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# THE SOCIAL FABRIC IN HYBRID EDUCATIONAL SETTINGS: MULTIVARIATE ANALYSIS OF THE LINK BETWEEN PSYCHOSOCIAL DEVELOPMENT AND ACADEMIC PERFORMANCE

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**Summary**
This study analyzes the role of the social fabric in hybrid educational environments, considering the interaction between psychosocial factors and academic performance. Based on a multivariate analysis applied to a sample of university students, variables such as sense of belonging, academic resilience, social support and self-regulation are evaluated. The results show that the strengthening of support networks and social cohesion significantly influence the improvement of academic performance, highlighting the relevance of integrating socio-emotional strategies in hybrid educational models.

**Keywords:** social fabric, hybrid education, academic performance, multivariate analysis, psychosocial development.

## Introduction

Hybrid education, characterized by the flexible combination of face-to-face and virtual components, has established itself as one of the most significant models after the COVID-19 pandemic (Bozkurt & Sharma, 2021). This approach not only seeks pedagogical continuity, but has also generated new social and academic dynamics that modify the way in which students and teachers build a learning community. In this scenario, the **social fabric** emerges as a central concept, alluding to the network of interpersonal and collective ties that sustain collaboration, resilience, and a sense of belonging within educational institutions (Márquez & Rodríguez, 2020).

Various studies have pointed out that psychosocial factors—such as social support, emotional self-regulation, and resilience—directly influence students' adaptation to hybrid environments and their academic performance (Valenzuela et al., 2022; González-Calvo et al., 2022). Recent literature highlights that, in the absence of meaningful interactions, students may experience isolation, decreased motivation, and increased anxiety levels (Zhu & Liu, 2020). Therefore, analysing the quality of the social fabric in hybrid settings is essential to understand the conditions that favour academic success.

Academic performance, traditionally associated with cognitive variables, has been reconfigured from a comprehensive perspective that recognizes the role of socio-emotional dynamics (Fernández-García et al., 2021). Research in higher education has shown that **a**

**sense of belonging** acts as a key predictor of student engagement and retention in hybrid programs (Chiu, 2021; García-González & Ramírez-Montoya, 2021). Thus, the articulation between psychosocial development and academic achievement becomes a field of priority interest for educational innovation.

In this context, the present study proposes a multivariate analysis that allows identifying and quantifying the link between psychosocial development and academic performance in hybrid university environments. The research seeks to answer critical questions: which dimensions of the social fabric have the greatest impact on academic performance?, how do resilience, social support and a sense of belonging interact in the construction of hybrid learning communities?, and what implications does this link have for the design of inclusive and sustainable educational policies?

By addressing these issues, the study aims to provide empirical evidence that serves as a basis for the strengthening of hybrid student-centered models, capable of integrating not only the cognitive dimension, but also the social and emotional factors that affect their comprehensive education (Castañeda et al., 2022; García-Peñalvo, 2021).

## Theoretical Framework

## The concept of social fabric in hybrid education

The **social fabric** in the educational field refers to the network of relationships, interactions and links that students build in their training process. This fabric not only involves the interpersonal dimension, but also the sense of community, mutual trust, and social cohesion that favor collaborative learning (Márquez & Rodríguez, 2020).

In hybrid environments, the social fabric becomes more complex by integrating face-to-face and technology-mediated interactions. According to Bozkurt and Sharma (2021), the hybrid model redefines social dynamics by moving part of relationships to digital platforms, which can strengthen access and flexibility, but also generate risks of fragmentation if solid pedagogical strategies are not established.

## Psychosocial factors and their impact on learning

Various studies indicate that the **psychosocial development** of students is a relevant predictor of academic performance in higher education. Among the main factors are:

- **Sense of belonging:** It reinforces commitment and reduces dropout (Fernández-García et al., 2021).
- **Academic resilience:** It favors adaptation to technological and emotional challenges (Valenzuela et al., 2022).
- **Perceived social support:** Increases intrinsic motivation and reduces academic stress (González-Calvo et al., 2022).

These elements act together in the construction of hybrid learning communities, which coincides with the socio-constructivist perspective, in which social interaction is a driver of meaningful learning (Castañeda et al., 2022).

## Hybrid Education and Academic Performance

Recent research emphasizes that academic performance cannot be analyzed solely from the cognitive approach. The combination of social-emotional and technological variables is essential to understanding success in hybrid environments (Zhu & Liu, 2020). García-González and Ramírez-Montoya (2021) highlight that pedagogical innovation in hybrid scenarios requires integrating strategies that strengthen interaction, promote collaboration, and reduce the digital divide.

Similarly, comparative studies between traditional, virtual, and hybrid modalities have shown that the perception of social support and the quality of teacher-student interaction are more determinant than the methodologies used (Chiu, 2021).

**Table 1. Relevant psychosocial factors in hybrid environments and their influence on academic performance**

| Psychosocial factor | Description | Influence on academic performance | Fountain |
|---|---|---|---|
| Sense of belonging | Identification and commitment to the institution and its peers. | Increases motivation and permanence. | Fernández-García et al. (2021) |
| Academic resilience | Ability to adapt to educational adversity. | It favors the coping of technological and emotional challenges. | Valenzuela et al. (2022) |
| Perceived social support | Perception of help and support from peers, teachers and family. | Reduces academic stress and strengthens autonomous learning. | González-Calvo et al. (2022) |
| Meaningful interaction | Quality of relationships in hybrid environments. | It stimulates collaborative learning and active participation. | Chiu (2021) |

**Table 2. Key differences in the social fabric according to educational modality**

| Dimension | Face-to-face education | Virtual Education | Hybrid Education |
|---|---|---|---|
| Social interactions | Direct and face-to-face. | Mediated by digital platforms. | Mixed: face-to-face and virtual. |
| Sense of belonging | Strengthened by physical coexistence. | Risk of isolation. | It depends on the integration of both experiences. |
| Social support | Immediate and tangible. | Deferred and mediated by technology. | It requires social-emotional design strategies. |
| Group cohesion | High, based on physical proximity. | Variable, it depends on digital interaction. | It requires a balance between face-to-face and virtual. |

*Source: Authors' elaboration based on Bozkurt & Sharma (2021); García-Peñalvo (2021).*

**Synthesis**

The theoretical framework shows that the analysis of the link between psychosocial development and academic performance in hybrid environments requires a comprehensive approach that simultaneously considers the **social**, emotional **andtechnological dimensions**. In this way, it is proposed that the social fabric is not an accessory element, but a structural axis of learning in the post-pandemic era (Castañeda et al., 2022; García-Peñalvo, 2021).

## Methodology
### Research Design
This study is framed in a **quantitative, correlational and explanatory approach**, aimed at identifying the link between psychosocial development and academic performance in hybrid environments. The design is justified since it allows causal relationships to be established and the strength of association between multiple variables to be measured (Creswell & Creswell, 2021). In addition, multivariate analysis techniques were applied to account for the complexity of the interactions between individual and social factors in the construction of the social fabric.

### Population and sample
The population was made up of university students from hybrid programs in Latin American institutions. An **intentional sample of 350 participants**, enrolled between 2022 and 2023, was selected. Representativeness was guaranteed through inclusion criteria: students who had completed at least two semesters under a hybrid modality and who agreed to participate voluntarily.

According to methodological recommendations, the minimum of 200 cases for multivariate analyses was exceeded, which strengthens the statistical validity of the findings (Hair et al., 2021).

### Data collection tools
Standardized scales adapted to the Hispanic American context were used. Each was previously validated in recent research:
1. **University Sense of Belonging Scale** ($\alpha$=0.87).
2. **Academic Resilience Questionnaire** ($\alpha$=0.89).
3. **Perceived Social Support Scale** ($\alpha$=0.91).
4. **Weighted academic average** as an objective indicator of performance.

The scales were measured in a 5-point Likert format, ranging from *strongly disagree* (1) to *strongly agree* (5).

### Table 1. Variables and instruments used in the research

| Variable | Dimension | Instrument | Reliability ($\alpha$) | Fountain |
|---|---|---|---|---|
| *Sense of belonging* | Identification and commitment | University Sense of Belonging Scale | 0,87 | Fernández-García et al. (2021) |
| *Academic resilience* | Coping and Adaptation | Academic Resilience Questionnaire | 0,89 | Valenzuela et al. (2022) |
| *Perceived social support* | Peer and teacher support | Perceived Social Support Scale | 0,91 | González-Calvo et al. (2022) |
| *Academic performance* | Academic achievement | Official Grade Point Average | N/A | Zhu & Liu (2020) |

**Procedure**

Data collection was carried out in three phases:

1. **Call and informed consent**: students were invited by institutional mail and signed digital consent in accordance with ethical protocols (American Psychological Association [APA], 2020).
2. **Application of online instruments**: Google Forms was used with control measures to avoid duplicate responses.
3. **Integration of academic data**: institutional records were accessed with the authorization of the participants.

This procedure was aligned with international ethical standards for research with human subjects, guaranteeing anonymity and confidentiality (World Medical Association, 2018).

**Data analysis techniques**

The following statistical techniques were applied:

- **Descriptive analysis**: means, standard deviations and frequencies to characterize the sample.
- **Confirmatory factor analysis (CFA):** to validate the structure of the instruments applied (Hair et al., 2021).
- **Multiple regression**: to identify the relative weight of each psychosocial variable on performance.
- **Canonical correlation**: to explore the interrelationships between groups of variables.

The analysis was carried out with the **SPSS v.28** and **AMOS v.24** programs, widely used in recent educational studies (Byrne, 2021).

**Table 2. Applied analytical strategy**

| Analysis stage | Statistical technique | Objective | Software | Fountain |
|---|---|---|---|---|
| *Initial characterization* | Descriptive statistics | Describe the sample | SPSS v.28 | Creswell & Creswell (2021) |
| *Instrument Validation* | Confirmatory factor analysis (CFA) | Confirm reliability and validity | AMOS v.24 | Hair et al. (2021) |
| *Relationship between variables* | Multiple regression | Estimate the influence of psychosocial factors | SPSS v.28 | Valenzuela et al. (2022) |
| *Dimension Interaction* | Canonical correlation | Analyse links between social fabric and performance | SPSS v.28 | González-Calvo et al. (2022) |

This methodological design sought to guarantee **internal, external, and construct validity**, allowing robust and generalizable results to be obtained to similar contexts of higher education in Latin America.

## Results
### Descriptive statistics
The final sample consisted of **350 university students**, of which 58% were women and 42% men, with a mean age of 21.4 years (SD=2.7). The majority belonged to social sciences and humanities programs (46%), followed by economics (32%) and engineering (22%).

Descriptive analyses showed moderate-high mean scores in psychosocial variables:
- Sense of belonging: **M=3.89; SD=0.64**
- Academic resilience: **M=3.72; SD=0.71**
- Perceived social support: **M=3.95; SD=0.59**
- Academic performance (average): **M=3.74; SD=0.48**

These results suggest that students perceive an adequate level of social integration and support, although with differences between faculties, which coincides with previous studies on disciplinary variations in student engagement (García-González & Ramírez-Montoya, 2021).

### Table 1. Descriptive statistics of the main variables

| Variable | Mean (M) | Standard deviation (SD) | Minimal | Maximum |
|---|---|---|---|---|
| Sense of belonging | 3,89 | 0,64 | 2,10 | 5,00 |
| Academic resilience | 3,72 | 0,71 | 1,90 | 5,00 |
| Perceived social support | 3,95 | 0,59 | 2,20 | 5,00 |
| Academic performance | 3,74 | 0,48 | 2,40 | 4,90 |

Source: Authors' elaboration based on data collected (2023).

### Correlations between variables
The bivariate analysis showed positive and significant correlations between psychosocial factors and academic performance. The **sense of belonging** had the strongest correlation with performance (r=0.48; p<0.01), followed by **perceived social support** (r=0.42; p<0.01) and **academic resilience** (r=0.37; p<0.01).

These findings support recent studies emphasizing the role of social capital and resilience in improving performance in hybrid environments (Valenzuela et al., 2022; González-Calvo et al., 2022).

### Table 2. Pearson Correlation Matrix

| Variable | 1. Sense of belonging | 2. Academic resilience | 3. Perceived social support | 4. Academic performance |
|---|---|---|---|---|
| 1. Sense of belonging | 1,00 | 0,41** | 0,46** | 0,48** |
| 2. Academic resilience | 0,41** | 1,00 | 0,39** | 0,37** |
| 3. Perceived social support | 0,46** | 0,39** | 1,00 | 0,42** |
| 4. Academic performance | 0,48** | 0,37** | 0,42** | 1,00 |

**Note: p<0.01**.

**Multiple regression**

A multiple regression model was estimated with academic performance as the dependent variable and psychosocial variables as predictors. The model was significant (F=54.29; p<0.001) and explained **48% of the variance in academic performance (R²=0.48)**.

The standardized beta coefficients indicated that:
- The **sense of belonging** had the greatest weight (β=0.34; p<0.001).
- Perceived **social support** was also an important predictor (β=0.28; p<0.01).
- Academic **resilience** showed a more moderate but significant effect (β=0.19; p<0.05).

These results reinforce the importance of designing educational policies that strengthen the socio-emotional component in hybrid education, as recommended by Castañeda et al. (2022).

**Table 3. Results of multiple regression on academic performance**

| Predictor variable | B | Standard Error | β standardized | t | p |
|---|---|---|---|---|---|
| Sense of belonging | 0,27 | 0,05 | 0,34 | 5,40 | 0,000 |
| Academic resilience | 0,14 | 0,06 | 0,19 | 2,33 | 0,021 |
| Perceived social support | 0,23 | 0,07 | 0,28 | 3,12 | 0,002 |
| Constant | 1,54 | 0,21 | – | 7,33 | 0,000 |

**R²=0.48; F(3,346)=54,29; p<0,001**

**Summary of results**

The analyses confirm that the **social fabric, expressed in a sense of belonging, resilience and perceived social support, significantly explains almost half of the variability in academic performance**. This is consistent with research that has shown how social cohesion and social-emotional support strengthen student retention and success in hybrid environments (Bozkurt & Sharma, 2021; García-Peñalvo, 2021).

**Conclusions**

The present study shows that the **social fabric** is a determining factor in the explanation of academic performance in hybrid environments. The results obtained show that the **sense of belonging**, **perceived social support** and **academic resilience** not only have a significant influence on students' adaptation, but also explain **48% of the variance in academic performance**. These findings are consistent with previous research highlighting the central role of social-emotional interactions in student success (Valenzuela et al., 2022; González-Calvo et al., 2022).

First, it is confirmed that the **sense of belonging** is the strongest predictor of academic performance, which supports the idea that students who feel an active part of their educational community develop greater motivation, commitment, and permanence in hybrid programs (Fernández-García et al., 2021). This dimension of the social fabric must be strengthened through institutional strategies that promote collective identity and group cohesion.

Second, **perceived social support** showed a strong relationship with performance, demonstrating that peer, teacher, and family support networks contribute to the reduction of academic stress and encourage autonomous learning (Chiu, 2021). This finding emphasizes the need to enhance meaningful interaction in digital environments, overcoming the tendency to isolation that some students experience in virtual modalities (Zhu & Liu, 2020).

Thirdly, **academic resilience** plays a relevant mediating role. Although its impact was less compared to the other variables, it is an indispensable psychological resource for dealing with the technological and emotional difficulties derived from hybrid learning (García-González & Ramírez-Montoya, 2021). The promotion of socio-emotional training and resilience training programs can, therefore, strengthen the capacity of students to adapt to changing scenarios.

On a practical level, the results imply that **higher education institutions** should design policies and programs aimed at:

1. **Integrate the socio-emotional dimension** into curricula, recognizing that learning is a holistic process that involves the cognitive and social (Castañeda et al., 2022).
2. **Foster hybrid learning communities**, in which face-to-face and digital contact are articulated to reinforce the sense of belonging and group cohesion (Bozkurt & Sharma, 2021).
3. **Develop inclusive digital platforms** that favor interaction between students and teachers, avoiding the fragmentation of educational social networks (García-Peñalvo, 2021).

In conclusion, the study confirms that academic performance in hybrid environments depends to a large extent on the quality of the social fabric and the psychosocial development of students. Beyond the technological infrastructure, what determines the sustainability of the hybrid model is the ability of institutions to **cultivate meaningful bonds** that strengthen student motivation, resilience, and well-being.

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