STUDENT PERSPECTIVE OF LEARNING IN RESEARCH COURSES IN LAW UNDER THE FLIPPED CLASSROOM MODALITY

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ABSTRACT

Objective: The purpose was to determine the factors that best describe the use of learning strategies of Peruvian law students who took research courses using the Flipped Classroom approach.

Method: A Questionnaire (LSQ-U α = 0.88) was administered to 160 subjects, consisting of 57 items scored on an ordinal scale; grouped into three macro dimensions with an acceptable reliability: Motivational Strategies (α = 0.82), Cognitive Strategies (α = 0.73) and Metacognitive Strategies (α = 0.81). An Exploratory Factor Analysis [Bartlett (Χ² p: <0.01) and KMO (0.836)] was performed.

Results: Two factors emerged. Factor 1 - Self-Regulated Learning (%σ²: 56.889), reflects the use applicability and self-reinforcement, together with organization, generative elaboration, and anchoring elaboration. Metacognitively, they make use of planning and revision. Factor 2 - Motivational (%σ²: 17.270), privileges positive association, gradual approach, and applicability.

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Conclusion: The Flipped Classroom defines a profile that moves away from memorization, it enhances learning and stimulates the use of metacognition, thus revealing its benefits. The results show that FC is also an appropriate didactic option for virtual classes in the context of pandemic and post-pandemic, whose greatest need is related to a teaching profile and the management of technical computer skills.

Practical Implications: The information obtained from this work can be considered in the design and planning of systematic teaching and learning strategies that focus on students' attention, to support them in their search for better performance and academic success as indicators of the quality of the university system.

Keywords: learning strategies, flipped classroom, learning in university students.
1 INTRODUCTION

In recent years, the Peruvian state has established policies aimed at reviewing the quality processes in their universities defining clear indicators within the framework of evaluations aimed at the licensing and accreditation of these institutions (SUNEDU, 2015). A systematic review of teaching-learning processes and graduate quality has been initiated based on these factors which are often overlapped behind the traditional importance given to academic performance expressed as a quantitative grade referenced to a scale, although in some cases it may be accompanied by a qualitative assessment (Touron, 1984), which should reflect the learning envisage in the pre-established objectives.

At the National University of Tumbes (UNTUMBES), the analysis of the academic and didactic processes is a task that is rarely undertaken, given the formative and technological nature of the institution. A priori, there is evidence of the characteristics of a traditional institution based on the objective principles of encyclopedic education which privileges the master class in all its faculties, which does not seem to be in line with the quality requirements indicated by SUNEDU (2015) and with the advances in pedagogical sciences, as well as with the different hybrid work methodologies (Burke & Fedorek, 2017; Divjak et al., 2022).

On the other hand, university education has undergone changes since 2014 because of the implementation of the University Law (Congress of Peru, 2014). One of the aspects to highlight was the requirement to draft a thesis to graduate. This requirement imposed new demands on teachers, who generally did not graduate with a dissertation, and on students also, breaking with the tradition centered on schooling. Nine years after this event, it is the case that in most faculties there is a marked contrast between the number of students who have completed all their schooling (graduates) and those who have not submitted a thesis for their degree. The difference is negative and has fluctuated between 70% and 90% in the last decade. The percentage of graduates is an indicator of the quality of universities (SUNEDU, 2015). Therefore, attention has gradually been paid to this situation in which few students aspire to graduate or have low success rates when they try.

The School of Law of the Faculty of Legal Sciences and Political Science of UNTUMBES presented one of the lowest graduation rates (>90%), but this has changed in the last four years. The institution has designed and implemented degree courses, as an
alternative of technical and academic attention managed under the FC modality, based on e-learning format, oriented to support the student in the process of elaborating a dissertation. These courses include virtual sessions of theoretical-practical activities, along with autonomous work, led by teachers with research expertise, backed by published academic works, who can conduct diagnostics of the students' learning strategies at the end of each course.

It should be noted that the indicators of thesis completion have increased significantly, from 5 graduates in 2018 to 160 in the second quarter of 2023, as shown in the institutional thesis repository. Therefore, the university needs to know how students learn to try to transfer the experience to other departments. This effort reflects the results of this evaluation over three and a half years, showing the factors that best predict the dimensionality of learning strategies used by Law students under the FC modality, which constitutes an input for teaching and learning practices.

2 THEORETICAL FRAMEWORK

There are studies on the exploration of learning strategies (LS) within the framework of quality assurance at the university level, a topic that gained momentum since the 1990s (Curione et al., 2017; De Miguel Díaz & Arias Blanco, 1999; Huertas & Curione, 2016), and explored both in distance education (Blumen; et al., 2011), as well as with students in university on-line education modality (Roys Rubio & Pérez García, 2018), and also in different areas of knowledge such as Health Sciences (Borracci, 2020; Borracci et al., 2008); Basic and Natural Sciences (Brand Rojas et al., 2019), and Engineering Sciences (Lee & Sidhu, 2015), which findings show that despite the different experiences, there is still no standardized profile of their use; however, the strategies are constituted as an initial exploratory or synchronic reference from which other variables can emerge.

The LS used by university students have been the subject of studies aimed at identifying factors that may improve academic performance (Alvarado Guerrero et al., 2014; Bahamón Muñetón et al., 2013; Martín Cabrera & García; Hernández, 1999), reporting results which are not always consistent (Alvarado Guerrero et al., 2019; Martín et al., 2008). They have also been examined when analyzing dropout rates (Norieiga Biggio et al., 2015) and the satisfaction of students (Tacca Huamán et al., 2019); as well as with self-efficacy in the study process. (Casiraghi et al., 2020; Mohallem Martins &
Angeli Dos Santos, 2019). The topic has also been addressed in relation to learning styles (Almigbal, 2015; Blumen et al., 2011; Borracci, 2020; Borracci et al., 2008), with convergences and divergences registered in the results.

In terms of measurement scales, there is also no uniformity of methods (Adrogué et al., 2021), on the contrary, there is a wide range of scales for their measurement. For Martín et al. (2008), the influence of LS on subject performance challenges the long-held assumption that students have all the skills and abilities to succeed in their studies (Martín et al., 2008). It also challenges the assumption that student success is only the result of effort (Castelló Badia & Monereo I Font, 1999; Monereo I Font & Castelló Badia, 1997).

The different methodologies used have allowed us to outline some attempts at successful profiles. Martín et al. (2008) and Boza & Toscano (2012) have reported that those students who use cognitive and metacognitive LS are facilitated to achieve meaningful learning (Boza Carreño & Toscano Cruz, 2012; Martín et al., 2008). García et al. (2016) privilege the strategies integrated in the processes of self-regulation of learning as driving elements of success. Other authors highlight in their explanations the influence of the intrinsic motivational components of the subject (Feiz et al., 2013; García Aretio, 2019; Pintrich, 2004), where the subject has high self-confidence and a high self-concept (Wolters, 2003, 2004; Wolters; Hussain, 2015).

It is also considered that there are contextual variables that may limit the performance of the university, independently or together with the strategies used by the students (Herrera-Núñez et al., 2019; Soares et al., 2011). From a more complex perspective, some research, apart from the influence of strategies and motivational aspects, gives importance to the organizational characteristics of the institution (Garbanzo Vargas, 2007), the didactic processes and the types of evaluation used by teachers (Islas & Gamiño, 2012) as determinants of success.

The literature review shows that FC is a didactic option with a good inventory of benefits in the context of the pandemic, but also challenges for university education (Listiqowati et al. 2022), also that FC is effective in cultivating students’ own critical thinking skills, which has a positive impact on academic performance (Listiqowati et al., 2022). However, it is necessary for them to show responsibility in their cognitive processes (Burke; Fedorek, 2017) and, in addition, to self-regulate the pace of learning (Lai & Hwang, 2016; Akçayir & Akçayir, 2018; Yoon et al., 2021).
Within this framework of complexity, the COVID-19 pandemic also generated new contexts in the field of education (Albar, 2023; Omotov, 2023), involving factors such as the use of methodologies initially based on e-learning, which have evolved to hybrid formats, demanding digital competencies for teachers and students, who initially resisted the implementation of a virtual education (Burke & Fedorek et al., 2017; Attarabeen et al., 2021; Divjak et al., 2022). This also boosted the teaching and learning process based on educational models, such as the inverted classrooms or Flipped Classroom (FC) of Constructivist style, with an active and learner-centered approach (Bergmann & Sams, 2012; Aşiksoy & Özdamli, 2016; Alqahtani et al., 2023), which, without being of recent postulations, have been taken up by the contextual conditions of the pandemic (Reyes et al., 2020; Divjak et al., 2022).

FC has disrupted the dynamics of traditional teaching and classroom learning (Attarabeen et al., 2021) to promote activities in which students are encouraged to inquire and interact with teachers, peers, virtual spaces and learning materials (Divjak et al, 2022), to further develop their learning processes at home with a collaborative approach where the teacher is no longer seen only as a useful subject to transmit knowledge, but rather to cultivate students' critique and independence (O'Flaherty & Phillips, 2015), to promote academic discussion and problem-solving, and to encourage practice (Akçayir & Akçayir, 2018).

FC also aims to increase the quality of learning (Aşiksoy & Özdamli, 2016; Knežević et al., 2020), offering possibilities for learning to be active and structured (Strelan et al., 2020), where the aim is to stimulate competencies for learning that facilitates the performance of graduates in the work context (O'Flaherty & Phillips, 2015). From the pedagogical point of view, the FC establishes as conditions the participation and active role of students, and the personal and group commitment to the learning sessions (Burke & Fedorek, 2017), prior to the work in the classroom, as well as during and after the realization of this, implying an appropriate use of ICT (Aguilera-Ruiz et al., 2017; Tang et al., 2023). The FC is flexible and scalable and can be adapted to the needs that arise due to deficiencies in student learning and academic performance (Divjak et al., 2022; Reyes et al., 2020).
3 METHODOLOGY

The research conforms to the quantitative paradigm with an explanatory level. The study group included all 160 students who took and passed the degree courses from 2019 to the first semester of 2023 (4 cohorts), so there was no sampling.

The LS were measured using the Learning Strategies Questionnaire for Undergraduates (LSQ-U) (Martín Cabrera et al., 2007; Martín et al., 2008), consisting of 57 items scored on an ordinal scale (4. Always; 3. Almost always; 2. Sometimes; 1. Rarely; 0 Never); grouped into three macro dimensions (see Table 1), whose proponents reported an acceptable reliability (LSQ-U of $\alpha = 0.88$): Motivational Strategies - MS (27 items; $\alpha = 0.82$), Cognitive Strategies - CS (22 items; $\alpha = 0.73$) and Control or Metacognitive Strategies - METAS (8 items; $\alpha = 0.81$) (Martín Cabrera et al., 2007).

<table>
<thead>
<tr>
<th>Dimensions of the LSQ-U</th>
<th>Operational definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 - MS - Involvement</td>
<td>Involvement Strategies based on interest in learning and creating habits of concentration in studying.</td>
</tr>
<tr>
<td>D2 - MS - Positive association</td>
<td>Positive association Strategies based on fighting listlessness and tension, trying to associate studying with pleasant and relaxed situations.</td>
</tr>
<tr>
<td>D3 - MS - Applicability</td>
<td>Applicability Strategies are based on the search for functionality and applicability of the content under study.</td>
</tr>
<tr>
<td>D4 - MS - Self-reinforcement</td>
<td>Self-reinforcement Strategies based on goal setting and self-reward for goal achievement.</td>
</tr>
<tr>
<td>D5 - MS - Gradual approach</td>
<td>Gradual Approach Strategies based on approaching the study task gradually, both physically and mentally.</td>
</tr>
<tr>
<td>D6 – CS - Organization</td>
<td>Organization Strategies based on the cognitive processes of essentializing and structuring information.</td>
</tr>
<tr>
<td>D7 - CS - Generative elaboration</td>
<td>Generative elaboration Strategies that go beyond what is in the text, producing new information.</td>
</tr>
<tr>
<td>D8 – CS - Anchor processing</td>
<td>Anchoring Processing Strategy that focuses on the information present in the text, relating it to prior knowledge and giving it personal meaning.</td>
</tr>
<tr>
<td>D9 – CS - Memorization</td>
<td>Memorisation strategies focusing on signifier rather than signified.</td>
</tr>
<tr>
<td>D10 - METAS - Planning</td>
<td>Planning checking strategies prior to studying.</td>
</tr>
<tr>
<td>D11 - METAS - Review</td>
<td>Review Study control strategies that are implemented both during the process and after its completion.</td>
</tr>
</tbody>
</table>

A pilot test was performed (25 subjects), which yielded a reliability higher than 0.80; both for the LSQ-U ($\alpha = 0.89$); and for the macro dimensions: MS ($\alpha = 0.872$), CS ($\alpha = 0.91$), and METAS ($\alpha = 0.88$). The data were statistically processed in SPSS v.26.
and Jamovi 2.3.24. Sums were obtained and descriptive statistics such as weighted mean ($\Sigma$ items/no. of items) and standard deviation were calculated for each of the 11 subscales (see Table 1). The normality of the data was done with the Kolmogorov-Smirnov (K-S) test \[H_0: \text{normality of the data (p-value > 0.05) / } H_1: \text{non-normality (p-value ≤ 0.05)}\].

Subsequently, a multivariate approach of the Exploratory Factor Analysis (EFA) type was conducted. The aim was to identify the interrelationships between the set of dimensions observed with the questionnaire used, thus reducing the complexity to the most significant aspects, to identify a few synthetic components or factors that best characterize the respondents.

De Winter et al. (2009) pointed out that traditionally EFA requires a large sample size (N > 50), but publications on this topic have mentioned that the results may be dependable even when the data is well conditioned, that is, when the level of load ($\lambda > 0.4$) is high (Field, 2009), the number of factors (f) is low, and the number of variables (p) is high, EFA may produce reliable results even when N is less than 50 (N<50), in line with the criteria of other authors (Jung, 2013; Jung & Lee, 2011).

The EFA procedure consisted of 4 stages (Hair et al., 2010), which are detailed below:

1. Selection of the set of variables that fit the chosen model and meet the formal conditions of intercorrelation (correlation matrix) and relevance of the EFA [Kaiser-Meyer-Olkin (KMO)] and Bartlett's test of sphericity [BTS]).
2. Extraction of the factorial axes based on the variance explained by each one and selection of the number of factors to be included in the analysis.
3. Interpretation of the principal components or factors (matrix of components and saturations), considering the correlation between them and the initial variables (decomposition of the correlation matrix), the communality and the possibility of rotating the factorial solution, in addition to obtaining factorial graphs that help to interpret and evaluate the factorial model.
4. Once the validity of the results has been established, factor scores can be calculated.

4 RESULTS AND DISCUSSION

The descriptive and AFE results are presented below.
4.1 VARIABLES SELECTED

Below is the list of variables considered for the AFE. The values of the means and the deviations of the variables under consideration are presented.

Table 2. Descriptive analysis of learning strategies used by students and normality by variables or subscales.

<table>
<thead>
<tr>
<th>Selected Variables or Subscales</th>
<th>X</th>
<th>DS</th>
<th>Z-K-S</th>
<th>Sig.</th>
<th>K-W* Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 - MS - Involvement</td>
<td>2.9</td>
<td>0.62</td>
<td>.983</td>
<td>0.289</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D2 - MS - Positive association</td>
<td>1.0</td>
<td>0.32</td>
<td>1.046</td>
<td>0.224</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D3 - MS - Applicability</td>
<td>3.0</td>
<td>0.73</td>
<td>1.127</td>
<td>0.158</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D4 - MS - Self-reinforcement</td>
<td>2.3</td>
<td>0.59</td>
<td>1.105</td>
<td>0.174</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D5 - MS - Gradual approach</td>
<td>2.7</td>
<td>0.35</td>
<td>0.767</td>
<td>0.598</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D6 - CS - Organization</td>
<td>2.7</td>
<td>0.53</td>
<td>1.325</td>
<td>0.060</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D7 - CS - Generative elaboration</td>
<td>2.1</td>
<td>1.0</td>
<td>1.197</td>
<td>0.114</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D8 - CS - Anchor processing</td>
<td>2.3</td>
<td>0.94</td>
<td>.910</td>
<td>0.379</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D9 - CS - Memorization</td>
<td>2.3</td>
<td>1.2</td>
<td>1.526</td>
<td>0.079</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D10 - METAS - Planning</td>
<td>3.4</td>
<td>0.61</td>
<td>1.092</td>
<td>0.184</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>D11 - METAS - Review</td>
<td>2.8</td>
<td>1.1</td>
<td>1.224</td>
<td>0.100</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>


The LS used by the students based on the indicated subscales show different mean values, where the METAS - Planning (3.4 ± 0.61) and Revision (2.8 ± 1.1); the MS of Applicability (3.0 ± 0.73), Implication (2.9 ± 0.62) and Gradual Approximation (2.7 ± 0.55); and the CS - Organization (2.7 ± 0.53), which are almost always used in the study processes (see Table 2).

The MS of self-reinforcement (2.3 ± 0.59) and the CS of anchoring elaboration (2.3 ± 0.94), generative elaboration (2.1 ± 1.0) and memorization (2.3 ± 1.2) are used less frequently by students (sometimes). Positive association SMs are the least used (1.0 ± 0.42). Of all the strategies evaluated, none of them reached averages that indicate that they always get used (see Table 2).

As summarized in Table 2, the results of the K-S test indicate that the distribution of the data is normal for all dimensions (sig. > 0.05). The K-W test used to compare the 4 cohorts of students showed no significant differences between them (sig. >0.05). Therefore, the groups are assumed to be equal.

4.2 CORRELATION MATRIX ANALYSIS

Figure 4 shows the correlation matrix, which summarizes 55 pairs of bivariate relationships, of which 46 were found to be significant (sig. ≤ 0.05). The positive significant correlations found in relation to D5- MS - Gradual approach, D7- CS -
Generative elaboration and D10- METAS - Planning stand out, all with nine (9) significant relationships out of the ten (10) possible. A second group made up of D3- MS - Applicability, D4- MS - Self-reinforcement, D6- CS - Organization, D8- CS - Anchoring elaboration and D11- METAS - Review presents eight (8) significant relationships out of the ten (10) ones which are possible. Note that most of these positive correlations are higher than $r >0.5$.

Figure 1. Correlation matrix.

* Significant relationship at 0.05. **. Significant relationship at 0.01. Source: Prepared by Authors (2023)

For its part, D9- CS - Memorization emerges as the only subscale with negative significant relationships, grouping a total of seven (7), six of which have an $r < -0.5$. The subscales D1- MS - Involvement (3) and D2- MS - Association in positive (1) presented the lowest frequency of significant relationships, registering no cases of strong correlations, neither positive nor negative.

We can consider the requirement of intercorrelation between the variables as covered by the pairs of significant correlations, whether positive or negative. The value
of the determinant \( r \) is \( 0.00000178 \). This is an indicator of the degree of intercorrelation between the variables analyzed. A low value of the determinant that is sufficiently close to 0, as was observed, means that there are variables with strong intercorrelations, and that the data analyzed are suitable to proceed with an EFA.

4.3 RELEVANCE OF EFA

The calculation of the KMO statistic and the PEB test are shown in Table 3. The former yielded a value of 0.836, considered meritorious by Kaiser's (1974) scale.

<table>
<thead>
<tr>
<th>Test</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMO</td>
<td>0.836</td>
</tr>
<tr>
<td>BTS</td>
<td>Chi(^2) 337.571</td>
</tr>
<tr>
<td></td>
<td>Sig. 0.000</td>
</tr>
</tbody>
</table>

Tabla 3. Estadísticos KMO and BTS.

Source: Prepared by Authors (2023).

The BTS test was used to assess \( H_0 \), which states that the correlation matrix of observed variables is the identity matrix \( I \), whereas \( H_1 \) indicates that they are different: \((H_0: R = I); (H_1: R \neq I)\]. The value of \( X^2 \) was 337.571 with a significance of 0.00. In this case, \( H_0 \) was rejected, indicating that there was no correlation between the variables and that there would be a tendency towards sphericity in the point cloud. The results obtained by calculating the KMO statistic and Bartlett's test allowed us to proceed with the EFA.

4.4 FACTOR EXTRACTION

The communalities quantify the inertia or percentage of variance that corresponds to the common factors, which allows, from the loss of information or variability, an increase in the simplicity of the system of variables and in the construction of a significant structural synthesis. This is manifested by emerging variables that constitute the factors that allow differentiating the subjects.
Table 4. Communalities.

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Initial Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 - MS - Involvement</td>
<td>1.000</td>
</tr>
<tr>
<td>D2 - MS - Positive association</td>
<td>1.000</td>
</tr>
<tr>
<td>D3 - MS - Applicability</td>
<td>1.000</td>
</tr>
<tr>
<td>D4 - MS - Self-reinforcement</td>
<td>1.000</td>
</tr>
<tr>
<td>D5 - MS - Gradual approach</td>
<td>1.000</td>
</tr>
<tr>
<td>D6 - CS - Organization</td>
<td>1.000</td>
</tr>
<tr>
<td>D7 - CS - Generative elaboration</td>
<td>1.000</td>
</tr>
<tr>
<td>D8 - CS - Anchor processing</td>
<td>1.000</td>
</tr>
<tr>
<td>D9 - CS - Memorization</td>
<td>1.000</td>
</tr>
<tr>
<td>D10 - METAS - Planning</td>
<td>1.000</td>
</tr>
<tr>
<td>D11 - METAS - Review</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Prepared by Authors (2023).

Table 5. Total variance explained by each of the components.

<table>
<thead>
<tr>
<th>Components</th>
<th>Total variance explained</th>
<th>Extraction Sums of Squared Loadings</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial eigenvalues</td>
<td>% of variance</td>
<td>% of variance</td>
</tr>
<tr>
<td>1</td>
<td>6.718</td>
<td>61.073</td>
<td>61.073</td>
</tr>
<tr>
<td>2</td>
<td>1.439</td>
<td>13.086</td>
<td>74.159</td>
</tr>
<tr>
<td>3</td>
<td>0.860</td>
<td>7.819</td>
<td>81.978</td>
</tr>
<tr>
<td>4</td>
<td>0.746</td>
<td>6.782</td>
<td>88.761</td>
</tr>
<tr>
<td>5</td>
<td>0.558</td>
<td>5.076</td>
<td>93.837</td>
</tr>
<tr>
<td>6</td>
<td>0.249</td>
<td>2.268</td>
<td>96.105</td>
</tr>
<tr>
<td>7</td>
<td>0.175</td>
<td>1.595</td>
<td>97.700</td>
</tr>
<tr>
<td>8</td>
<td>0.103</td>
<td>0.933</td>
<td>98.633</td>
</tr>
<tr>
<td>9</td>
<td>0.067</td>
<td>0.613</td>
<td>99.246</td>
</tr>
<tr>
<td>10</td>
<td>0.046</td>
<td>0.421</td>
<td>99.667</td>
</tr>
<tr>
<td>11</td>
<td>0.037</td>
<td>0.333</td>
<td>100.000</td>
</tr>
</tbody>
</table>

Extraction method: Principal Component Analysis.

Source: Prepared by Authors (2023).

Table 4 shows that the communality obtained by extraction is high for some variables, especially D11- METAS - Review (0.941), D3- MS - Applicability (0.930), D7- CS - Generative elaboration (0.896) and D8- CS - Anchor elaboration (0.816). Then there are other variables with important percentages of variance, although not as high as the previous ones, where D10- METAS - Planning (0.795), D5- MS - Gradual approach (0.759), D9- CS - Memorization (0.756), D4- MS - Self-reinforcement (0.756) stand out.
The variables D1- MS - Involvement (0.437), D2- MS - Positive association (0.589), D6- CS - Organization (0.482), present the lowest communalities and are configured as the least influential factors in the factorial model.

Figure 2. Sedimentation graph.

Source: Prepared by Authors (2023).

Table 6 shows the variance explained by each component with its corresponding eigenvalues. The first factor or component accounts for 56.889% of the total variance of the system, the second for 17.270%, and the third for 7.819%, and so on, gradually, and decreasingly, the other components until the eleventh, which explains only 0.333% of the

![Figure 2. Sedimentation graph.](image)

**Table 6. Saturation or component matrix, before and after varimax rotation.**

<table>
<thead>
<tr>
<th>Component matrixa</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D11- METAS - Review</td>
<td>0.969</td>
<td>-0.051</td>
</tr>
<tr>
<td>D7- ECA - Generative elaboration</td>
<td>0.946</td>
<td>0.031</td>
</tr>
<tr>
<td>D3- MS - Applicability</td>
<td>0.943</td>
<td>-0.203</td>
</tr>
<tr>
<td>D8- CS - Anchor elaboration</td>
<td>0.902</td>
<td>-0.046</td>
</tr>
<tr>
<td>D10- METAS - Planning</td>
<td>0.885</td>
<td>-0.108</td>
</tr>
<tr>
<td>D4- MS - Self-reinforcement</td>
<td>0.864</td>
<td>-0.096</td>
</tr>
<tr>
<td>D9- CS - Memorization</td>
<td>-0.742</td>
<td>0.453</td>
</tr>
<tr>
<td>D5- MS - Gradual approach</td>
<td>0.711</td>
<td>0.503</td>
</tr>
<tr>
<td>D6- CS - Organization</td>
<td>0.676</td>
<td>0.157</td>
</tr>
<tr>
<td>D2- MS - Positive association</td>
<td>0.146</td>
<td>0.754</td>
</tr>
<tr>
<td>D1- MS - Involvement</td>
<td>0.342</td>
<td>0.566</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rotated component matrixa</th>
<th>Component 1</th>
<th>Component 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3- MS - Applicability</td>
<td>0.960</td>
<td>0.084</td>
</tr>
<tr>
<td>D11- METAS - Review</td>
<td>0.941</td>
<td>0.238</td>
</tr>
<tr>
<td>D7- ECA - Generative elaboration</td>
<td>0.895</td>
<td>0.309</td>
</tr>
<tr>
<td>D10- METAS - Planning</td>
<td>0.878</td>
<td>0.158</td>
</tr>
<tr>
<td>D8- CS - Anchor elaboration</td>
<td>0.876</td>
<td>0.163</td>
</tr>
<tr>
<td>D4- MS - Self-reinforcement</td>
<td>0.854</td>
<td>0.222</td>
</tr>
<tr>
<td>D9- CS - Memorization</td>
<td>-0.843</td>
<td>0.213</td>
</tr>
<tr>
<td>D5- MS - Gradual approach</td>
<td>0.600</td>
<td>0.350</td>
</tr>
<tr>
<td>D6- CS - Organization</td>
<td>-0.083</td>
<td>0.763</td>
</tr>
<tr>
<td>D2- MS - Positive association</td>
<td>0.531</td>
<td>0.691</td>
</tr>
<tr>
<td>D1- MS - Involvement</td>
<td>0.159</td>
<td>0.642</td>
</tr>
</tbody>
</table>

Extraction: Principal component analysis. Rotation: Varimax normalization with Kaiser.

Table 6 shows the variance explained by each component with its corresponding eigenvalues. The first factor or component accounts for 56.889% of the total variance of the system, the second for 17.270%, and the third for 7.819%, and so on, gradually, and decreasingly, the other components until the eleventh, which explains only 0.333% of the

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*Source: Prepared by Authors (2023).*
The cumulative percentage of variance for components 1 and 2 adds up to 74.159%, which meets the criterion of Hair et al. (2010), which states that the AFE model should explain at least 60% of the variance. As for the determination of the axes, the criterion of Kaiser (1974) was chosen, which implies the selection of those components that have an eigenvalue > 1, which can be observed in the sedimentation plot (see Figure 2). From this observation, component 1 has an eigenvalue of 6.72, while the second component has 1.44; therefore, the other components have values less than 1, which is why they were excluded. Factor 1 explains about 57% of the variance, therefore it is a component with an important load and is decisive in explaining the system and configuring the structure of the variables. Both in the saturation matrix or the matrix of components before and after the varimax rotation (see Table 6) and in Figure 3, it is possible to distinguish the subscales that make up the matrix.

![Figure 3. Scatter plot between the factors and the original variables after rotation.](source: Prepared by Authors (2023))

On the far right of the scatter plot between the factors and the original variables after rotation (see Figure 3), the variables D3- MS - Applicability, D11- METAS - Revision, D7- CS - Generative elaboration, D10- METAS - Planning, D6- CS - Organization, D8- CS - Anchoring elaboration, and D4- MS - Self-reinforcement are located, while on the far left is D9- CS - Memorization. Self-regulated learning can be identified with this component. Factor 2 explains 17.270% of the variance and includes...
D5- MS - Gradual Approach, D1- MS - Involvement and D2- MS - Positive Association.
The component was named Motivational.

4.5 DISCUSSION

The exploratory analysis conducted allows us to know the profile of the student wishing to support an undergraduate thesis. Two distinctly different factors have emerged. The first component explains 56.889% of the variance. It is called Self-Regulated Learning. According to the results of the configuration of the structure of the variables, the student privileges his own motivation of applicability in the professional field of what he is doing, learning, or researching, setting goals and self-rewards for the achievement of the established purpose (self-reinforcement). The latter has been positively related to the performance of university students (Carini et al., 2006; Pintrich, 2000, 2004; Pugh & Bergin, 2006), which is a good potential indicator for students.

This motivational edge is accompanied by a cognitive aspect of organization to grasp the essentials and structure the information received. Cognitively, he is concerned with producing information from what is given by teachers and researched by himself (generative elaboration), relating it to previous knowledge and constructing his own meanings (anchor elaboration). This distances him from rote processes, which are of little help to him in the practical work of writing a dissertation. Metacognitively, he shows control over learning activities before and during the process by frequently using planning and revision strategies. Currently, studies in this area are of great interest in the educational field (Mitchell & McConnell, 2012). However, there is still no agreement on the models and findings that facilitate their discussion (González Lomelí et al., 2022; Rosario et al., 2019; Vergara-Morales et al., 2022).

The characteristics of self-regulated learning and the students who practice it can be good proxies for academic success (Stoeger et al., 2015). Torrano et al. (2017) characterize students with this type of learning as subjects who are oriented towards achieving excellent academic results, who enjoy being motivated, autonomous and protagonists in their learning process, thus enabling them to transfer what they have learned to different life situations (Torrano et al., 2017). The characteristics described here are consistent with this conceptual framework, which is based on Bandura's socio-cognitive approach (Panadero & Alonso-Tapia, 2014). Its precursors are Pintrich's work.
since the late 1980s (Torrano Montalvo & González Torres, 2004) and Zimmerman's contributions (Panadero & Alonso-Tapia, 2014).

The condition of working students in the field of professional training favors that the respondents have a good base of prior knowledge, which increases the applicability and allows them to make operational the cognitive strategies of elaboration, organization, and integration of prior knowledge with the learning material and resources, which is in line with what has already been reported by Martín et al. (2008). Salazar & Heredia (2018) have mentioned that the use of cognitive strategies can be a determinant of student success, which is a good sign given the results (Salazar Malerva & Heredia Escoza, 2019).

Metacognitively plan and control their learning process by being able to identify the right moment to use such strategies for the benefit of personal performance. Suárez & Fernández (2005) had already indicated that planning and review could be considered within the analytical framework of self-regulatory metacognitive strategies, and it has been mentioned that their use can be a predictor of academic performance (Herrera-Núñez et al., 2019; Suárez Riveiro & Fernández Suárez, 2013).

Self-regulated learning also values the motivational component (Pintrich, 2004). In the first component, this can be identified or manifested through the applicability and self-reinforcement subscales, which is in support of this author's findings. Motivational aspects have also been highlighted as a necessary safeguard for achieving meaningful learning (Alvarado Guerrero et al., 2019) and self-efficacy (Casiraghi; et al., 2020; Mohallem Martins & Angeli Dos Santos, 2019).

Component 2 explains only 17.270% of the variance and indicates that students attach secondary importance to the use of motivational strategies where there is a gradual approach (gradual approximation) to the task undertaken both physically (presence) and mentally (positive association), finding space for tension-free and leisure time, seeking relaxed and comfortable situations. Involvement and its secondary role in terms of interest in learning and the creation of habits towards the study task give way to the weight of applicability. Due to the prevalence of the affective-emotional, this factor was named Motivational.

From the above, students tend to require favorable learning environments where the affective and cognitive can be integrated, which has already been reported in the literature (Herrera-Núñez et al., 2019; Soares et al, 2011) and, when possible, to reduce...
environmental distractions to promote motivation and concentrated effort (Soares et al., 2011) while performing academic activities. This is in line with what Torrano et al. (2017) mentioned regarding motivational characteristics that go hand in hand with self-regulation processes (Torrano et al., 2017).

Although the first component privileges the cognitive and metacognitive, this does not mean that motivational characteristics are absent. They are much more prominent in the second component identified. This work shows that motivational variables influence learning (García-Ripa et al., 2016). They are aspects that must be considered in the teaching and learning process, as highlighted by Boza & Toscano (2012). In support of these approaches, Cabanach et al. (2009) mentioned that the motivational component is conceived in terms of self-regulation as has also been expressed by Wolters and other authors (Tacca Huamán et al., 2019; Wolters, 2003; Wolters & Hussain, 2015).

In terms of methodology, De Winter et al. (2009) point out that EFA traditionally requires large sample sizes (N>50); however, publications from the new wave of statistics on the subject indicate that results can be dependable even when samples with proportionality >20 cases per item are not available. If the data are well conditioned, i.e., when there are high loadings (λ>0.4) (Field, 2009), a low number of factors (f) and a high number of variables (p), EFA can produce reliable results for N<50; this is in line with the criteria of other authors (Jung, 2013; Jung & Lee, 2011). The results presented here meet these conditions and validate these criteria.

The FC modality proved to be appropriate in the research team's courses, whose driving factor was the management of virtual education competencies, an element already mentioned by other authors (Attarabeen et al., 2021; Divjak et al., 2022). Another driving factor was the management of an active and collaborative methodology centered on the learner, which met the success requirements outlined in previous studies (Bergmann & Sams, 2012; Aşıksoy & Özdamli, 2016; Alqahtani et al., 2023).

This modality has promoted a change within the School of Law, breaking with the tradition of rote learning and low applicability, which was confirmed by using cognitive strategies and learning control, moving to a style where classroom learning allows constructive criticism (O'Flaherty; Phillips, 2015), discussing the different contents, solving operational research problems and putting into practice what has been learned (applicability), thus confirming what was pointed out in other works (Akçayir & Akçayir, 2018).

The quality of learning was demonstrated by the fact that all students started the registration process for their dissertation projects and completed their degrees without significant gaps, as mentioned in the background (Aşiksoy & Özdamli, 2016; Knežević et al., 2020). An advantage of the FC application was the collaborative, active learning orientation and the structured framework, which confirms what has already been stated in the literature (Strelan et al., 2020).

From a didactic point of view, it could not be assumed that FC could be applied as a recipe in other schools or departments. As adverted by Burke & Fedorek (2017), the university should carry out a selection process of teachers who value the methodology and have thinking schemes in line with the requirements of FC, who can give relevance to the participation and active role of the learners, and who can stimulate a high level of student engagement with the learning activities. Only in this way could an experience like the one reported here be replicated. We agree with other reports conducted during or after the pandemic (Reyes et al., 2020; Yoon et al., 2021; Divjak et al., 2022; Listiqowati et al., 2022; Tang et al., 2023) that FC is useful, flexible and allows learning to be approached in a practical and scalable way, with individual shortcomings being addressed along the way.

5 CONCLUSIONS

The results show that FC is also an appropriate didactic option for virtual classes in the context of pandemic and post-pandemic, whose greatest need is related to a teaching profile and the management of technical computer skills. Decreasing the monopolistic role of the professor in the classroom is already a transformation in the Peruvian university education system centered on the anachronism of the so-called master class, which tends to obviate discussion, problem-solving and student-centered collaborative practices. This work confirms what has already been reported in other educational systems.

As a modality applied to education based on virtual spaces, it enhances the learning and use of MS, CS and stimulates the use of metacognitive approaches. In this sense, two components have been identified that reduce the dimensionality of the LS used by students. Component 1, conformed by eight (8) subscales, explains 56.889% of the variance and has been named Self-Regulated Learning, because as a whole it reflects the attributes or characteristics highlighted by Torrano et al. (2017), for students who are
motivated, are facilitated to work autonomously, are dedicated to achieving academic performance taking into account goals, and enjoy taking the protagonist role in their learning process, as well as being able to recognize the applicability of what they have learned to their daily situations. Cognitively, students are engaged in the elaboration of information organizers, using prior knowledge as a starting point to make sense of what they are doing. They make little use of rote learning, which is perceived as not being particularly useful in the elaboration of the thesis. Metacognitively, they show evident control over their learning process in its distinct stages.

The second component accounts for 17.270% of the variance and comprises subscales typical of motivational strategies, including gradual approach, positive association, and involvement. It was named the motivational component due to its predominant affective-emotional characteristics. Motivational attributes go hand in hand with self-regulatory processes, as shown by the interaction between the motivational, cognitive, and metacognitive components.

The EFA proved to be an adequate statistical technique to reveal the components or factors associated with the use of learning strategies. Following this line of work, the variables considered could be expanded in the future to include some of those reported to be influential in learning, such as curricular design and curriculum (Cope & Staehr, 2005), students' conditions of entry and career choice (Soria-Barreto & Zúñiga-Jara, 2014), learning styles (Freiberg Hoffmann et al., 2017) and learner contextual variables (Herrera-Núñez et al., 2019; Soares et al., 2011), which contribute to a better inventory of variables that can help determine success in higher education (Noriega Biggio et al., 2015).

The methodology used has practical value and can be enriched for future studies with other variables that contribute to improving the profile of these students. The information obtained from this work can be considered in the design and planning of systematic teaching and learning strategies that focus on students' attention, to support them in their search for better performance and academic success as indicators of the quality of the university system.
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