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Learner Engagement, academic motivation and learning strategies of university students

Learner engagement, motivación académica y estrategias de aprendizaje de estudiantes universitarios

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ABSTRACT

The establishment and promotion of effective learning strategies in the university context is essential for improving academic performance and personal development. This stage is based on the convergence of behavioural, cognitive and emotional factors, which allow students to successfully adjust to the demands of the academic context as well as define their strategies. The aim of this research is to study the learner engagement enhancement effect between motivation and learning strategies. A reflective structural equation model (PLS-SEM) was applied according to the proposed theoretical framework, from an explanatory-predictive perspective. In this study, 648 university students participated, 417

were women (64.3%) and 231 were men (31.7%), with a mean age of 19.40 years (±3.67). The instruments used were: *Échelle de Motivation en Éducation* (EME), *Utrecht Work Engagement Scale* (UWES) and *Learning Strategies Scale* (ACRA). The results showed the relationship between variables, with the following coefficients of determination: learning strategies [(Q^2 = .295); (R^2 = .456)]; engagement [(Q^2 = .314); (R^2 = .364)], in the model estimation, indicating an adequate fit. In addition, the learner engagement enhancement effect between motivation and learning strategies was corroborated and contrasted with the empirical evidence. This research has shown that there is a significant relationship between the variables under study. This confirms the need to implement cross-disciplinary training in learning strategies based on internal factors, such as learner engagement and motivation, in order to strengthen both adaptive processes and personal and academic performance.

Keywords: learner engagement, learning strategies, university students, motivation

RESUMEN

Establecer y promover estrategias de aprendizaje eficaces en el contexto universitario resulta fundamental para la mejora del rendimiento académico y desarrollo personal. Esta etapa se sustenta en la confluencia de factores estratégicos conductuales, cognitivos y emocionales, que permiten al alumnado ajustarse satisfactoriamente a las demandas del contexto académico y definir sus estrategias. El objetivo de esta investigación es estudiar el efecto mediador del *learner engagement* entre la motivación y las estrategias de aprendizaje. Se aplicó un modelo reflectivo de ecuaciones estructurales (PLS-SEM) en función del marco teórico propuesto, desde una perspectiva explicativa-predictiva. En este estudio, participan 648 estudiantes universitarios, de los Grados de Educación, 417 son mujeres, (64.3%) y 231 hombres (31.7%), con una edad media de 19.40 años (±3.67). Se utilizaron los instrumentos: *Échelle de Motivation en Éducation* (EME), *Escala Utrecht de Engagement en el Trabajo* (UWES) y *Escala de Estrategias de Aprendizaje* (ACRA). Los resultados mostraron la relación entre variables, siendo los coeficientes de determinación: estrategias de aprendizaje [(Q^2 = .295); (R^2 = .456)]; learner engagement [(Q^2 = .314); (R^2 = .364)], en la estimación del modelo, indicando un ajuste adecuado. Además, se corroboró el efecto potenciador del *learner engagement* entre la motivación y las estrategias de aprendizaje. La presente investigación ha demostrado que existe relación significativa entre las variables de estudio, constatando la necesidad de implementar formación transversal en estrategias de aprendizaje a partir de factores internos, como *learner engagement* y motivación, para fortalecer tanto los procesos adaptativos como el rendimiento personal y académico.

Palabras clave: *learner engagement*, estrategias de aprendizaje, estudiantes universitarios, motivación

INTRODUCTION

The university stage is a complex time because of the combination of different factors related to the environment and an increased independence, where greater responsibilities, dedication and academic efforts must be assumed in a new and demanding environment (van Rooij et al., 2018). This adaptive process to the university context is related to motivation, emotional development, development of learning strategies and academic performance (Cobo-Rendón et al., 2022). This connection involves a process that forces students to be aware of their motives and to control the selection and use of strategies in their learning task. This link between motivation, task involvement and strategy build a dynamic set of relationships that come together in the act of learning (Biggs, 1993). Research has shown that learner engagement and motivation are key factors influencing students' academic adaptation and performance (Li et al., 2017). To ignore the difference between motivation and feelings of well-being regarding an academic challenge would be to neglect the essence that promotes closer interrelation with the environment and predisposition towards the task, as well as the use of better strategies (Santana-Monagas et al., 2022).

Most research related to academic performance and task predisposition of university students has considered the early identification of socio-emotional factors as predictors of university dropout (Denle et al., 2020). Similarly, other studies have considered this stage as a critical period. It could be addressed through institutional strategies (Bélanger & Ratelle, 2021), to identify those factors that positively affect academic performance, including components associated with cognitive and affective processes that highlight the determinant role of motivation, learner engagement, self-concept or learning goals (Sandoval-Muñoz et al., 2018). Thus, the research we propose seeks to explore in depth from this perspective, to discover whether motivation and learner engagement are related and, if so, in what way they are related to learning strategies.

Learner engagement

One of the variables closely related to student achievement and the adaptive process in the university context is learner engagement or involvement in the task (van Rooij et al., 2018). This is expressed through the feeling of well-being to overcome obstacles (Salanova & Schaufeli, 2009; Schaufeli, 2017), beyond the conditioning factors and commitments acquired. It includes three dimensions: vigour or mental strength, which is manifested during the development of the task and allows to remain in the activity constantly; dedication or mental process, where

the student performs the task with motivation, involvement and enthusiasm; finally, absorption or state of well-being where the student can abstract in the development of the activity, (Schaufeli, 2017). Learner engagement is an ability to engage emotionally, cognitively and behaviourally in a task, activity or situation in the university educational context. It relates to the active and positive involvement of students in their learning process and has been shown to be associated with higher academic performance and greater long-term knowledge retention. In the university context, learner engagement is key for the development of better learning strategies in students. There is a close relationship between learner engagement and motivation, being relevant its development in educational contexts, related to learning strategies (Sharp et al., 2020; Truta et al., 2018).

Academic motivation

Another of the relevant variables for the development of learning strategies is motivation, which is defined as those perceived forces that induce a person to act and develop those strategies that are most suitable for achieving their academic goals (Ryan & Deci, 2019). In the university context, different studies have highlighted the incidence of greater or lesser motivation in the development of learning strategies. This construct is understood as a key factor in behaviour, depending on a set objective, focusing its content on the importance of internal resources for personal development, self-regulated behaviours and contextual aspects that favour or diminish motivation, according to the Theory of Self-Determination (Deci & Ryan, 1985). From this perspective, motivation is an internal factor that helps to develop self-motivation mechanisms for study, coexistence with peers and involvement in the task (Ben-Eliyahu et al., 2018). Research has shown that self-motivated students learn more, have a better understanding and retention of information, and experience less anxiety and distress in the academic context (Oriol-Granado et al., 2017). By achieving this, the desire to continue learning, which is one of the main goals of education, is fostered. Similarly, motivation is also influenced by external factors (Werner & Milyavskaya, 2018).

Motivation can be intrinsic, i.e., performing an action for satisfaction without expecting a tangible reward; and extrinsic, as a construct that is applied whenever an activity is performed to achieve some result (Zimmerman, 2008). Some research that has analysed motivation in university contexts from the perspective of achieving the goals set (Oriol-Granado et al., 2017; Werner & Milyavskaya, 2018), has noted the importance and prevalence of the contributions of goal orientation theory in the development of learning strategies. These theories (Ben-Eliyahu et al., 2018) explain learner motivation based on interests and commitments to the task.

Learning strategies

Learning strategies consist of making decisions about the most appropriate means to achieve the objectives and goals established. It is essential to create appropriate situations for the development of learning strategies (Williams-Oyarce et al., 2022), which include control and socio-emotional elements, related to the student's internal regulation. Research on learning strategies has corroborated their relevance, by differentiating people with different cognitive traits, which allows the transfer of knowledge according to complexity and adaptive processes, key to effective learning (Ergen & Kanadli, 2017). In the university context, a qualitative step forward takes place, where the student must establish different learning strategies that allow him/her to relate, apply and transfer knowledge to achieve the objectives set (De la Fuente & Justicia, 2003). Specifically, it has been corroborated that the development of learning strategies is related to cognitive and emotional factors, and that this relationship favours better academic performance (Ergen & Kanadli, 2017). Specifically, this research uses the 44-item Learning Strategies Scale (ACRA), which has shown good psychometric properties (De la Fuente & Justicia, 2003). Similarly, this scale has been positively related to socio-emotional support and academic engagement (Álvarez et al., 2015), in addition to increased positive emotions and greater motivation towards academic activity.

Academic motivation and learner engagement

Personal resources are self-assessments related to one's perceived ability to control and influence the surrounding context. These self-evaluations predict goal setting, goal development and increased task motivation (Ben-Eliyahu et al., 2018). Learner engagement is a persistent motivational state that students develop in relation to their academic activity, which manifests itself in the level of active participation in academic activities (Reeve, 2013). Therefore, learner engagement and academic motivation are factors that have shown a positive relationship, related to higher academic performance of university students (Oriol-Granado et al., 2017; Werner & Milyavskaya, 2018), being predictor variables of higher or lower performance adjustment and learning strategies.

Hypothesis 1 (H1): Academic motivation and learner engagement are related variables, which indicate the intensity and persistence of individuals' effort to achieve their goals.

Academic engagement in the development of learning strategies

Learner engagement as a positive attitude of involvement towards the development of learning strategies and persistence towards the academic task, includes behavioural and affective elements, such as a positive predisposition towards the task; and cognitive elements, such as a preference for challenges, autonomy and involvement in the tasks (Sandoval-Muñoz et al., 2018). In other words, a high level of learner engagement is positively related to the predisposition towards homework and the development of study habits. High-achieving students are characterised by being more autonomous, having a positive self-perception of their own learning strategies and having extensive control over their study habits, managing adverse situations adaptively (Ferrer et al., 2020). To put this into practice, it is worth asking the question: does learner engagement influence the development of learning strategies in university students? Based on the assumption that students with high levels of learner engagement will be able to develop better study habits and task involvement, the following hypothesis is put forward:

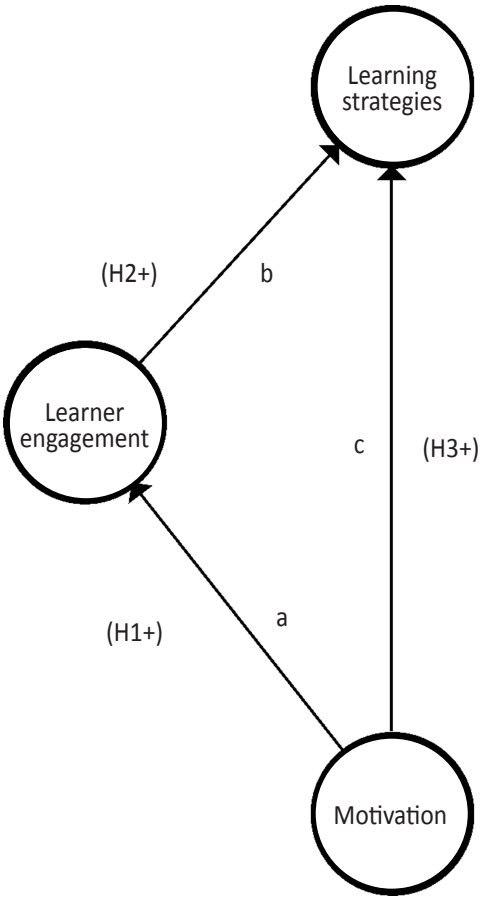
Hypothesis 2 (H2): Higher levels of learner engagement will be related to the optimisation of better learning strategies and task control.

Academic motivation, learner engagement and learning strategies

Learner engagement has been related to contextual factors that can either promote or reduce the motivation level towards the task (Rigo & Amaya, 2020; Perkmann et al., 2021). This is especially true in the university context, affecting affective, behavioral and cognitive components (Larson et al., 2019). Related to the motivational components (interest shown by students) or commitment to the task, the positive relationship with learning strategies has been demonstrated (Smith et al., 2020). Therefore, the improvement of academic strategies and skills will be determined by greater learner engagement (Agger & Koenka, 2019).

Hypothesis 3 (H3): Academic motivation and learner engagement will promote the development of better learning strategies.

Figure 1
Proposed Theoretical Model



METHOD

Participants

The sample is made up of 648 university students from the Education Degrees, which belong to the Faculties of Humanities and Education Sciences in Andalusia (Spain). Of the distribution by sex in the education degrees, the majority are women, 417 (64.3%) and 231 (35.7%) are men, with an average age of 19.40 years (±3.67). 62.5% belong to the University Degree in Primary Education and 37.5% to the degree in Early Childhood Education. Specifically, the number of predictors of learning strategies in our model is 2. The results of the statistical power analysis (Cohen, 1988) show a power of .923 above 80% and at 5% significance level to observe R2 values of less than 10%. Therefore, no problems related to the adequacy of the sample size were found.

Instruments

Échelle de Motivation en Éducation (EME) of Vallerand et al. (1989), which was adapted in Spanish by Núñez et al. (2005). It consists of 28 items, distributed in seven subscales that correspond to the three degrees of autonomy on which behaviours are based according to Deci and Ryan's (1985) self-determination theory. Thus, motivation can be expressed from lack of control to self-determination, distributed in seven dimensions of four items each that assess the three types of MI (MI to knowledge, MI to achievement and MI to stimulating experiences), three types of ME (external regulation, introjected regulation and identified regulation) and amotivation. In our sample the reliability of the scale scores is Cronbach's α = .944 and McDonald's ω = .947.

Utrecht Work Engagement Scale (UWES) developed by Schaufeli and Bakker (2004). The Spanish version of the UWES-S scale for students (Belando et al., 2012) was used. It is a self-report questionnaire made up of 17 items that analyse the three dimensions that compose it: vigour, dedication and absorption. It has a Likert-type scale with seven response options. Schaufeli & Bakker (2004) reported that the UWES scale has an internal consistency reliability with Cronbach's alpha values ranging from .80 to .90. In our sample the reliability of the scale scores is Cronbach's α = .928 and McDonald's ω = .932.

Learning strategies scale (ACRA) developed by De la Fuente and Justicia, (2003). It used the version for university students of the scale designed by Román and Gallego (1994) that measures the use of strategies during the learning process. It is an inventory of 44 Likert-type items with 7 response options that assesses three

components of the strategies involved in learning according to the principles of information processing: cognitive and learning control strategies; learning support strategies; study habits. The internal consistency index for the total of 44 items is Cronbach's α = .92 and McDonald's ω = .91. In our sample the reliability of the scale scores is Cronbach's α = .944 and McDonald's ω = .947.

Procedure

The ethical guidelines promoted and encouraged by national and international regulations for the conduct of research involving human subjects were followed. All data were treated in accordance with EU Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016, both on Personal Data and Organic Law 3/2018 of 5 December on guaranteeing digital rights. Participants were assured that their responses would be kept anonymous and confidential, and that all information provided would be used for scientific purposes only. The instrument was administered individually through the platform Google (Google forms), subject to the informed consent of each participant. The researchers explained to the participants the purpose of the research, as well as the guidelines for proper compliance and confidentiality of the data, requesting the voluntary collaboration of the students. Data were collected and quality checked, always ensuring that the process conformed to the ethical principles for research as defined in the Declaration of Helsinki (World Medical Association, 2013).

Data analysis

Descriptive statistics (means and standard deviations) were obtained. Previously, the Hot-Deck multiple-entry method was applied to reduce bias while preserving the joint and marginal distributions (Lorenzo-Seva & Van-Ginkel, 2016), by analysing a priori the validity, reliability (Cronbach's alpha and Omega coefficient) and internal consistency of each instrument, using Confirmatory Factor Analysis (CFA), to verify the psychometric properties of the questionnaire and obtain the factor loadings of each item. The normality analysis was carried out using multivariate hypothesis testing, resulting in a non-normal distribution. The analyses were carried out using the Amos programme (Version 25.0, IBM SPSS), the Jamovi software (The Jamovi Project, 2020) in its Version 1.2 and SmartPLS (version 3.3.6). The coefficients considered in this research were the $\chi 2/df$ ratio, the root mean square error of approximation (RMSEA), the comparative fit index (CFI) and the Tucker-Lewis index (TLI). The goodness of fit of the model was considered satisfactory when the TLI and CFI ≥ .95, and the RMSEA was close to .07 (Kline, 2016). We used the Partial Least

Squares (PLS) technique for explanatory and predictive purposes for the dependent variables and types of relationships, direct and indirect. Statistical significance required a 95% confidence level (significance p<.05).

RESULTS

The assumptions of multicollinearity, homogeneity and homoscedasticity were analysed to verify that the resultant distribution met the criteria of dependence between variables. From the data obtained with each of the instruments (Table 1, 2 and 3), a Confirmatory Factor Analysis (CFA) was performed to verify the validity and internal structure of each item.

Table 1
Factor loadings of learning strategies

Latent factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
Cognitive strategies and learning control strategies	Item 1	.943	.946	.630	.0774	8.14	< .001	.530	.525	.922
	Item 2	.944	.946	.605	.0974	6.22	< .001	.418		
	Item 3	.943	.946	.585	.0729	8.02	< .001	.523		
	Item 4	.943	.946	.718	.0880	8.16	< .001	.531		
	Item 5	.943	.945	.601	.0703	8.55	< .001	.552		
	Item 6	.943	.945	.768	.0820	9.36	< .001	.595		
	Item 7	.943	.945	.627	.0726	8.64	< .001	.557		
	Item 8	.943	.945	.712	.0800	8.90	< .001	.571		
	Item 9	.943	.945	.752	.0857	8.77	< .001	.564		
	Item 10	.943	.946	.772	.0964	8.01	< .001	.523		
	Item 11	.942	.945	.718	.0704	10.19	< .001	.637		
	Item 12	.943	.945	.695	.0663	10.49	< .001	.652		
	Item 13	.942	.944	.836	.0692	12.08	< .001	.724		
	Item 14	.942	.944	.879	.0661	13.30	< .001	.775		
	Item 15	.943	.945	.677	.0759	8.92	< .001	.573		
	Item 16	.942	.945	.846	.0896	9.44	< .001	.599		
	Item 17	.943	.945	.677	.0768	8.83	< .001	.567		

Latent factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
	Item 18	.942	.945	.800	.0831	9.63	< .001	.609		
	Item 19	.943	.945	.634	.0729	8.70	< .001	.560		
	Item 20	.943	.946	.693	.0840	8.25	< .001	.536		
	Item 21	.943	.946	.566	.0810	6.98	< .001	.463		
	Item 22	.943	.945	.668	.0846	7.90	< .001	.517		
	Item 23	.943	.944	.468	.0681	6.87	< .001	.457		
	Item 24	.943	.946	.589	.0752	7.83	< .001	.512		
	Item 25	.943	.945	.565	.0618	9.13	< .001	.583		
Learning support strategies	Item 26	.943	.945	.778	.0866	8.99	< .001	.583	.555	.875
	Item 27	.942	.945	.806	.0731	11.03	< .001	.685		
	Item 28	.944	.946	.632	.0937	6.74	< .001	.456		
	Item 29	.943	.946	.650	.0905	7.18	< .001	.483		
	Item 31	.943	.946	.822	.0869	9.46	< .001	.611		
	Item 32	.944	.946	.784	.1004	7.81	< .001	.520		
	Item 33	.943	.946	.712	.0924	7.71	< .001	.513		
	Item 34	.942	.945	.833	.0677	12.30	< .001	.743		
	Item 35	.943	.945	.687	.0706	9.73	< .001	.623		
	Item 36	.943	.945	.658	.0615	10.70	< .001	.672		
	Item 37	.943	.945	.580	.0581	9.99	< .001	.636		
	Item 38	.943	.945	.792	.0915	8.66	< .001	.568		
	Item 39	.943	.945	.849	.0939	9.04	< .001	.590		
Study habits	Item 40	.943	.945	1.265	.0851	14.87	< .001	.862	.536	.774
	Item 41	.944	.946	1.180	.0803	14.69	< .001	.857		
	Item 42	.943	.946	.702	.0821	8.55	< .001	.572		
	Item 43	.944	.946	.466	.0992	4.70	< .001	.335		
	Item 44	.943	.945	.694	.0890	7.80	< .001	.529		

Note: CR: Composite reliability. AVE: Average variance extracted. *: Significant p < 0.05 (2 tails).

The factor loadings for the items of the Learning Strategies Scale (ACRA) for university students (De la Fuente & Justicia, 2003), presented an adequate fit (Hair et al., 2021), $\chi 2/df$ = 2.334, with CFI = .919, SRMR = .067, RMSEA = .077. The reliability of this scale was Cronbach's α = .944 and McDonald's ω = .947.

Table 2
Motivation factor loadings

Latent Factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
External regulation	Item 1	.907	.916	.820	.0795	10.31	< .001	.652	.591	.851
	Item 8	.904	.913	.963	.0696	13.83	< .001	.807		
	Item 15	.907	.916	1.095	.0738	14.84	< .001	.847		
	Item 22	.910	.919	.953	.0763	12.49	< .001	.755		
Injected regulation	Item 7	.908	.917	.985	.0916	10.75	< .001	.688	.608	.849
	Item 14	.907	.916	.785	.0886	8.87	< .001	.593		
	Item 21	.911	.919	1.094	.1118	9.79	< .001	.652		
	Item 28	.909	.918	1.286	.0856	15.03	< .001	.855		
Regulation identified	Item 3	.908	.916	.850	.0940	9.04	< .001	.601	.604	.818
	Item 10	.907	.915	1.125	.0921	12.22	< .001	.754		
	Item 17	.906	.915	1.324	.0887	14.94	< .001	.874		
	Item 24	.906	.915	.872	.0856	10.18	< .001	.663		
My to the knowledge	Item 2	.905	.914	.784	.0771	10.17	< .001	.662	.582	.887
	Item 9	.904	.913	.731	.0706	10.35	< .001	.671		
	Item 16	.916	.923	.896	.0857	10.46	< .001	.674		
	Item 23	.915	.922	.914	.0731	12.50	< .001	.766		
My to achievement	Item 6	.914	.922	1.171	.0985	11.88	< .001	.720	.636	.819
	Item 13	.915	.923	1.072	.1018	10.53	< .001	.657		
	Item 20	.906	.914	1.094	.0989	11.05	< .001	.687		
	Item 27	.906	.914	1.293	.0836	15.47	< .001	.870		
My to stimulating experiences	Item 4	.904	.913	1.163	.0735	15.83	< .001	.869	.751	.900
	Item 11	.904	.913	1.251	.0873	14.33	< .001	.816		
	Item 18	.907	.916	1.313	.0827	15.87	< .001	.871		

Latent Factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
	Item 25	.904	.913	1.362	.0797	17.08	< .001	.910		
Amotivation	Item 5	.907	.916	1.046	.0808	12.95	< .001	.772	.667	.839
	Item 12	.910	.919	.970	.0752	12.91	< .001	.776		
	Item 19	.908	.917	1.074	.0875	12.28	< .001	.740		
	Item 26	.907	.916	.976	.0976	11.80	< .001	.720		

Note: CR: Composite reliability. AVE: Average variance extracted. *: Significant p < 0.05 (2 tails).

The factor loadings for the Échelle de Motivation en Éducation (EME) items presented an adequate fit (Hair et al., 2021), $\chi 2/df$ = 3.034, with CFI = .908, SRMR = .053, RMSEA = .069. The reliability of this scale was Cronbach's α = .911 and McDonald's ω = .919.

Table 3

Learner engagement factor loadings

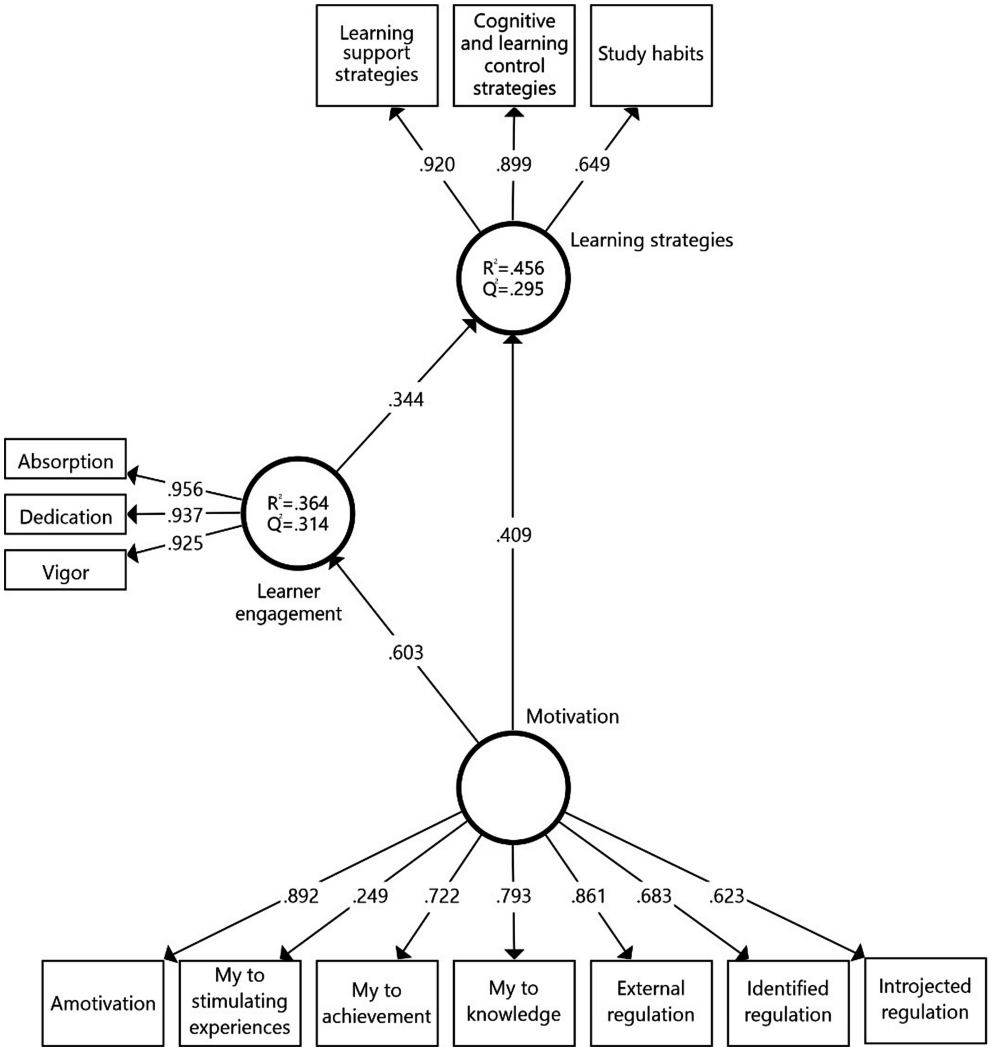
Latent Factor	Indicator		α	ω	Estimation	SE	Z	p	β	AVE	CR
Vigor	Item 1	.926		.930	.616	.0666	9.25	< .001	.592	.643	.855
	Item 4	.924		.928	.775	.0680	11.40	< .001	.698		
	Item 8	.927		.930	.726	.0878	8.27	< .001	.541		
	Item 12	.928		.931	.705	.0940	7.50	< .001	.493		
	Item 15	.924		.928	.692	.0652	10.61	< .001	.657		
	Item 17	.927		.931	.647	.0840	7.70	< .001	.504		
Dedication	Item 2	.922		.926	.988	.0731	13.51	< .001	.781	.611	837
	Item 5	.921		.924	.950	.0672	14.15	< .001	.809		
	Item 7	.925		.929	.799	.0809	9.87	< .001	.618		
	Item 10	.922		.925	.803	.0594	13.52	< .001	.780		
	Item 13	.926		.930	.684	.0793	8.61	< .001	.551		
Absorption	Item 3	.922		.925	.859	.0616	13.94	< .001	.792	.583	.846
	Item 6	.923		.927	.827	.0745	11.10	< .001	.672		
	Item 9	.921		.925	.882	.0660	13.37	< .001	.770		
	Item 11	.924		.927	.768	.0664	11.56	< .001	.690		
	Item 14	.922		.926	.848	.0697	12.18	< .001	.720		
	Item 16	.927		.931	.534	.0717	7.44	< .001	.480		

Note: CR: Composite reliability. AVE: Average variance extracted. *: Significant p < 0.05 (2 tails).

Factor loadings for the Utrech Engagement Scale (UWES) items showed adequate fit (Hair et al., 2021), χ2/df = 3.324, with CFI = .963, SRMR = .058, RMSEA = .077. The reliability of this scale was Cronbach's α = .928 and McDonald's ω = .932.

Figure 2

Results of the structural model



Estructural Model

To assess the robustness of the factor loadings and the significance between variables, the Bootstrapping procedure was used with 2000 subsamples (Hair et al., 2021). This resulted in the structural model (Figure 2), where the variables considered in this study are reported. The predictive relevance and standardised regression coefficient or path coefficient of learning strategies [(Q2 = .295); (R^2 = .456)]; learner engagement [(Q2 = .314); (R^2 = .364)], in the estimation of the measurement model, indicated a moderate model fit. In this regard, R^2 values above .67 indicate a substantial model fit and above .33 a moderate fit.

Table 4 presents Cronbach's alpha, Omega coefficient, external loadings and composite reliability index (CFI) scores. In relation to the convergent validity or degree of certainty that the proposed indicators measure the same latent variable or factor, through the estimation of the average variance extracted (AVE), the values must be greater than .5, according to the criteria of Becker et al. (2018). That is, a high value of (AVE) will have a better representation of the loading of the observable variable.

Table 4
Correlation weights, reliability estimates and convergent validity statistics

Variable	α	Composite reliability index (CFI)	Rho_A	Average variance extracted (AVE)
Learner engagement	.934	.958	.936	.883
Learning strategies	.776	.868	.863	.692
Motivation	.795	.846	.888	.515

Note: In accordance with recommendations made by Ghasemy, Teroovengadum, et al. (2020), one-tailed 95 % percentile confidence intervals [5 %, 95 %] of reliability and validity statistics were provided. CR = composite reliability; AVE = average variance extracted.

Discriminant validity (Table 5) shows the difference between the latent variable, to determine the statistical differentiation of each factor with respect to the others, indicating in bold the square root of the mean variance extracted (Martínez-Ávila & Fierro-Moreno, 2018).

Table 5
Measurement model. Discriminant validity

Fornell–Larcker Criteria	1	2	3
1. Learner engagement	**.940**		
2. Learning strategies	.591	**.832**	
3. Motivation	.603	.617	.718
Heterotrait–Monotrait ratio (HTMT)	**1**	**2**	**3**
1. Learner engagement			
2. Learning strategies	.655		
3. Motivation	.627	.712	

Note: Fornell-Larcker criteria: the diagonal elements (in bold) are the square root of the shared variance between the constructs and their measures (average variance extracted). The diagonal items are the correlations between constructs. For discriminant validity, the diagonal items must be larger than the off-diagonal items. n / a. not applicable.

Discriminant validity (Table 6) was analysed through the analysis of the cross-loadings of each of the latent variables and their respective observed variables, where the loadings were higher than the rest of the variables (Ramírez-Asís et al., 2020).

Table 6
Cross-loadings (latent and observable variables).

Variable	Learner engagement	Learning strategies	Motivation
Learner engagement			
Absorption	**.956**	.548	.603
Dedication	**.937**	.526	.531
Vigor	**.925**	.590	.564
Learning strategies			
Learning support strategies	.607	**.920**	.626
Cognitive strategies and learning management strategies	.532	**.899**	.513
Study habits	.254	**.649**	.352

Variable	Learner engagement	Learning strategies	Motivation
Motivation			
Amotivation	.510	.549	.892
External regulation	.629	.575	.861
Identified regulation	.475	.376	.683
Intriyected regulation	.148	.328	.623
My to achievement	.264	.283	.722
My to knowledge	.474	.573	.793
My to stimulating experiences	.238	.185	.249

Table 7 shows the results of the hypothesis testing, following the criteria of Hair et al. (2021), where the causal relationship with the latent variables can be observed. The t-test was obtained (values higher than 1.96 indicate the coherence of the reflective model. In this research, the results that showed a higher value were: learner engagement → learning strategies (β = .344, t = 3.937, p<.001); motivation → learner engagement (β = .603, t = 8.311, p<.001) and motivation → learning strategies (β = .409, t = 4.388, p<.001).

Table 7
Path coefficient (standardised regression coefficient)

Relationship between variables	Path coefficient (β)	Standard deviation (σ)	Statistic t	p
Learner engagement → Learning strategies	.344	.087	3.937	***
Motivation → Learner engagement	.603	.073	8.311	***
Motivation → Learning strategies	.409	.093	4.388	***

Note: *=*p*<.05; **= *p*<.01; ***=*p*<.001.

DISCUSSION AND CONCLUSIONS

This research has made it possible to analyse different cognitive and emotional aspects of university students enrolled in the Education Degrees, from the Faculties of Humanities and Education Sciences in Andalusia (Spain), on the relationship between learner engagement, motivation and the development of learning strategies in the educational processes. From this perspective, it relates the involvement and

control level of learning strategies, from a cognitive, behavioral and emotional level of the university student (Cobo-Rendón et al., 2022). In addition, this research confirms the potential level of motivation between learner engagement and learning strategies, which corroborates different studies that argue that the most motivated students, who have high levels of learner engagement, will be able to develop better study strategies and involvement in the task (Agger & Koenka, 2019; Ben-Eliyahu et al., 2018; Oriol-Granado et al., 2017; Werner & Milyavskaya, 2018).

According to the first hypothesis (H1), the results indicated that academic motivation and learner engagement were adequately related. These results are consistent with different research studies, which argue that students' adjustment processes are determined by greater or lesser motivation (Truta et al., 2018), which has a direct impact on the intensity and persistence of the effort an individual makes to achieve their goals (Werner & Milyavskaya, 2018). Other studies indicate that motivated students effectively use better learning strategies, optimise the task, regulate emotions and are more involved in the university structure (Ben-Eliyahu et al., 2018).

In relation to the second hypothesis (H2), the results indicate that learner engagement is related to the learning strategies and task control employed by the student. Different research corroborates this association in two directions; one more concrete, related to effort and involvement in a specific task (exam preparation); and the other, to enthusiasm and motivation to learn (Biggs, 1993). Both associations are explained through cognitive and emotional processes, allowing the establishment of different strategies to cope with the demands present in their activities, through control, level of involvement and motivation (Agger & Koenka, 2019).

Finally, the hypothesis (H3) confirms that academic motivation and learner engagement variables will enhance the development of better learning strategies. These results are in agreement with different research, indicating that the university student's predisposition, whether greater or lesser, to face new challenges, will be conditioned by their level of involvement, producing deeper learning experiences, better learning habits and strategies, a better adaptive process (Perkmann et al., 2021), persistence over time, obtaining better performance (Larson et al., 2019), in contrast to the less involved student, therefore, less motivated.

In general, our research findings corroborate that higher academic motivation will enhance the level of involvement or learner engagement, conditioning the way of learning and better strategies when facing the task in a more effective way (Sandoval et al., 2018). Considering the educational challenges and demands that shape adaptive processes, university students will maintain their level of involvement in the task, developing different learning strategies to achieve their goals (Truta et al., 2018). Therefore, it can be affirmed that high levels of motivation promote the level of involvement or learner engagement, which affects the development of

better learning strategies and academic results. Since this is a latent consequence in the university context, it is necessary to generate programmes that contribute to the development of deeper learning styles through active learning strategies capable of defining routes and solving problems.

In terms of limitations, it is important to point out that, as a cross-sectional design is used, cause-effect relationships cannot be established between the dimensions of the research, and therefore only statistical prediction is considered. On the other hand, in future publications, the mediating power of variables that may be determinant, such as gender or relationships between the factors of each of the constructs, could be analysed. Similarly, the results obtained cannot be extrapolated to university students, so it would be necessary to further analyse the association between motivation and academic involvement with larger samples in order to generalise the results. Also, the use of self-report and social desirability scales could condition the results.

Finally, it would be necessary to carry out longitudinal studies, in addition to using qualitative methods, to explore different academic pathways and contribute to the development of a motivational attitude, leading to the achievement of a better academic performance, increasing the expectations of success. Similarly, an understanding of the current state of university students' learning strategies and their relationship with academic motivation and learner engagement can facilitate the creation of training activities that foster awareness of the learning process and the acquisition of skills necessary for lifelong learning and professional development. Learner engagement, which acts as a mediating variable, redefines the ability to engage emotionally, cognitively and behaviourally in a task, activity or situation; and in the university context, it will be related to the active and positive involvement of students in their learning process, which translates into better academic performance, long-term knowledge retention and increased motivation.

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