Research Article

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Academic Autonomous Learning in Two Ecuadorian Universities: A Statistical and Student-Centered Perspective

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Abstract

This study explores the role and extent of academic autonomous learning among students from two public universities in central Ecuador. Recognizing the importance of self-directed learning in higher education, especially in post-pandemic contexts, the research aims to assess how students apply autonomous work strategies in their academic routines. A total of 158 students from four different academic programs participated in the study. Data were collected using the validated CETA instrument, which evaluates six dimensions of autonomous work: expansion, collaboration, conceptualization, planning, exam preparation, and participation. The research adopts a quantitative, non-experimental, cross-sectional approach. Statistical methods included descriptive analysis, Pearson correlations, t-tests, ANOVA, and Chi-square tests. The findings reveal a high level of internal consistency in the CETA dimensions and strong correlations between key strategies, particularly between expansion and exam preparation. While no statistically significant differences were found between genders or institutions, some programs displayed subtle variations. The study concludes that autonomous academic work is a critical factor in students' academic performance and professional development. It highlights the importance of fostering self-regulation, planning, and motivation in the educational process. These findings provide valuable insights for higher education institutions seeking to strengthen autonomy-oriented teaching strategies.

Keywords: *higher education 1; learning strategies2; skills 3: autonomous work 4*

1. Introduction

Teaching carries multiple responsibilities, but the role of students in the learning process is even more complex. When engaging in self-directed activities such as autonomous learning students must manage time effectively, self-regulate their behavior, apply metacognitive skills, think critically, stay organized, and continually revise their work (Broadbent & Poon, 2015; Marcondes et al., 2024; Núñez-Naranjo, 2024; Núñez-Naranjo et al., 2023). These elements align with the six dimensions assessed by the CETA test (Ortega & Sepúlveda, 2021; Sánchez-Caballé et al., 2024) application, collaboration, conceptualization, planning, exam preparation, and participation. Each dimension involves specific cognitive and behavioral strategies with varying levels of complexity.

Recent studies by Clayton-Bernard and Kermarrec (2025), Núñez-Naranjo (2022) and Panadero and Järvelä (2015) highlight a theoretical concept known as "Socially Shared Regulation of Learning" (SSRL). This framework views self-regulation as a mechanism that facilitates learning, but with the support of social groups, emphasizing that education is fundamentally a social phenomenon.

Furthermore, self-regulation is closely associated with academic success across a student's educational trajectory, as it involves both metacognitive actions and cognitive strategies that enhance learning outcomes (Dent & Koenka, 2016; Schunk & Greene, 2017). It includes managing emotions, exercising self-control, and making informed decisions about what tasks can or cannot be carried out effectively. As such, this cognitive competence reinforces autonomous learning in all its dimensions (Dent & Koenka, 2016).

Motivation is also a key factor in promoting autonomous academic work, as demonstrated by studies involving both undergraduate and postgraduate students (Artino & Stephens, 2009; Puiu et al., 2023)and Puiu et al., (2023) These studies confirm a strong relationship between self-regulation and motivation. Autonomous learning is not spontaneous; rather, it is developed through consistent practice beginning in early education. By the time students reach higher education, autonomous work should already be a habitual part of their academic behavior. This becomes especially important when students are required to make independent efforts to reinforce classroom learning in private study environments. Therefore, establishing a dedicated study space, allocating sufficient time, and receiving ongoing guidance from instructors are essential components (Artino & Stephens, 2009; Cramarenco et al., 2023)

Under these considerations, teachers must implement a series of pedagogical strategies aimed at fostering student autonomy and critical thinking, as well as helping them manage their educational tasks and actions. The goal is to prepare students for lifelong learning, which is one of the core functions of Higher Education Institutions (HEIs) (Enríquez Vázquez & Hernández Gutiérrez, 2021).

After the critical pandemic period, during which students were "forced" to study online, the opportunity arose to strengthen autonomous learning. However, the return to in-person education has not significantly altered the dynamic, as educational activities still revolve around extracurricular tasks and assignments that enhance students' training and improve their knowledge, skills, and competencies in an increasingly complex and competitive world. In this context, planning skills, self-motivation, reflective critical thinking, collaborative work, strategic learning, and, above all, willpower (motivation) are essential elements of autonomous work and must be consistently applied (Ortega & Sepúlveda, 2021). While many have shown that virtual learning, in one way or another, sparked students' interest in seeking strategies to consolidate their learning autonomously, critically, and self-regulated (Cumpa Rivalles & Gálvez Montoya, 2021; Santamaria-Velasco et al., 2025), today, Virtual Learning Objects (VLOs) remain indispensable for both classroom and extracurricular activities. They also serve as a motivating factor for advancing academic training (Enríquez Vázquez & Hernández Gutiérrez, 2021).

Reading and reading comprehension are also critical factors for effective learning. Therefore, it is essential for teachers to teach autonomous work strategies focused on reading and understanding texts (Nasralla et al., 2021), This is supported by studies from (Medina-Coronado & Nagamine-

Miyashiro, 2019) which demonstrate a significant correlation between reading comprehension and autonomous work strategies, ultimately leading to improved learning outcomes.

This study aims to diagnose and contrast the current state of autonomous academic work among university students from two public Higher Education Institutions (HEIs) in the central region of Ecuador. This is achieved through the application of the CETA test (Questionnaire of Autonomous Work Strategies), which evaluates the primary habits and practices students employ when learning educational content and skills that contribute to their professional profiles.

Despite the increasing relevance of autonomous learning strategies in global higher education, especially in the context of digital and hybrid modalities, there remains a notable gap in localized empirical research within Latin America, particularly in Ecuador. While several international studies have examined the relationship between self-regulation, motivation, and academic performance, few have analyzed how students from Ecuadorian public universities engage with structured autonomous work frameworks like CETA.

Moreover, most existing research focuses on either single institutions or general theoretical constructs without differentiating how such strategies are adopted across diverse academic programs or regional contexts. This study addresses this gap by offering comparative insights from two public universities in central Ecuador. It aims to examine not only the presence of autonomous work practices but also their correlation with academic planning, participation, and performance across gender and institutional lines. By doing so, it contributes to both the local and international dialogue on effective, student-centered learning in higher education.

2. Materials and Methods

This study is based on descriptive-correlational and explanatory research with a quantitative, non-experimental, cross-sectional approach, as data were collected only once. The sample consists of 158 students: 48.1% from the Technical University of Ambato (UTA), Ecuador (76 from the eighth semester of Economics) and 51.9% from the Polytechnic School of Chimborazo (ESPOCH), Ecuador (41 from the first and third semesters of Accounting and Auditing; 18 from the sixth semester of Business Administration; and 23 from the second semester of Transportation Management).

The "Autonomous Work Strategy Questionnaire" (CETA) test was applied, which includes six dimensions (strategies) with the following Cronbach's alpha values: strategy of expansion (0.917), collaboration (0.929), conceptualization (0.893), planning (0.858), exam preparation (0.892), and participation (0.850). The overall test achieved an alpha of 0.976, demonstrating high reliability according to scientific literature criteria. These values exceed the minimum thresholds identified by (López-Aguado, 2010) and surpass the recommended 0.7 threshold (Oviedo & Campo Arias, 2005)

Statistical analysis included Pearson correlations for the six dimensions globally (across institutions) and separately for each HEI. Significant differences were assessed using the t-student test for independent samples, as the data met normality assumptions (K-S test > 0.05). For some categorical variables, the Chi-square test was used. Additionally, an ANOVA was conducted across programs, considering the Global Autonomous Work (TAG), which represents the average of the six strategies, followed by Tukey's post hoc test.

3. Results

In an initial exploration of the studied phenomenon, it is essential to analyze the generational framework in terms of age. For example, the mean age of UTA students is 23.04, which is considered atypical since students generally graduate around the age of 22. This higher average is attributed to the presence of students over 30 years old within the sample. At ESPOCH, the average age is 20.61, reflecting the fact that the observed participants are students either at the beginning or midpoint of their academic programs.

Globally, the average age by gender is 21.98 for men and 21.63 for women. Age was considered as

a variable to analyze potential significant differences in the scores obtained for autonomous work strategies. The results confirmed that no significant differences were observed.

To validate the distribution by gender and program, the Chi-square test was applied, revealing significant differences, particularly between the Accounting and Auditing program, which has a higher presence of women, as confirmed by academic studies (Martínez Rebollar & Campos Francisco, 2015), and the Transportation Management program, which is predominantly male.

An overall average of the six strategies was calculated, consolidating them into a single variable called Global Autonomous Work (TAG). Descriptive statistics were then computed under the Exploratory Data Analysis (EDA) approach (López Fernández et al., 2017), as detailed below:

Table 1. Descriptive Statistics of Global Autonomous Work.

	Institution		Gender		Carrier			
Descriptives	UTA	ESPOCH	Male.	Female	Economics	Businnes adminf	Accounting Audit.	Transport Management
Mean	3,52	3,37	3,40	3,47	3,52	3,42	3,36	3,37
Trimmed Mean (5%)	3,53	3,37	3,40	3,48	3,53	3,45	3,35	3,37
Median	3,57	3,36	3,36	3,52	3,57	3,37	3,36	3,35
Variance	0,50	0,59	0,57	0,54	0,50	0,22	0,71	0,72
Standard Deviation	0,70	0,77	0,76	0,73	0,70	0,46	0,84	0,85
Minimum	1,52	1,83	1,83	1,52	1,52	2,29	1,95	1,83
Maximum	4,92	5,00	5,00	4,89	4,92	4,00	5,00	4,89
Range	3,40	3,17	3,17	3,37	3,40	1,71	3,05	3,05
Interquartile Range	1,07	1,12	1,08	1,06	1,07	0,62	1,22	1,20
Skewness	-0,15	0,09	0,08	-0,12	-0,15	-0,80	0,18	0,13
Kurtosis	-0,28	-0,59	-0,53	-0,43	-0,28	0,54	-0,90	-0,69
Coefficient of Variation	19,99	22,83	22,18	21,09	19,99	13,60	25,12	25,23

* Main descriptive statistics for Global Autonomous Work across different variables. Source: Own elaboration.

The most representative statistic is the arithmetic mean, with values showing a minimum of 3.36 in the Accounting and Auditing program at ESPOCH and 3.52 in the Economics program at UTA. In percentage terms, this indicates that the application and practice of autonomous work in educational labor ranges from a minimum of 67.2% to a maximum of 70.4%. From a pedagogical perspective, these values are quite advisable and acceptable as part of the educational activity and practice.

In terms of data dispersion, the Transport Management program shows the highest standard deviation, reaching 0.85 points. However, it is not sufficient to look only at the standard deviation; the coefficient of variation should also be analyzed to determine which academic program exhibits the greatest dispersion. In this case, Transport Management has the highest relative percentage, while Business Administration has the lowest. By gender, males show the most dispersion, and by institution, UTA shows the least.

When analyzing skewness, Accounting and Auditing and Transport Management programs show a positive skew, meaning the arithmetic mean is higher than the median and mode. In contrast, Business Administration and Economics programs exhibit a negative skew, meaning the arithmetic mean is lower than the median and mode.

Regarding kurtosis indicators, three distributions are platykurtic, while one is leptokurtic, showing greater dispersion in three cases and lesser dispersion in one.

A more perceptive representation of the information is presented in Figure 1, where the averages of autonomous work are shown, considering all six strategies together. The highest value is found for

UTA, which corresponds with the Economics program, as this institution participated only with this major. In percentage terms, this means that the application of autonomous work in these students exceeds 70% compliance (with five points representing 100%). ESPOCH reaches 67.4%, but this is the accumulation of three programs: Business Administration, the highest, followed by Transport Management, and finally, Accounting and Auditing, which has the lowest value.

Regarding gender, females show more careful application of their skills and competencies for autonomous work, with their percentage value exceeding 69%.

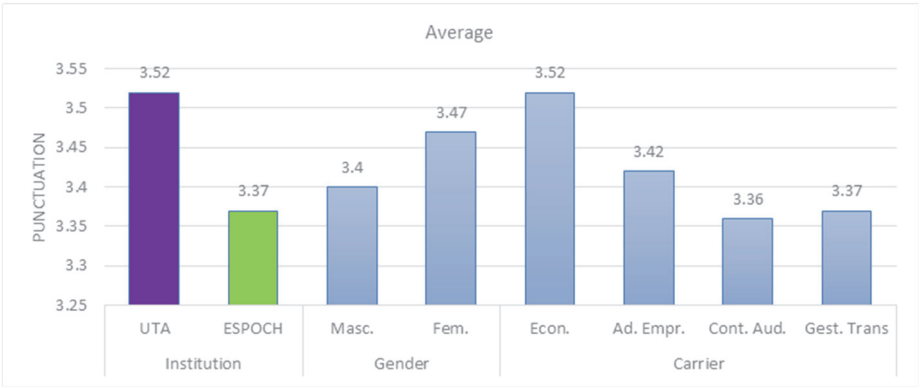

Figure 1. Averages of Autonomous Work by Variables. (a) Distribution of average values of Global Autonomous Work by variables. Source: Own elaboration**.**

It should be considered that the four professions, while part of the Social Sciences, have a strong technical component with extensive application of numerical disciplines or modules that require constant feedback and reinforcement for a better understanding of their contents, theories, and foundations. In this regard, autonomous work becomes indispensable in their education and preparation.

The research work is primarily concerned with verifying the correlations that occur between the six strategies of autonomous learning. To this end, the values were calculated globally, meaning without distinguishing between Higher Education Institutions (HEIs), and then specifically for each educational institution. The data show that the best correlation occurs between expansion and exam preparation, without distinguishing between the HEIs (0.848). This is consistent because the first strategy aims to increase knowledge through complementary activities, material preparation, and other actions aimed at strengthening learning (López-Aguado, 2010), in contrast to reinforcement activities for evaluations at the end of the period.

Next in importance are the strategies of conceptualization and planning (0.829). This indicates that students are focused on creating concept maps, diagrams, summaries, etc., to generate a greater conceptual understanding of the theory received in the classroom, as well as on time management and task organization as part of their academic planning.

The correlation with the lowest value (0.712) occurs between collaboration and exam preparation, with the first strategy being aimed at student involvement in collaborative work, group actions, and other related activities.

Table 2. Bivariate Correlations of the Autonomous Work Strategies for the Two HEIs.

Strategies	Ampl	Global (UTA+ESPOCH)				
		Ampl.	Colab.	Concep.	Planif.	Exam.
Colab.	r-Pear	,801**				
	Sig.	0,000				
Concep.	r-Pear	,806**	,737**			
	Sig.	0,000	0,000			
Planif.	r-Pear	,793**	,770**	,829**		
	Sig.	0,000	0,000	0,000		
Exam.	r-Pear	,848**	,712**	,736**	,745**	
	Sig.	0,000	0,000	0,000	0,000	
Part.	r-Pear	,822**	,751**	,783**	,805**	,805**
	Sig.	0,000	0,000	0,000	0,000	0,000
**The correlation is significant at the 0.01 level (bilateral).						

* **Note:** The correlation is significant at the 0.01 level (bilateral).(a) Main Pearson Correlations of the Autonomous Work Strategies for the Two Higher Education Institutions (HEIs).

Now, from the specific perspective of each institution, the results vary slightly compared to the global university-wide results. For the case of the Universidad Técnica de Ambato, considering only the Economics program, the results are detailed in Table 3. The highest correlations occur between expansion and exam preparation (0.864). It is clearly evident that when taking a partial or final exam, students are more aware that they need to expand their knowledge base and strengthen their learning by seeking new theoretical or practical contributions to guarantee a good grade. Next in importance are the correlations between planning and participation (0.826). Once again, the ability to organize and plan their studies through autonomous work is confirmed, along with a determined participation in class, curricular, and extracurricular activities that contribute to their formative and professional quality.

In lesser scale, the relationship between collaboration and participation (0.711) is observed; however, according to (Martínez Rebollar & Campos Francisco, 2015) all the correlations are considered to have a "high positive correlation," also demonstrating direct proportionality.

Table 3. Bivariate Correlations of the Autonomous Work Strategies for UTA

Strategies	Coef.	Universidad Técnica de Ambato, UTA				
		Ampl.	Colab.	Concep.	Planif.	Exám.
Colab.	r-Pear	,749**				
	Sig.	0,000				
Concep.	r-Pear	,813**	,730**			
	Sig.	0,000	0,000			
Planif.	r-Pear	,780**	,766**	,822**		
	Sig.	0,000	0,000	0,000		
Exám.	r-Pear	,864**	,746**	,772**	,726**	
	Sig.	0,000	0,000	0,000	0,000	
Part.	r-Pear	,803**	,711**	,788**	,826**	,773**
	Sig.	0,000	0,000	0,000	0,000	0,000
**.The correlation is significant at the 0.01 level (bilateral).						

[1] **Note:** Main Pearson Correlations of the Autonomous Work Strategies for Universidad Técnica de Ambato. Source: Own elaboration.

The analysis and description for ESPOCH is as follows: Interestingly, the strategy of expansion has the same correlation value with collaboration, exam preparation, and participation (0.837), reaffirming the theory that this strategy is crucial in students' education because, with the help of ICT, the search for new material, data, and resources is infinite, which fundamentally supports

performance and meaningful assessments. In lesser proportion, conceptualization is correlated with exam preparation (0.704); however, it is still considered a high positive correlation (Martínez Rebollar & Campos Francisco, 2015).

Table 3. Bivariate Correlations of the Autonomous Work Strategies for ESPOCH

Strategies	Coef.	Escuela Superior Politécnica de Chimborazo, ESPOCH				
		Ampl.	Colab.	Concep.	Planif.	Exam.
Colab.	r-Pear	,837**				
	Sig.	0,000				
Concep.	r-Pear	,807**	,751**			
	Sig.	0,000	0,000			
Planif.	r-Pear	,802**	,774**	,836**		
	Sig.	0,000	0,000	0,000		
Exam.	r-Pear	,837**	,690**	,704**	,758**	
	Sig.	0,000	0,000	0,000	0,000	
Part.	r-Pear	,837**	,777**	,779**	,785**	,829**
	Sig.	0,000	0,000	0,000	0,000	0,000
**. The correlation is significant at the 0.01 level (bilateral).						

[1] Main Pearson Correlations of the Autonomous Work Strategies at Escuela Superior Politécnica de Chimborazo (ESPOCH). Source: Own elaboration.

The next step is to determine whether there are significant differences between different variables, programs, and institutions using the Student's t-test. To verify its application, normality tests were first run, specifically using the Kolmogorov-Smirnov test. When considering autonomous work in a global sense, i.e., as the average of the 6 strategies, it is evident that the data meet the normality assumption, with a p-value of 0.2000. When applying the t-test between universities, no significant statistical difference was found, as shown by the data: t(1.9752) = 1.249; p-value = 0.213 assuming equal variances (Levene's test) with 196 degrees of freedom.

To better understand the studied reality, the same t-statistic is calculated, comparing different variables summarized in Table 5:

Table 5. t-Student Between Different Variables Subjected to Testing.

Institution	**Variables**	**p-value**	**Observation**
UTA	TAG/Gender	0,665	Not significant
	Amplification/Gender	0,492	Not significant
	Colaboration/Gender	0,551	Not significant
	Conceptualization/Gender	0,55	Not significant
	Planning/Gender	0,725	Not significant
	Pre-exam/Gender	0,662	Not significant
	Participation/Gender	0,335	Not significant
ESPOCH	TAG/Gender	0,295	Not significant
	Amplification/Gender	0,361	Not significant
	Collaboration/Gender	0,15	Not significant
	Conceptualization/Gender	0,239	Not significant
	Planning/Gender	0,255	Not significant
	Pre-exam/Gender	0,952	Not significant
	Participation/Gender	0,365	Not significant
	TAG-Accounting/Administration	0,791	Not significant
	TAG-Accounting/Transport Mgmt.	0,976	Not significant
	AG-Administration/Transport Mgmt.	0,824	Not significant

[1]**Note.** Contrast through t-student for the strategies and different study variables. Source: Own elaboration.

Finally, validation continues with an ANOVA test. Globally, the CETA test between the different programs is applied, and for greater objectivity, a post-hoc Tukey test is used. The results show no significant difference (p-value: 0.840). This means that in both universities and across different programs, students apply academic autonomous work strategies equally for the success of their academic tasks.

4. Discussion

To understand the construct of academic autonomous work, it is essential to consider García-Peñalvo et al. (2018), who define it as a learning mode in which students take responsibility for organizing their academic tasks and acquiring competencies at their own pace. This process includes autonomy in planning, execution, and evaluation, aligning with the broader concept of self-regulated learning (Dent & Koenka, 2016; Panadero & Järvelä, 2015).

The findings of this study confirm the utility of the CETA test in identifying students' use of autonomous work strategies. High levels of internal consistency in each dimension support the test's psychometric robustness (López-Aguado, 2010). Additionally, strong positive correlations particularly between expansion and exam preparation demonstrate that students who actively seek additional materials tend to perform better in evaluative contexts. These patterns align with findings in the literature emphasizing the role of strategic learning and metacognitive planning in academic success (Artino & Stephens, 2009; Broadbent & Poon, 2015).

However, one notable result of this research is the absence of statistically significant differences across gender, programs, and institutions. While these findings might initially suggest homogeneity in how students approach autonomous work, they also invite a deeper interpretation. One explanation may lie in the institutional frameworks of both UTA and ESPOCH, which share similar academic cultures and teaching models that emphasize curricular alignment and structured student engagement. This convergence may lead to relatively uniform implementation of autonomous learning strategies across faculties.

Culturally, the collectivist orientation prevalent in Ecuadorian education may also play a role in minimizing observable differences. The emphasis on group collaboration, respect for authority, and compliance with academic expectations may lead to widespread but similarly levelled adoption of autonomous work habits, regardless of gender or field of study (Martínez Rebollar & Campos Francisco, 2015). Furthermore, despite differences in program content, the common denominator is that all are rooted in social sciences with strong technical components such as economics, accounting, and transportation management which require consistent reinforcement through autonomous practice.

Another key insight is the role of gender. Although women demonstrated slightly higher average scores in autonomous work strategies, these differences were not statistically significant. Nonetheless, this tendency is consistent with international findings that highlight women's stronger academic responsibility, thoroughness, and ethical orientation in higher education contexts (Haski-Leventhal et al., 2017)

In conclusion, the discussion of these results suggests that while statistical differences may not be pronounced, institutional policies, cultural norms, and shared academic structures can create environments that standardize autonomous learning behaviors. This highlights the importance of not only evaluating outcomes but also understanding the underlying sociocultural and institutional mechanisms that shape learning behaviors in Latin American higher education.

5. Conclusions

Academic autonomous work is a key component of the teaching-learning process, as it requires students to take responsibility for their learning through strategies that promote reflection, planning, and independent engagement with educational content. This study confirms the relevance of such

strategies in university settings, showing high levels of internal consistency and strong correlations between key dimensions, such as expansion and exam preparation.

Although no statistically significant differences were found across gender, programs, or institutions, this uniformity reveals important contextual insights. The shared educational culture between the two universities both public, structured, and regionally located may contribute to the standardization of autonomous learning behaviors. Additionally, the influence of collective academic values in Ecuador, along with institutional pedagogical frameworks, could explain the consistency across groups.

Slightly higher averages among women, although not statistically significant, align with international findings that suggest stronger academic commitment among female students. These observations underscore the importance of considering both cultural and institutional factors in future studies on autonomous work.

Ultimately, this research contributes valuable empirical evidence from Latin America and supports the need for higher education institutions to strengthen autonomy-oriented teaching practices. Promoting self-regulated learning, time management, and critical thinking must remain central goals in preparing students for lifelong learning.

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