geared toward developing skills for the knowledge society. In this sense, teachers are no longer merely transmitters of content, but facilitators of autonomous, collaborative, and meaningful learning.

In recent decades, education has undergone a holistic transformation encompassing social, cultural, and technological dimensions. This process of change has intensified the need to renew teaching practices and take advantage of the opportunities offered by emerging technologies to strengthen educational quality. Education systems are dynamic organizations whose mission is to respond to the training needs of the population. As these needs are variable, changes must be made to institutional strategies if they are to respond to the society they aim to serve (Córica, 2020).

These dimensions of the learning environment significantly influence the cognitive, affective, and social processes that determine students' academic performance. A supportive educational environment can enhance self-regulation, commitment to tasks, and perceptions of self-efficacy, while an environment perceived as negative or unstimulating can lead to demotivation, anxiety, and poor performance. Therefore, understanding the structure and interactions of the educational environment is key to designing more effective teaching strategies that are tailored to the needs of students. Various studies have pointed out that the educational environment encompasses not only physical and technological space, but also social, emotional, organizational, and pedagogical dimensions that make up the student's overall experience (Fraser, 2012; Roldán López, 2019). In this regard, the analysis of the learning environment has become increasingly important in higher education, particularly in contexts that demand quality, retention, and adaptation to new educational models, such as private universities.

These findings underscore the need to conceive of the learning environment as a comprehensive system where pedagogical, institutional, emotional, and technological factors converge. When these elements are aligned and focused on student well-being and development, not only is academic performance enhanced, but critical skills for independent learning, problem solving, and participation in professional contexts are also fostered. Consequently, the design and evaluation of the educational environment must be a strategic priority for higher education institutions committed to quality and equity. Educational research has shown that school performance is influenced by multiple factors, including the methodologies used by teachers, pedagogical resources, and the sociocultural context of students (Cleofe & Quispe, 2021).

Elements such as clear teaching expectations, institutional support, positive social interaction, and access to adequate technological resources can facilitate the development of cognitive and emotional skills that promote autonomous and sustained learning (Barros & Salazar, 2020).

For the present study, four key dimensions of the learning environment that significantly influence the student's academic experience are considered. The first is the academic environment, which encompasses aspects such as the quality of teaching, the organization of content, the level of demand, and the feedback provided by teachers (Fraser, 2012; Biggs & Tang, 2011). Secondly, the institutional environment refers to access to educational resources, administrative flexibility, and academic support available, which has been shown to have a positive impact on university student retention and performance (Tinto, 2012; Kuh et al., 2010). The third dimension is that of safety and order, linked to respect for rules, the perception of justice

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within the classroom, emotional well-being, and conflict prevention, factors that are essential for promoting inclusive and healthy educational environments (Moos & Trickett, 1974; Pianta, Hamre & Allen, 2012). Finally, the dimension of community and belonging relates to student participation, cooperation among peers, and a sense of identity with the university institution, elements that reinforce academic commitment and intrinsic motivation (Osterman, 2000; Deci & Ryan, 2000).

Understanding these dimensions allows us to analyze the educational environment from a systemic perspective, where each component contributes to the construction of more meaningful learning experiences. Several studies have shown that a well-structured academic environment, with active methodologies and formative assessment, is positively associated with higher levels of student motivation and performance. Similarly, when the institution offers ongoing support and accessible resources, student autonomy is strengthened and factors contributing to dropout rates and academic underachievement are reduced. Furthermore, safety and order within the classroom and on campus have a direct influence on students' emotional well-being. An environment perceived as fair, respectful, and free from violence or discrimination promotes concentration, participation, and psychosocial stability, which are essential conditions for deep learning. Furthermore, the socio-affective component takes on special relevance in higher education, where a sense of belonging and peer interaction contribute to the construction of collaborative learning communities.

In this sense, the learning environment should be understood as a relational and dynamic space, where institutional policies, pedagogical practices, physical structures, and human connections converge. Assessing their dimensions not only allows us to identify strengths and weaknesses in educational processes, but also to guide continuous improvement actions that directly impact the quality of higher education. Therefore, incorporating this comprehensive perspective into the analysis of academic performance is essential for designing strategies that promote successful and sustainable educational trajectories..

These dimensions have been addressed in various psychometric instruments, including the Classroom Environment Scale (CES) developed by Moos and Trickett (1974), which has been adapted to the university context in multiple studies. In this study, an adjusted version of the CES is used that incorporates variables relevant to business administration students in private higher education institutions, taking into account the particularities of the post-pandemic hybrid and digital environment.

The choice of this theoretical framework allows us not only to understand the overall impact of the environment on academic performance, but also to break down its components in order to identify more precisely which aspects of the educational environment deserve strengthening or intervention. In this way, it is hoped that this will contribute to the design of teaching and educational management strategies that respond to the real needs of students in training.

Methodology

Methodological Design

This study was conducted using a quantitative approach, with a non-experimental, cross-sectional, exploratory-descriptive, and correlational design. This type of approach allows relationships between variables to be analyzed without directly manipulating them, which is appropriate when seeking to describe phenomena and establish associations between them (Hernández-Sampieri et al., 2018). Likewise, cross-sectional design is useful for obtaining a snapshot of the phenomenon at a given moment, facilitating the identification of patterns or correlations in specific populations (Ato et al., 2013).

Participants

The sample consisted of 568 students from the Business Administration program at a private university. The selection was made using non-probability convenience sampling, ensuring anonymity, confidentiality,

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and voluntary participation of respondents. This population was chosen for its representativeness within the vocational training process and its exposure to virtual and hybrid learning environments.

Instrument

A structured questionnaire was used, consisting of closed Likert-type items and some open-ended questions aimed at identifying specific perceptions and experiences. The questionnaire was designed based on the adaptation of the Classroom Environment Scale (CES) to the context of private higher education, and included the following analytical categories. The use of Likert scales allows us to capture the intensity of students' attitudes and perceptions, while models such as the CES have been widely used and adapted to assess psychosocial dimensions of the educational environment (Moos & Trickett, 1974; Fraser, 2012).

The following analytical categories were included:

Learning strategies used, challenges in the use of digital technologies, technological platforms considered effective, perception of the impact of virtual education on academic performance, key digital skills for vocational training, perception of the impact of technology on educational equity, and skills that need to be improved to make better use of digital resources.

The responses were transformed into ordinal variables, allowing them to be statistically processed using JASP software.

Data Encoding

The open-ended questions were processed using content analysis, grouping them into predefined analytical categories. The coding was carried out as follows:

Learning_strategy: 1 = Use of platforms, 2 = Collaborative work, etc.

Technological_challenge: 1 = Lack of training, 2 = Connectivity issues, etc.

Performance_impact: Scale from 1 (Has decreased significantly) to 5 (Has improved significantly)

Key_skills: 1 = Collaborative tools, 2 = Information search, 3 = Data analysis

Equity_impact: 1 = Gap has increased, 2 = No change, 3 = Gap has decreased

Skills_to_improve: 1 = Time management, 2 = Technological skills, etc.

This process ensured consistency in the treatment of qualitative and quantitative data, enabling integrated analysis.

Data Analysis

Data processing and analysis were performed using JASP software, version XX. Descriptive statistics (frequencies, means, standard deviations) were initially applied to characterize each variable. Subsequently, nonparametric correlational analyses (Spearman) were performed to explore the associations between the dimensions of the learning environment and academic performance. Finally, a multiple linear regression model was used to identify the most relevant predictive factors affecting performance, evaluating the statistical significance of each predictor and the explanatory power of the model. The use of JASP allows for robust statistical analysis in an accessible way with integrated visualizations, facilitating the interpretation of data in educational research (Love et al., 2019). Likewise, multiple regression is a widely recommended technique for predicting the value of a dependent variable based on multiple predictors, maximizing the explanation of the phenomenon under study (Field, 2018).

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Results

Multiple Linear Regression Model

In order to analyze the impact of different dimensions of the learning environment on perceived academic performance, a multiple linear regression model was applied to a sample of 568 students in the Business Administration program. The dependent variable was Impact_performance (measured on an ordinal scale from 1 to 5), and the independent variables were:

Learning_strategy, technological_challenge, effective_platform, key_skills, equity_impact, skills_improvement.

Model Quality

The model's overall indicators suggest a high explanatory capacity:

$R = 0.803$

$R^2 = 0.646$

R^2 tight= 0.643

RMSE = 1.988

This indicates that the model explains 64.6% of the variance in perceived academic performance, representing a robust fit. Compared to the null model (RMSE = 3.327), the mean prediction error was significantly reduced.

Table 1. Summary Of The Multiple Linear Regression Model

1.	Stadistic	2.	Valor
3.	**R**	4.	0.803
5.	**R^2**	6.	0.646
7.	**R^2 tight**	8.	0.643
9.	**Standard error (RMSE)**	10.	1.988

Source: results from data in JASP 0.19.3.0

The multiple linear regression model has a multiple correlation coefficient (R) of 0.803, indicating a strong association between the predictor variables and academic performance. The coefficient of determination (R^2) is 0.646, which implies that approximately 64.6% of the variance in academic performance can be explained by the dimensions of the learning environment included in the model. This value remains stable after adjusting for the number of predictors, with an adjusted R^2 of 0.643, confirming the robustness of the model with no evidence of overfitting. The root mean square error of prediction (RMSE) is 1.988, suggesting moderate dispersion of the observed values with respect to the values predicted by the model. Taken together, these results support the relevance of the proposed model for identifying key factors in the learning environment that influence students' academic performance.

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Table 2. ANOVA of the Linear Regression Model

11.	Source	12.	SS (Sum of squares)	13.	gl	14.	MS (Mean square)	15.	F	16.	p
17.	Regression	18.	4050.646	19.	4	20.	1012.662	21.	256.317	22.	< .001
23.	Residual (Error)	24.	2224.311	25.	56	26.	3.951	27.	—	28.	—
29.	Total	30.	6274.958	31.	56	32.	—	33.	—	34.	—

Source: results from data in JASP 0.19.3.0

The analysis of variance (ANOVA) for the linear regression model indicates that the model is statistically significant. The sum of squares of the regression (SS = 4050.646) with 4 degrees of freedom (df = 4) reflects the variability explained by the independent variables. The corresponding mean square (MS = 1012.662) is considerably larger than that of the error (MS = 3.951), which translates into a high F statistic (F = 256.317). The associated significance value ($p < .001$) confirms that the model has robust predictive power and that, taken together, the independent variables included contribute significantly to explaining the variance in academic performance. The low proportion of residual variance (SS = 2224.311) compared to the total (total SS = 6274.958) further supports the adequacy of the model.

Global Significance (ANOVA)

The global significance of the model was confirmed by analysis of variance (ANOVA), showing that the proposed multiple linear regression is statistically significant. The statistic $F(4, 563) = 256.317$, with a p-value $< .001$, indicates that at least one of the independent variables included in the model contributes significantly to explaining the variations in academic performance. The sum of squares explained by the model was 4050.646, which represents a considerable proportion of the total variance (6274.958). Meanwhile, the sum of squares of error was 2224.311, suggesting that the model manages to explain a substantial part of the variability in the dependent variable, with a relatively low margin of error. These results reinforce the statistical validity of the proposed model and justify its use in identifying predictors of academic performance.

These results support the hypothesis that variables in the learning environment explain a substantial part of academic performance in university students.

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Table 3. Linear Regression Coefficients

35.	Variable	36. B (not classified)	37. Common error	38. β (classified)	39. t	40. p
41.	(Constant)	42. 6.893	43. 0.353	44. —	45. 19.523	46. < .001
47.	Learning_strategy	48. 0.895	49. 0.058	50. 0.387	51. 15.381	52. < .001
53.	Technological_challenge	54. 0.898	55. 0.060	56. 0.380	57. 15.076	58. < .001
59.	Effective_platform	60. 1.022	61. 0.061	62. 0.425	63. 16.852	64. < .001
65.	Key_skills	66. 0.865	67. 0.059	68. 0.366	69. 14.574	70. < .001

Source: results from data in JASP 0.19.3.0

The results of the multiple linear regression model, presented in Table 3, reveal that all independent variables included in the analysis have a positive, significant, and substantial effect on academic performance. The model constant is 6.893 ($p < .001$), indicating the estimated value of performance when all predictor variables are zero. Among the predictors, the Effective_platform variable shows the highest relative weight, with a standardized coefficient $\beta = 0.425$, followed by Learning_strategy ($\beta = 0.387$), Technological_challenge ($\beta = 0.380$), and Key_skills ($\beta = 0.366$), all with p-values $< .001$, confirming their statistical significance. These results suggest that perceptions of the effectiveness of the educational platform, the learning strategies adopted, the ability to cope with technological challenges, and the development of key competencies are important and complementary predictors of academic performance. The robustness of the unstandardized coefficients and their relatively low standard errors support the stability of the model.

Discussion

The results obtained in this study confirm that the learning environment has a significant impact on the academic performance perceived by business administration students at a private university. This finding coincides with previous research that has pointed to the influence of the educational climate, the availability of technological resources, and pedagogical strategies on academic outcomes in administrative training programs (Montoya & Vargas, 2021; Rodríguez, 2020). In particular, the Effective_platform variable showed the greatest explanatory weight in the model, supporting recent studies that highlight the role of interactive and functional virtual environments in improving student performance (Salinas & Pérez, 2022).

Likewise, the variables Learning_strategy, Technological_challenge, and Key_skills were also significantly associated with performance, suggesting that the academic experience is not limited to access to technology, but rather involves a set of skills, attitudes, and institutional conditions that mediate the effectiveness of the educational process. Compared to research applied to other areas of knowledge, this study provides contextualized evidence for the field of administration, in which the literature on learning environments has been less developed, especially in private institutions.

From an applied perspective, the findings have important implications for academic management in private universities. First, they highlight the need to strengthen technological platforms not only in terms of infrastructure, but also in terms of their pedagogical integration. Secondly, it is suggested that teacher training strategies be designed that focus on active methodologies, virtual classroom management, and personalized support. In addition, it is recommended that induction and digital skills reinforcement programs be developed for students, focused on overcoming technological challenges and effectively appropriating available resources.

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However, the study has some limitations. First, the information was collected through self-reporting, which may involve social desirability bias or subjective perception. Second, non-probability convenience sampling limits the generalizability of the results to other populations or institutional contexts. Nevertheless, the sample size (n = 568) and the statistical robustness of the model support the validity of the findings for the specific context analyzed.

Future studies could expand this line of research through longitudinal designs, multivariate models with mediators or moderators, or comparisons between public and private universities, in order to delve deeper into the factors that influence academic performance from a comprehensive perspective of the educational environment.

Conclusions

The results of this research allow us to conclude that the learning environment has a significant influence on the academic performance perceived by university students. In particular, factors such as the effectiveness of technological platforms, the learning strategies employed, overcoming digital challenges, and the development of key competencies are established as relevant predictors of academic performance in students enrolled in administrative programs.

This evidence highlights the urgent need to strengthen the positive components of the educational environment, especially in private higher education institutions, where infrastructure conditions, pedagogical support, and access to digital resources vary considerably. Investment in educational technologies must be accompanied by an institutional strategy that promotes active teaching practices, digital training for students, and the creation of environments that encourage participation, equity, and autonomous learning.

In analytical terms, the multiple linear regression model developed proved to be statistically robust, explaining 64.6% of the variance in academic performance. This finding not only validates the study's hypothesis, but also provides an empirical basis for guiding pedagogical, technological, and academic management decisions in university programs, particularly those focused on management training.

Finally, this research contributes to the field of higher education by offering a comprehensive and contextualized view of how the academic, institutional, and technological environment affects the learning experience. It is recommended that future studies address this issue from comparative, longitudinal, or mixed perspectives in order to broaden understanding of the determinants of academic performance and contribute to the continuous improvement of educational quality in the country.

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