_____

Learning self-regulation as a predictor of academic self-efficacy in Ecuadorian undergraduate students

Autorregulación del aprendizaje como predictor de la autoeficacia académica en universitarios del Ecuador

A autorregulação da aprendizagem como preditora da autoeficácia acadêmica em estudantes universitários no Equador

Jacqueline del Pilar Regatto-Bonifaz[1], ORCID 0000-0002-1028-7477
Víctor Manuel Viteri-Miranda[2], ORCID 0000-0002-5776-6731
Rodrigo Moreta-Herrera[3], ORCID 0000-0003-0134-5927

[1] *Universidad Estatal de Milagro, Ecuador; Universidad de Palermo, Argentina*
[2] *Universidad Estatal de Milagro, Ecuador; Universidad de Palermo, Argentina*
[3] *Pontificia Universidad Católica del Ecuador, Ecuador; Universitat de Girona, Spain*

Abstract

Self-regulated learning (SRL) and academic self-efficacy (ASE) both fall within social cognitive and learning theory and play a key role in the educational context. The aim of this study was to identify the explanatory potential of SRL and ASE among a group of university students in Ecuador. A quantitative, descriptive and explanatory methodology was applied using structural equation modelling (SEM). The sample consisted of 570 students from two public universities in Ecuador of which 76 % were female and 24 % were male ranging from 17 to 56 years old ($M = 25.29$) The results reflected that there was a moderate positive correlation between SRL and ASE. Furthermore, there were no significant differences by gender ($p > .05$) for both attributes. SRL explained 23.8 % of ASE's variance changes at the influence level using SEM techniques. Therefore, it was concluded that SRL is a moderate ASE predictor in Ecuadorian university students.
Keywords: learning; academic self-efficacy; self-regulation; university students

Resumen

La autorregulación del aprendizaje (ARA) y la autoeficacia académica (AA) forman parte de la teoría social cognitiva y del aprendizaje, y cumplen un rol fundamental en el contexto educativo. Este trabajo tiene por objetivo identificar el potencial explicativo de la ARA en la AA en una muestra de estudiantes universitarios del Ecuador. Se utilizó una metodología cuantitativa, descriptiva y explicativa por medio del modelo de ecuaciones estructurales (SEM). La muestra la comprenden 570 estudiantes de dos universidades públicas del Ecuador. El 76 % son mujeres y el 24 % son varones, con edades entre los 17 y los 56 años ($M = 25.29$). Los resultados reflejan que existe una correlación positiva y moderada entre la ARA y la AA. Además, no se presentan diferencias significativas por género ($p > .05$) en ambos atributos. A nivel de influencia, la ARA explica en un 23.8 % los cambios de la varianza de la AA mediante de técnicas SEM. Se concluye que la ARA es un predictor moderado de la AA en universitarios del Ecuador.
Palabras clave: aprendizaje; autoeficacia académica; autorregulación; estudiantes universitarios

_____

Resumo

A autorregulação da aprendizagem (ARA) e a autoeficácia acadêmica (AA) fazem parte da teoria social cognitiva e da aprendizagem e desempenham um papel fundamental no contexto educacional. O objetivo deste trabalho é identificar o potencial explicativo da ARA na AA em uma amostra de estudantes universitários do Equador. Foi utilizada metodologia quantitativa, descritiva e explicativa por meio de modelagem de equações estruturais (MEE). A amostra foi composta por 570 estudantes de duas universidades públicas do Equador. 76 % são mulheres e 24 % são homens, com idades entre 17 e 56 anos (*M* = 25,29). Os resultados refletem a existência de uma correlação positiva e moderada entre a ARA e a AA. Além disso, não existem diferenças significativas por gênero (*p* > 0,05) em ambos os atributos. A nível de influência, a ARA explica 23,8 % das alterações na variância da AA por meio de técnicas SEM. Conclui-se que a ARA é um preditor moderado da AA em estudantes universitários no Equador.
Palavras-chave: aprendizagem; autoeficácia acadêmica; autorregulação; estudantes universitários

In the teaching-learning process, both self-regulation of learning (SRL) and academic self-efficacy (ASE) constitute significant attributes for the psychological processes in higher education performance. They regulate the affective, cognitive and behavioral dimensions of academic achievement (Ben-Eliyahu & Linnenbrink-García, 2015; Torrano & Soria, 2017). In Ecuador, such phenomena of self-monitoring and regulation of internal learning mechanisms have not been thoroughly researched. In general, there is limited research, making it important to explore the importance of these personal resources that enable the acquisition of consolidated and operative knowledge (Regatto-Bonifaz & Miranda-Viteri, 2022).

Learning self-regulation and its contribution to higher education

SRL refers to the control that a person exerts over his or her thoughts, actions, emotions and motivation through strategies to achieve a learning goal (Panadero, 2017; Zimmerman, 2013). It consists of a series of processes that allow learning to be conducted in an effective way. They include a) active meta-cognition: planning, goal setting, organization, self-monitoring and self-evaluation of strategies; b) motivation: self-efficacy, self-attributions and intrinsic interest in the task; and c) directed behavior: selecting, structuring and creating environments that maximize learning, seeking advice, information and places where learning is more likely to occur, self-instruction during a task and self-reinforcement after results have been achieved. In this sense, SRL is allowed to include in its internal structure three elements that act in a cyclical manner: a) planning; b) execution; and c) evaluation (Zimmerman, 2013).

SRL in undergraduate students tends to show a low intensity in many cases, with deficiencies in the processes of planning, control and self-evaluation in their strategies to achieve academic goals (Burbano et al., 2021). Furthermore, evidence indicates that there are differences by gender (*p* < .05), in which women perform better SRL strategies (external attributions, planning, organization, management of resources to use acquired information and processing strategies) than men (Gaeta et al., 2021; Zambrano et al.,

2018); although this cannot yet be considered as a generality, given the absence of specific academic studies.

In the academic field, SRL affects competencies such as text comprehension (Van de Pol et al., 2019), academic writing (Palermo & Thomson, 2018), numeracy and mathematics (Callan & Cleary, 2019), research competencies (Paredes-Proaño & Moreta-Herrera, 2019), among others. As a result, SRL has a positive impact on school success as a predictor of academic performance (Hernández-Barrios & Camargo-Uribe, 2017) while reducing negative aspects such as situational factors associated with learning problems including academic procrastination (Grunschel et al., 2018).

Nevertheless, it is still important to examine the relationship and impact it may have with other internal processes of self-control and self-motivation that support the directionality towards learning-focused behaviours such as self-efficacy. This will contribute to interpretative and predictive models of learning processes in the educational psychology and academic context.

Academic self-efficacy and its contribution to higher education

ASE is a particular type of general self-efficacy (Bandura, 1992; Maddux & Gosselin, 2012; Moreta-Herrera et al., 2019) that has been widely examined in the psychological and educational fields, as it comprises beliefs as well as personal achievement assessments about academic processes, including the development of activities, content, knowledge, interest in learning or educational competencies such as research (Reyes & Gutiérrez, 2015). Several studies have shown that positive self-efficacy beliefs can be nurtured by direct experiences, verbal persuasion and vicarious learning (Ahn et al., 2017; Beatson et al., 2018), therefore their presence is relevant in people's global and academic lives.

ASE has a modest presence among higher education students, and also shows significant improvement in the mid-term, as one progresses in studies and academic degree (Del Rosal & Bermejo, 2017; Piergiovanni & Depaula, 2018). Some authors think that there is a greater presence of ASE in males than in females (Domínguez-Lara & Fernández-Arata, 2019); other authors, however, mention that gender is actually non-variant (Schnell et al., 2015).

In the context of education, ASE has an impact and incidence, as it is associated with school support, well-being and performance (González et al., 2020; Paez et al., 2017), academic resilience (Cassidy, 2015), academic well-being (Paciello et al., 2016), school motivation (Montes de Oca-Sánchez & Moreta-Herrera, 2019), attitudes towards technology (Regatto-Bonifaz & Viteri-Miranda, 2023), among others. Although it is relevant in the educational field, there is little information about the precursors, academic and psychical determinants that affect this attribute.

Self-Regulated Learning and Academic Self-Efficacy

SRL refers to a student's self-directional resource that enables him/her to achieve specific goals. It promotes independent and effective academic performance, which involves metacognitive ability, intrinsic motivation and strategic action. The attainment of these goals also reinforces their self-confidence and achievement beliefs in order to set higher goals (ASE). In this way, students with positive self-efficacy beliefs will generally perform better academically (Wang et al., 2013). This suggests that these elements work together for ASE development.

Some evidence shows the relationship between SRL and ASE and the possible interaction among undergraduate students (Alegre, 2014; Araya et al., 2022; Covarrubias et al., 2019; Gaeta et al., 2021; Luna & Álvarez, 2020). These studies report that the

_____

existing relationship is positive and significant, with fluctuating intensities ranging from low to moderate. This possible variability could be related to particular teaching methods in higher education institutions, for example, or to other factors that have not yet been identified. It is therefore important to pursue further study and research, mainly in the Latin American and Ecuatorian context. There is only the Sáez et al. (2022) study on undergraduate teachers that suggests that SRL explains 33.7 % of the changes in the ASE variance, which supports this probable characteristic, despite the fact that it has not been proven in undergraduates nowadays. Therefore, there are still significant gaps in understanding undergraduate student behaviour.

By exploring this aspect, it is possible to learn about the impact that these internal processes have on the belief system on academic performance, which in the short term may generate intervention mechanisms for learning enhancement.

Objectives and hypothesis

As previously mentioned, studies on SRL and ASE are limited, mostly focused on covariance with little impact on influence or predictability, which means that it is important to examine these concerns. While several studies on higher education have been conducted, in the case of Ecuador they are practically nil, hence the need, a *priori*, to develop an analysis that will enable to understand the mechanics of performance and educational life.

Consequently, the objectives of the study are: a) to identify the prevalence of SRL and ASE in a sample of undergraduate students in Ecuador; b) to assess the differences in SRL and ASE according to the gender of the participants; c) to establish the relationship between the variables SRL and ASE in Ecuadorian undergraduate students; and d) to determine the influence of SRL on ASE. It is therefore hypothesised that there is a fairly high correlation among these variables (H_1); furthermore, that there are gender differences (H_2); a moderate and significant relationship (H_3) and that ARA is a predictor of AA (H_4).

Method

Design

The present study is based on a quantitative, descriptive, correlational and explanatory cross-sectional approach (Ato et al., 2013) using structural equation modelling (SEM) which is a technique that combines both multiple regression and factor analysis to understand the levels of association at the level of latent variables (Mueller & Hancock, 2018; Wolf et al., 2013).

Participants

The study sample consisted of 570 undergraduate students from two public universities in Ecuador in the cities of Milagro (Coastal Region) and Riobamba (Highlands Region), chosen for their representativeness and diversity in terms of geographic location and study areas. Seventy-six per cent ($n = 433$) are female and 24 % ($n = 137$) are male, aged between 17 and 56 years ($M = 25.29$ years; $SD = 6.5$ years). Seventy per cent were urban dwellers and 30 per cent were rural. Regarding marital status, 77.8 % were single and 22.2 % were married, divorced and separated.

Participants were selected by non-probabilistic convenience sampling with inclusion criteria. These criteria consisted of: a) being an undergraduate university student from the selected higher education institutions; b) voluntary participation and a signed letter of consent.

Measurements or instrumentation

Self-regulated Learning Inventory Processes (IPAA; Rosário et al., 2007) adapted to undergraduate students (Bruna et al., 2017). This scale aims to identify the students' presence at different levels of the self-regulation of their own learning process through three common phases: preparation, performance and self-reflection. The IPAA is composed of 12 items in 3 dimensions: a) Planning (items 1, 2, 3); b) Execution (items 4, 5, 6, 7) and Evaluation (items 8, 9, 10, 11 and 12). Each item is scored on a five-choice Likert scale, where 1 is *Strongly Disagree* and 5 is *Strongly Agree*. The scale has a reliability of $\alpha = .98$ in a sample of university students. In the present study, the factorial measurement validity is performed using a hierarchical fit model with three first-order factors (planning, implementation and evaluation), and a general second-order factor. The fit values indicate that the proposed model is adequate with $\chi^2 = 116.4$; $p < .001$; $df = 53$; $\chi^2/df = 2.2$; CFI = .999; TLI = .999; SRMR = .022; RMSEA = .046 [.035 - .057]. Finally, SRLI internal consistency is $\alpha = .94$ equivalent to high.

Self-Efficacy Scale of Specific Perceived Academic Situations (EAPESA, Palenzuela, 1983) as validated in Ecuador (Moreta-Herrera et al., 2021). The purpose of this scale is to determine students' ASE levels through a 9-item questionnaire. The response component to items is structured on a 4-option Likert scale ranging from 1 *Never* to 4 *Always*. While there are no specific normative values for the scale, it is considered that the higher the score, the higher the perceived self-efficacy. The cut-off point is 50. Regarding the psychometric properties, the internal consistency of the Spanish version is identified as high with $\alpha = .89$ and temporarily stable with $r = .87$. In the present study, the factorial validity of the scale corresponds to $\chi^2 = 107.6$; $p < .001$; $df = 27$; $\chi^2/df = 3.99$; CFI = .999; TLI = .999; SRMR = .039; RMSEA = .073 [.058 - .087] by using a one-factor fit model which concludes that it has an adequate fit. Furthermore, the internal consistency for this scale is $\alpha = .91$ which is equivalent to high.

Procedure

This research required the consent of the participating institutions. Subsequently, the project was socialized, the objectives were explained and the data collection process was discussed. In addition, the information confidentiality was guaranteed during the process. The survey was conducted virtually through the following Google Form link <https://forms.gle/gsredpLNsM51wV3S9>. The target group of respondents completed the authorized consent form, including socio-demographic data, the EAPESA and IPAA scales. After completing the surveys, the data were filtered and computerized in spreadsheets for statistical analysis, the hypotheses were tested and the respective research reports were elaborated. It is worth noting that the present research took into account the recommendations issued by the Helsinki Convention regarding the ethical handling of information.

Results analysis

The present study involved the management of three blocks of analysis. The first was a descriptive analysis of the study sample characterization. For this, the measures of central tendency (Arithmetic Mean [*M*]), Dispersion (Standard Deviation [*SD*]); Distribution (Skewness [g_1] and Kurtosis [g_2]) were employed. The Kolmogorov-

_____

Smirnov (*K-S*) test was also used to corroborate the assumption of univariate normality, which is met in the absence of statistical significance ($p > .05$).

The second block was a comparative analysis by group (sex) of the variables under study to determine the possible existing statistical differences ($p < .05$). The parametric *t-student* (t) test for independent samples was used.

The third block consisted of the confirmatory factor analysis (CFA) by means of SEM. In this analysis, both the correlation between SRL and ASE (see figure 1) and the explanatory potential in terms of variance change of SRL over ASE (see figure 2) are studied. To this end, CFA with Diagonally Weighted Least Squares (DWLS) estimation was used. This criterion was used due to the absence of normality and the categorical nature of the items (Caycho-Rodríguez et al., 2022; Li, 2016). The fit models were tested based on the absolute indicators such as Chi-square (χ^2), Chi-square normed (χ^2/df) and Standardised Mean Square Residual (SRMR); the relative indicators which are the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI); and the non-centrality based indicator which is the Root Mean Squared Error Approximate (RMSEA). Appropriate fits are considered adequate when the χ2 is not significant (p > .05) or the χ^2/df is less than 4; the CFI and TLI are greater than .95; the SRMR and RMSEA less than .08 and the saturations (λ) greater than .50 (Brown, 2015; Byrne, 2006; Domínguez-Lara, 2018; Moreta-Herrera et al., 2022; Mueller & Hancock, 2018; Wolf et al., 2013).

Data were processed using the R programming language version 4.2.2 (R Core Team, 2022) through the Foreign, Lavaan and MVN packages.

Results

Descriptive analysis

Information in Table 1 shows that SRL, scores are generally high for the global component as well as for its dimensions. On the other hand, ASE mean scores indicate moderate presence as well. It may be observed that SRL does not follow a normal distribution, while for ASE the data are normal.

Table 1
Descriptive Analysis for Self-Regulation Learning and Academic Self-Efficacy

Variables	*M*	*SD*	As.	Ku.	*K-M*
Academic Self-Efficacy	26.24	4.95	-1.21	1.52	.170***
Planning	12.06	3.59	-1.60	1.45	.000***
Implementation	15.51	4.43	-1.50	1.38	.000***
Evaluation	19.56	5.74	-1.47	1.28	.000***
Learning self-regulation	47.13	13.40	-1.64	1.66	.000***

Note. *n* = 570 cases; *M*: arithmetic mean; *SD*: standard deviation; As: Asymmetry; Ku: Kurtosis; *K-M*: Kolmogorov-Smirnov test. *** *p < .001*

Comparative gender analysis

Table 2 shows the mean scores obtained by both men and women on SRL and ASE. There are no significant differences ($p > .05$) in the factor scores and the overall SRL scale, although women report slightly more SRL than men. For ASE, there are also no differences between groups ($p > .05$), although women report slightly more intensity than men.

_____

Table 2
Gender difference analysis in learning self-regulation and academic self-efficacy

Variables	Male		Female		Contrast
	M	*SD*	*M*	*SD*	*t; p*
Planning	11.76	3.44	12.16	3.63	-1.14; *p* > .05
Implementation	15.05	4.44	15.65	4.43	-1.39; *p* > .05
Evaluation	19.07	5.81	19.71	5.71	-1.13; *p* > .05
Learning Self-Regulation	45.88	13.28	47.52	13.43	-1.25; *p* > .05
Academic Self-Efficacy	26.53	5.05	26.15	4.93	0.14; *p* > .05

Note. *p* < .05; *M:* Arithmetic mean; *SD*: Standard Deviation; *t*: t-test; *p*: significance.

Latent class analysis

Figure 1, shows the latent correlation analysis between SRL and ASE using SEM. It shows both positive and moderate covariation between the variables analyzed. Furthermore, the fit values for the overall model SRL-ASE through AFC indicate that they are suitable for the interpretation of the constructs and how they operate in the Ecuadorian university population in terms of the different indicators (absolute, relative and not based on centrality).

Figure 1
General Fit Model for Learning Self-regulation and Academic Self-efficacy
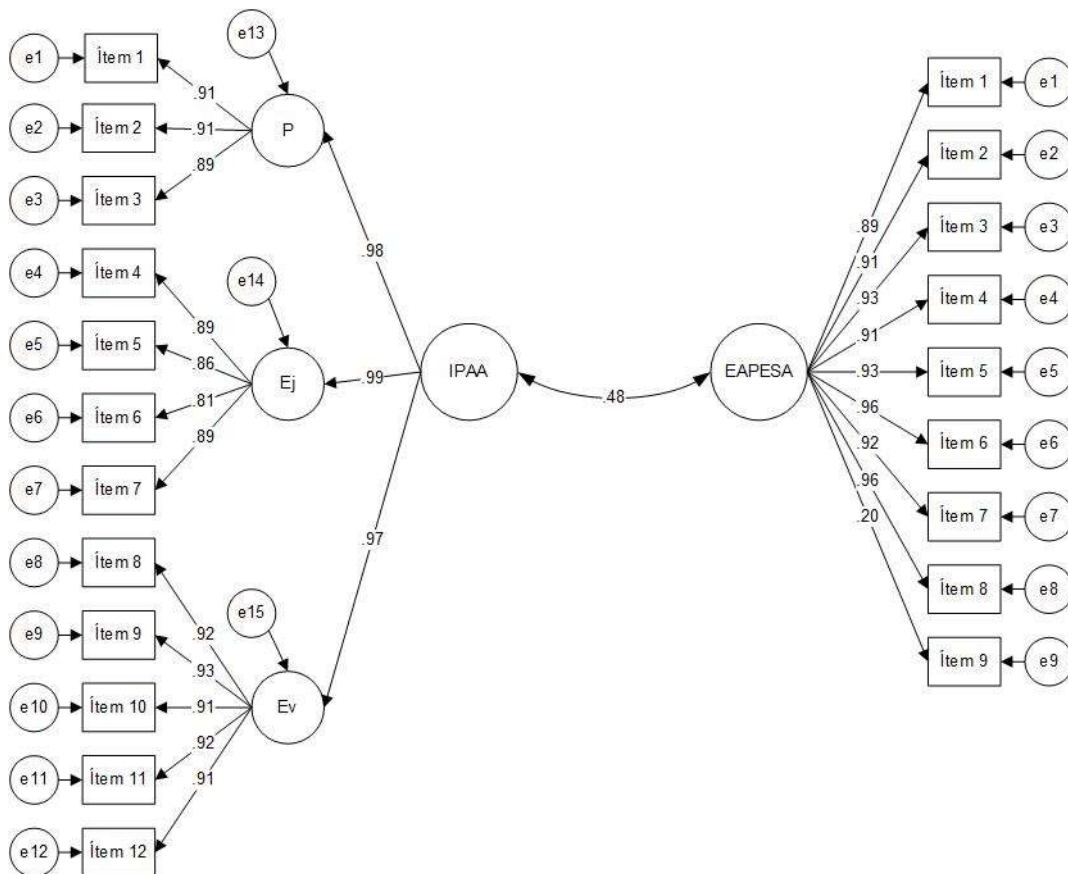
$\chi^2 = 403.1$; $p < .001$; $df = 187$; $\chi^2/df = 2.16$; CFI = .999; TLI = .999; SRMR = .042; RMSEA = .045 [.039-.051]
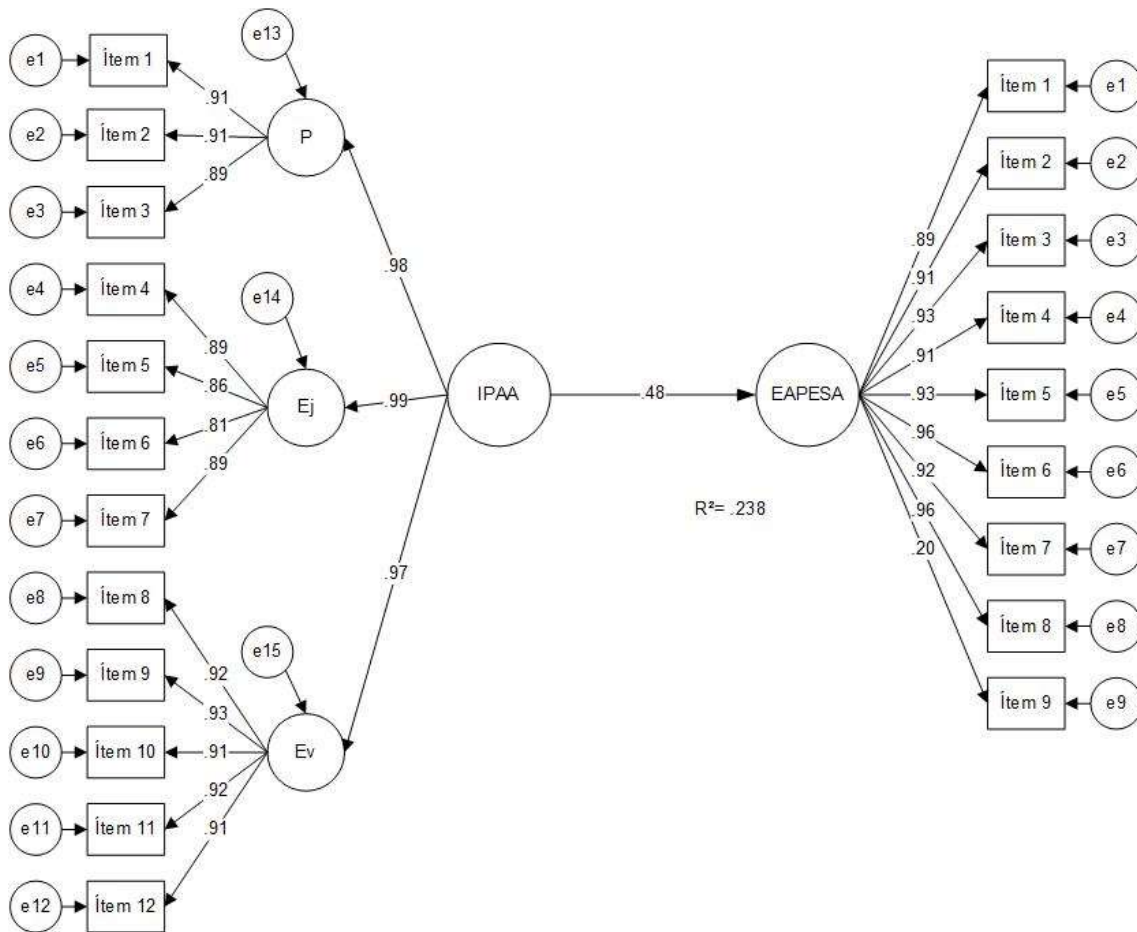
_____

Note. χ^2: Chi square; *DF*: degrees of freedom; χ^2/df: normed Chi square; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; SRMR: Standardized Mean Square Residue; RMSEA: Mean Square Error of Approximation.

Structural regression analysis

Considering the presence of covariance between SRL and ASE, the degree of influence or explanation in the variance changes was identified. To this end, a structural regression analysis with SEM was used as shown in Figure 2. This analysis showed that SRL explained 23.8 % of the changes in the variance of ASE. The structural model showed that it has an adequate fit and is therefore applicable to the Ecuadorian university population. In summary, SRL is a moderate predictor for ASE.

Figure 2

Structural Regression Model of Learning Self-regulation on Academic Self-efficacy

$\chi^2 = 408.1$; $p < .001$; $df = 187$; $\chi^2/df = 2.18$;   CFI = .999;   TLI = .999;   SRMR = .042; RMSEA = .046 [.040-.052]

Nota. χ^2: Chi square; *DF*: degrees of freedom; χ^2/df: normed Chi square; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; SRMR: Standardized Mean Square Residue; RMSEA: Mean Square Error of Approximation.

_____

The general findings suggest a strong association between SRL and ASE among university students, this association is of moderate strength to such an extent that the variability or change in ASE is largely consistent with changes in the variability of SRL, which makes it possible to determine that SRL is a significant predictor of ASE.

Discussion

The aims of this study focused on identifying the prevalence of SRL and ASE, gender differences, the latent correlation between them and the influence of SRL on ASE in an Ecuadorian sample of undergraduate students using structural models (SEM).

With regard to the prevalence of ASE, the levels are moderate, meaning that there is a predisposition to set academic objectives or goals and to create an effort to achieve them. These prevalence results are consistent with preliminary studies of similar trends (Beatson et al., 2018; González et al., 2020; Páez et al., 2017; Panadero, 2017; Reyes & Gutiérrez, 2015; Zimmerman, 2013) conducted outside Ecuador, which suggest that this phenomenon is apparently typical among higher education students. In the case of SRL, it was generally found that the prevalence is high, with a slight superiority in learning planning. This means that students when performing their academic activities and making decisions, make a projection in which they consider planning their activities in order to be effective. These results agree with the preliminary work of Paredes-Proaño & Moreta-Herrera (2020), who consider that planning and self-regulation are essential components in academic learning, but disagree with Burbano et al. (2021), who state that students present deficiencies in the processes of planning, control and self-evaluation of their learning strategies to achieve their academic goals.

With regard to gender, it was found that there are no gender differences in the values obtained in the study sample for both ASE and SRL. In both cases, females slightly outperformed males, but without significant differences ($p > .05$). These findings differ from those reported by Domínguez-Lara and Fernández-Arata (2019) and are consistent with those proposed by Schnell et al. (2015), who conclude that gender is invariant in ASE. On the other hand, in the case of ARA, they also differ from Gaeta et al. (2021) and Zambrano et al. (2018), who state that gender does have an impact on ARA. Given the differences shown in the reference studies, it can still be considered that the results regarding the impact of gender on these attributes are inconclusive.

In terms of the covariance between the variables using structural models, it is confirmed that SRL and ASE are correlated to one another. Furthermore, the relationship existing is moderate and positive, meaning that there is a tendency to achieve academic objectives and goals that enable better control, management and organization of the students' own learning. These results are consistent with similar criteria previously reported in undergraduate samples (Alegre, 2014; Araya et al., 2022; Covarrubias et al., 2019; Gaeta et al., 2021; Luna & Álvarez, 2020), although it is worth noting that the methodologies used are different, as in the reference works the covariances were estimated from observable variables and not as the latent variables presented in this study. Furthermore, there are no specific studies on these findings in Ecuadorian undergraduate students, resulting in a pioneering study for educational research in the country.

Finally, with regard to the influence of SRL on ASE with structural linear regression analysis, SRL explains 23.8 % of the changes in the variance of ASE. Therefore, SRL is estimated to be a moderate predictor of ASE of Ecuadorian undergraduate students. These findings do not show any prior studies on undergraduate students that can be contrasted to these findings. However, it can be considered to have a similar performance with other groups such as university teachers (Sáez et al., 2022). This

also represents an important advance in the study of the impact of SRL in the educational context, considering that no previous studies have been reported, and it allows to evidence its influence.

In terms of research implications, the following factors should be considered. At a theoretical level, the study provides evidence to establish the association and predictability of SRL with ASE in an Ecuadorian sample that has not been previously considered. This reinforces the variables' generality in terms of interacting with one another and with the educational population. At the methodological level, it employs SEM techniques that not only indicate the influence between variables at the observable level but also at the latent level- This enables a better interpretation of the phenomenon, since the results are more precise by integrating the error measurement of the items. This also represents a significant contribution because similar studies have not been conducted before. On a practical level, the results suggest the importance of considering the relationship and predictability between the two variables within the curricular process on the part of teachers and educational institutions to acquire knowledge and competencies. In this way, it will allow a meaningful curriculum design that contributes to learners' profiles based on evidence.

Conclusions

ASE and SRL levels are at moderate-high and high levels respectively for the Ecuadorian sample of undergraduate students. In addition, there are no significant gender differences between them. The correlation is positive and significant between SRL and ASE. Finally, SRL is a positive predictor of ASE in Ecuadorian undergraduate students. All this contributes to the breakdown of traditional teaching schemes and the achievement of results focused not only on what, but also on how they learn to meet university demands.

References

Ahn, H., Bong, M., & Kim, S. (2017). Social models in the cognitive appraisal of self-efficacy information. *Contemporary Educational Psychology*, *48*, 149-166. https://doi.org/10.1016/j.cedpsych.2016.08.002

Alegre, A. (2014). Autoeficacia académica, autorregulación del aprendizaje y rendimiento académico en estudiantes universitarios iniciales. *Propósitos y Representaciones*, *2*(1), 79-120.

Araya, E., López, E., & Guevara, R. (2022). Autorregulación del Aprendizaje y autoeficacia académica: Correlación con el rendimiento académico en estudiantes de ingeniería. *Revista Electrónica de Investigación en Docencia Universitaria*, *4*(1), 67-98. https://doi.org/10.54802/r.v4.n1.2022.99

Ato, M., López, J., & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología*, *29*(3), 1038-1059. https://doi.org/10.6018/analesps.29.3.178511

Bandura, A. (1992). Exercise of personal agency through the self-efficacy mechanism. In R. Schwarcer (Ed.), *Self-efficacy: Thought control of action* (pp. 3-38). Hemisphere Publishing Corp.

Beatson, N., Berg, D., & Smith, J. (2018). The impact of mastery feedback on undegraduate students´ self-efficacy beliefs. *Estudios en Evaluación Educativa*, *59*, 58-66. https://doi.org/10.1016/j.stueduc.2018.03.002

_____

Ben-Eliyahu, A., & Linnenbrink-García, L. (2015). Integrating the regulations of affect, behavior, and cognition into self-regulated learning paradigms among secondary and post-secundary students. *Metacognition Learning*, *10*, 15-42. https://doi.org/10.1007/s11409-014-9129-8

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). Guilford Publications.

Bruna, D., Pérez, M. V., Bustos, C., & Núñez, J. C. (2017). Propiedades psicométricas del inventario de procesos de autorregulación del aprendizaje en estudiantes universitarios chilenos. *Revista Iberoamericana de Diagnóstico y Evaluación-e Avaliação Psicológica, 2*(44), 77-91. https://doi.org/10.21865/ridep44.2.07

Burbano, P., Basantes, M., & Ruiz, I. (2021). Autorregulación del aprendizaje en estudiantes universitarios: un estudio descriptivo. *Cátedra*, *4*(3), 74-92. https://doi.org/10.29166/catedra.v4i3.3048

Byrne, B. (2006). *Structural equation modeling with EQS: basic concepts, applications, and programming.* L. E. Associates.

Callan, G., & Cleary, T. (2019). Examining cyclical phase relations and predictive influences of self-regulated learning processes on mathematics task performance. *Metacognition and Learning*, *14*(1), 43-63. https://doi.org/10.1007/s11409-019-09191-x

Cassidy, S. (2015). Resilience building in students: the role of academic self-efficacy. *Frontiers in Psychology*, *6*, 1781. https://doi.org/10.3389/fpsyg.2015.01781

Caycho-Rodríguez, T., Ventura-León, J., Valencia, P. D., Vilca, L. W., Carbajal-León, C., Reyes-Bossio, M., ... & Petzold, O. (2022). What is the support for conspiracy beliefs about COVID-19 vaccines in Latin America? a prospective exploratory study in 13 countries. *Frontiers in Psychology*, 13, 1885. https://doi.org/10.3389/fpsyg.2022.855713

Covarrubias, C., Acosta, H., & Mendoza, M. (2019). Autorregulación del aprendizaje y autoeficacia general y su relación con las metas académicas en estudiantes universitarios. *Formación universitaria*, *12*(6), 103-114. https://dx.doi.org/10.4067/S0718-50062019000600103

Del Rosal, I., & Bermejo, M. (2017). Autoeficacia en estudiantes universitarios: diferencias entre el grado de maestro en educación primaria y los grados en ciencias. *Revista Internacional de Psicología del Desarrollo y la Educación, 1*(1), 115-123. https://doi.org/10.17060/ijodaep.2017.n1.v1.904

Domínguez-Lara, S. (2018). Propuesta de puntos de corte para cargas factoriales: una perspectiva de fiabilidad de constructo. *Enfermería Clínica*, *28*(6), 401-402. https://doi.org/10.1016/j.enfcli.2018.06.002

Domínguez-Lara, S., & Fernández-Arata, M. (2019). Autoeficacia académica en estudiantes de Psicología de una universidad de Lima. *Revista Electrónica de Investigación Educativa, 21*(32), 1-13. https://doi.org/10.24320/redie.2019.21.e32.2014

Gaeta, M., Gaeta, L., & Rodríguez, M. (2021). Autoeficacia, estado emocional y autorregulación del aprendizaje en el estudiantado universitario durante la pandemia por COVID-19. *Actualidades Investigativas en Educación*, *21*(3), 3-27. https://doi.org/10.15517/AIE.V21I3.46280

González, J., Morón, J., González, V., Abundis, A., & Macías, F. (2020). Autoeficacia académica, apoyo social académico, bienestar escolar y su relación con el rendimiento académico en estudiantes universitarios. *Psicumex*, *10*(2), 95-113. https://doi.org/10.36793/psicumex.v10i2.353

_____

Grunschel, C., Patrzek, J., Klingsieck, K., & Fries, S. (2018). "I'll stop procrastinating now!" Fostering specific processes of self-regulated learning to reduce academic procrastination. *Journal of Prevention & Intervention in the Community*, *46*(2), 143-157. https://doi.org/10.1080/10852352.2016.1198166

Hernández-Barrios, A., & Camargo-Uribe, Á. (2017). Self-regulated learning in higher education in Latin-America: A systematic review. *Revista Latinoamericana de Psicología, 49*(2), 146-160. https://doi.org/10.1016/j.rlp.2017.01.001

Li, C. (2016). Confirmatory factor analysis with ordinal data: Comparing robust maximum likelihood and diagonally weighted least squares. *Behavior Research Methods, 48*(3), 936-949. https://doi.org/10.3758/s1342

Luna, S., & Alvarez, R. (2020). Relación entre autoeficacia académica y autorregulación del aprendizaje en estudiantes de la carrera de tecnología médica. *Revista Veritas et Scientia - UPT*, *9*(2), 170 - 181. https://doi.org/10.47796/ves.v9i2.392

Maddux, J., & Gosselin, J. (2012). *Self-efficacy*. The Guilford Press.

Montes de Oca-Sánchez, C., & Moreta-Herrera, R. (2019). La función predictora de la autoeficacia en la motivación escolar en estudiantes de medicina del Ecuador. *Uniandes EPÍSTEME*, *6*(4), 565-578.

Moreta-Herrera, R., Caycho-Rodríguez, T., Salinas, A., Jiménez, M., Gavilanes-Gómes, D., & Jiménez-Borja, C. (2022). Factorial validity, reliability, measurement invariance and the graded response model for the COVID-19 Anxiety Scale in a sample of Ecuadorians. *OMEGA - Journal of Death and Dying, 0*(0). https://doi.org/10.1177/00302228221116515

Moreta-Herrera, R., Lara-Salazar, M., Camacho-Bonilla, P. & Sánchez-Guevara, S. (2019). Análisis factorial, fiabilidad y validez de la escala de autoeficacia general (EAG) en estudiantes ecuatorianos. *Psychology, Society & Education*, *11*(2). 193-204. https://dx.doi.org/10.25115/psye.v10i1.2024

Moreta-Herrera, R., Montes De Oca, C., Navarro-Cuéllar, L., & Villegas-Villacrés, N. (2021). Validez factorial con estimación robusta de la Escala de Autoeficacia Percibida Específica de Situaciones Académicas (Eapesa) en universitarios ecuatorianos. *Ciencias Psicológicas*, *15*(1), 21-53. https://doi.org/10.22235/cp.v15i1.2153

Mueller, R., & Hancock, G. (2018). Structural equation modeling. In G. Hancock, L. Stapleton, & R. Mueller (Eds.), *The Reviewer's Guide to Quantitative Methods in the Social Sciences* (pp. 445-456). Routledge.

Paciello, M., Ghezzi, V., Tramontano, C., Barbaranelli, C., & Fida, R. (2016). Self-efficacy configurations and wellbeing in the academic context: A person-centered approach. *Personality and Individual Differences*, 99, 16-21. https://doi.org/10.1016/j.paid.2016.04.083

Paez, Y., Burne, C., Mosconi, S., & Montenegro, S. (2017). Actitudes de estudiantes hacia la estadística, antes y después de cursar la asignatura, en una escuela médica Argentina. *Revista de Educación en Ciencias de la Salud*, *14*(2), 109-114.

Palenzuela, D. L. (1983). Construcción y validación de una escala de autoeficacia percibida específica de situaciones académicas. *Análisis y Modificación de conducta*, *9*(21), 185-219. https://doi.org/10.33776/amc.v9i21.1649

Palermo, C., & Thomson, M. (2018). Teacher implementation of self-regulated strategy development with an automated writing evaluation system: effects on the argumentative writing performance of middle school students. *Contemporary Educational Psychology*, 54, 255-270. https://doi.org/10.1016/j.cedpsych.2018.07.002

Panadero, E. (2017). Una revisión del aprendizaje autorregulado: seis modelos y cuatro direcciones para la investigación. *Frontiers in Psychology*, *8*, 422. https://doi.org/10.3389/fpsyg.2017.00422

Paredes-Proaño, F., & Moreta-Herrera, R. (2020). Attitudes towards research y self-regulated learning in university students. *CienciAmérica, 9*(3), 11-26. http://dx.doi.org/10.33210/ca.v9i3.263

Piergiovanni, L., & Depaula, P. (2018). Descriptive study of self-efficacy and stress management among Argentinean university students. *Revista Mexicana de Investigación Educativa, 23*(77), 413-432.

R Core Team. (2022). R: *A language and environment for statistical computing*. R Foundation for Statistical.

Regatto-Bonifaz, J., & Viteri-Miranda, V. (2022). Análisis de las estrategias de enseñanza multimodal en los estudiantes universitarios del Ecuador. *Veritas & Research*, *4*(1), 4-15.

Regatto-Bonifaz, J., & Viteri-Miranda, V. (2023). Attitude towards technology and its relationship with Academic self-efficacy in Ecuadorian university students. *Journal of Namibian Studies: History Politics Culture*, *33*, 3216-3233. https://doi.org/10.59670/jns.v33i.2807

Reyes, M., & Gutiérrez, J. (2015). Sentido de autoeficacia en investigación de estudiantes de posgrado. *Sinéctica*, *45*, 1-15.

Rosário, P., Mourao, R., Núñez, J., González, J., Solano, P., & Valle, A. (2007). Eficacia de un programa instruccional para la mejora de procesos y estrategias de aprendizaje en la educación superior. *Psicothema*, 19(3), 422-427. https://digibuo.uniovi.es/dspace/handle/10651/26418

Sáez, F., López, Y., Mella, J., & Casanova, D. (2022). Prácticas docentes para promover la autorregulación del aprendizaje durante la pandemia COVID-19: escalas de medición y modelo predictivo. *Formación Universitaria*, *15*(1), 95-104. https://doi.org/10.4067/s0718-50062022000100095

Schnell, K, Ringeisen, T, Raufelder, D., & Rohrmann, S (2015). The impact of adolescents' self-efficacy and self-regulated goal attainment processes on school performance – Do gender and test anxiety matter? *Learning and Individual Differences, 38*, 90-98. https://doi.org/10.1016/j.lindif.2014.12.008

Torrano, F., & Soria, M. (2017). Diferencias de género y aprendizaje autorregulado: el efecto del rendimiento académico anterior. *Revista Complutense de Educación*, *28*(4), 1027-1042. http://doi.org/10.5209/RCED.51096

Van de Pol, J., de Bruin, A.B.H., van Loon, M.H., & van Gog, T. (2019). Students' and teachers' monitoring and regulation of students' text comprehension: Effects of comprehension cue availability. *Contemporary Educational Psychology*, *56*, 236-249. https://doi.org/10.1016/j.cedpsych.2019.02.001

Wang, C., Shannon, D., & Ross, M. (2013). Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. *Distance Education*, *34*(3), 302-323. https://doi.org/10.1080/01587919.2013.835779

Wolf, E., Harrington, K., Clark, S., & Miller, M. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and psychological measurement, 73*(6), 913-934. https://doi.org/10.1177/0013164413495237

_____

Zambrano C., Albarran F., & Salcedo P.A. (2018). Percepción de estudiantes de pedagogía respecto de la autorregulación del aprendizaje. *Formación Universitaria, 11*(3), 73-86. http://dx.doi.org/10.4067/S0718-50062018000300073

Zimmerman, B. (2013). From cognitive modeling to self-regulation: A social cognitive career path. *Educational Psychologist*, *48*(3), 135-147. https://doi.org/10.1080/00461520.2013.794676

Data availability: The dataset supporting the results of this study is not available.

How to cite: Regatto-Bonifaz, J. P., Viteri-Miranda, V. M., & Moreta-Herrera. R. (2023). Learning self-regulation as a predictor of academic self-efficacy in Ecuadorian undergraduate students. *Ciencias Psicológicas*, *17*(2), e-3254. https://doi.org/10.22235/cp.v17i2.3254

Authors' participation: a) Conception and design of the work; b) Data acquisition; c) Analysis and interpretation of data; d) Writing of the manuscript; e) Critical review of the manuscript.
J. P. R. B. has contributed in a, b, c, d, e; V. M. V. M. in a, b, c, d, e; R. M. H. in a, c, e.

Scientific editor in-charge: Dra. Cecilia Cracco.