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Psychometric Characteristics of the EEAA (Scale of Affective Strategies in the Learning Process)

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Abstract

Introduction. Affective strategies for coping with affective states linked to the learning process may be oriented toward controlling emotions or toward controlling motivation. Both types affect performance, directly and indirectly. The objective of this research was to design an instrument for measuring the affective strategies used by university students. This measurement model is consistent with the concept of affective strategies and the theoretical model presented in this study.

Method. A total of 487 students from different degree programs answered the *EEAA* (Scale of Affective Strategies in the Learning Process) and a learning competence scale. Several strategies were used for instrument validation, such as expert judgment, confirmatory factorial analysis and reliability and correlation analysis.

Results. A 37-item instrument for the measurement of affective strategies was validated. The measurement was based on a theoretical model consisting of 5 factors: Effort Avoidance, Social Image, Intrinsic Motivation, External Anxiety Control and Internal Anxiety Control. All these factors are correlated except the Effort Avoidance factor which has no correlation with Internal Anxiety Control and only a slight correlation with Intrinsic Motivation. Further work on the model and the instrument is required in order to improve the statistical fit. The correlations between the *EEAA* and the learning competence scale (scales and dimensions) support the instrument's criterion validity. The results confirm that Intrinsic Motivation and Anxiety Control have a positive, moderate correlation with Self-managed Learning, while Effort Avoidance is not related to any dimension of *Learning Competence*.

Conclusion. Adaptive affective strategies should be encouraged, and negative strategies should be replaced as far as possible with other more effective alternatives for learning.

Keywords: affective strategies, learning competence, confirmatory factorial analysis, university teaching, self-regulated learning

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Características Psicométricas de la *Escala de Estrategias Afectivas en el Proceso de Aprendizaje* (EEAA)

Resumen

Introducción. Entre las estrategias afectivas como forma de afrontar estados afectivos vinculados al proceso de aprendizaje se incluyen aquellas orientadas al control de emociones y las enfocadas a la motivación; ambas influyen directa o indirectamente en el rendimiento. El objetivo de esta investigación fue diseñar un instrumento para medir las estrategias afectivas utilizadas por los estudiantes universitarios durante el proceso de aprendizaje coherente con el concepto de estrategia de tipo afectivo y con el modelo teórico presentado.

Método. Un total de 487 estudiantes universitarios de distintas titulaciones respondieron a la Escala de Estrategias Afectivas de Aprendizaje y a la Escala de Competencia para aprender. Para la validación del instrumento se realizaron diferentes técnicas y análisis tales como juicio de expertos, análisis factorial confirmatorio, análisis de fiabilidad y correlaciones.

Resultados. Se ha validado un instrumento de 37 items para medir las Estrategias Afectivas basado en un modelo teórico formado por cinco factores: Evitación de Esfuerzo, Imagen Social, Motivación Intrínseca, Control de Ansiedad Externo y Control de Ansiedad Interno. Todos los factores están correlacionados menos el factor Evitación de Esfuerzo que no se relaciona con Control de Ansiedad Interno y apenas se relaciona con Motivación. Es preciso seguir avanzando en el modelo y en el instrumento para mejorar el ajuste. Las correlaciones de esta escala de Estrategias Afectivas y sus dimensiones con la escala y con las dimensiones de la Competencia para Aprender avalan la validez de criterio del instrumento. Los datos confirman que la Motivación Intrínseca y el Control de Ansiedad correlacionan de forma positiva y moderada con la Autogestión del Aprendizaje, mientras que la Evitación del Esfuerzo no se relaciona con ninguna dimensión de la Competencia para Aprender.

Conclusiones. Se propone incidir en el uso de estrategias afectivas adaptativas y sustituir, en la medida de lo posible, las estrategias negativas por alternativas más eficaces para aprender.

Palabras Clave: estrategias afectivas, competencia para aprender, análisis factorial confirmatorio, enseñanza universitaria, autorregulación del aprendizaje.

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Introduction

This article falls within the study of competence for learning and its different related factors. Affectivity is a psychological construct referring to a person's disposition to be affected by different environmental stimuli, states or situations. Páez and Carbonero (1993) considered three main components in their definition of affectivity: motivational processes, emotional processes and cognitive schemata (hereafter referred to as motivation, emotion and beliefs). In the educational and learning context, affective factors are described as emotions, moods, beliefs and motivation that influence how learning situations are perceived (Bueno, Teruel & Valero, 2005). In this same context, approaches to the affective domain synthesize these factors into emotions, beliefs and attitudes (Gil, Blanco & Guerrero, 2005). The emotional elements involved in learning processes have to do with: emotional control throughout the learning process, from planning stages to final evaluation; with keeping up the necessary motivational tenor and sustained effort to complete the process, overcoming any interfering conditions; with social image and with task management (Zimmerman, 2011).

Studies on the affective dimension of learning have increased notably in recent years, especially in reference to learning in certain areas such as science (Brígido, Caballero, Bermejo & Mellado, 2009; Garritz, 2010; Koballa & Glynn, 2007), mathematics (Gamboa Araya, 2013; Gil, Blanco & Guerrero, 2005; 2006; Palacios, Hidalgo, Maroto & Ortega, 2013; Walshaw & Brown, 2012), language arts (Marcos Llinàs, 2007; Marins de Andrade & Guijarro Ojeda, 2010), as well as generic aspects of learning such as continuing or abandoning one's studies (Alarcon & Edwards, 2013), and the importance of including this topic area in teacher training, both initial training and in-service training (Hugo, Sanmartí, & Adúriz Bravo 2013; Schutz & Zembylas, 2009; Zembylas, 2007).

Having understood the importance of affective processes in learning, it would be valuable to identify steps that can be taken to optimize such processes (Boekaerts, 1995; Gargallo, Almerich, Suárez, & García-Félix, 2012). Affective control strategies are one such type of action, making it possible to regulate affective states in favor of successful learning. Affective learning strategies facilitate learning through motivation and emotion, unlike cognitive strategies that have a direct influence on the process.

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Studies on self-regulated learning have made important contributions to identifying and studying the role of strategies for improving learning processes. Strategies are assigned a central function in the concept of self-regulation as "the control that a subject exercises over his or her own thoughts, actions, emotions and motivation through personal strategies for meeting the goals they have set" (Panadero & Alonso-Tapia, 2014, pp. 450-451). For the purposes of this study, we turn our focus to one such type of strategy, strategies oriented toward controlling emotions, whether seeking to reduce the intensity of emotional interference in the learning process, or to generate emotions that support learning. The latter are strategies aimed at controlling motivation, such as strategies that evoke the desire to act before initiating the process, as well as strategies for maintaining concentration and interest during execution. From the present study, we will use *affective strategies* to refer to strategies oriented toward the control of emotions and motivation.

A review of the different affective factors that influence learning highlights motivation (Boza Carreño & Toscano Cruz, 2012; Gil, Bernaras, Elizalde & Arrieta, 2009; Núñez, et. al., 2009), social image (Pekrun, Maier, & Elliot, 2009; Valle Arias, Nuñez Pérez et al.,2007; Valle Arias, Rodríguez Martínez et al., 2009; Vázquez, 2009;) and anxiety (Álvarez, Aguilar, & Lorenzo, 2012; García-Ros, Pérez González, Pérez Blasco & Natividad, 2012; Putwain, 2007) for their impact on performance. The relationship between learning goals as a motivational variable associated with intrinsic or extrinsic learning orientation, emotions and emotional states, particularly anxiety toward learning and learning outcomes, have prompted numerous studies (Doménech & Gómez-Artiga, 2011; González, Donolo & Rinaudo, 2009; Gil, Bernaras, Elizalde, & Arrieta, 2009; Pekrun, Maier & Elliot, 2009).

Affective strategies are not always aimed at achieving desirable learning objectives: in psychological terms, they are not always adaptive. There are dysfunctional strategies that are ineffective for meeting learning goals and are oriented toward avoidance of unpleasant states (Hervás & Vázquez, 2006). In our theoretical approach to affective states (motivational and emotional), we have included both positive affective strategies, oriented toward improved learning, and negative strategies, oriented toward avoiding unpleasant emotional states or affective situations:

1) *Intrinsic motivation:* strategies for motivating oneself with regard to the task itself.

2) *Social image:* strategies that seek to make the best of one's social image as a learner. This factor is closely related to goal orientation and its aim is to preserve one's image, in other words, to be highly regarded and valued by others.

3) *Internal Control of Anxiety (self-affirmation):* strategies that seek to avoid or control anxiety, by relying on one's own abilities.

4) *External Control of Anxiety (task):* strategies for thinking that you are capable of addressing the difficulty of the task, by using procedures that seek to "minimize" that difficulty.

5) *Avoidance of effort:* strategies that seek to avoid effort. Management of effort reflects one's commitment to meet learning objectives, despite difficulties and distractions. The characteristics of university learning and its organization within time schedules make this kind of management especially important in modulating the process and achieving the intended results. Domenéch and Gómez-Artiga (2011) found significant, negative relationships between needs, avoidance strategies and performance. These authors assign avoidance strategies a mediating value between needs and results.

A content analysis of instruments used for measuring learning strategies (Villardón-Gallego, Yániz, Achurra, Iraurgui & Aguilar, 2013) reveals that they collect not only information on strategies in the sense of conscious, intentional actions and procedures for meeting a learning objective in a given context, but they also identify emotional states that are associated with the learning situation (e.g. anxiety) and learning expertise (e.g., the ability to select information or transfer learning to other situations). This observation has prompted interest in the differential assessment of affective states and the strategies used for coping with them. Assessment of affective states would provide a substantiated description of the emotions elicited during the learning process, and would contribute data toward interpreting the possible causes of the way learning progresses. Strategies have a more concrete purpose, to generate and manage motives, emotions and beliefs for initiating and maintaining the actions needed for learning. Distinguishing between these two elements would lead to more adequate intervention to improve learning. This reasoning led us to consider the benefit of developing an instrument that assesses affective learning strategies, as differentiated from affective states.

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Objective

The research objective, therefore, was to design an instrument to measure affective strategies used by university students during the learning process, consistent with the concept of the affective-type strategy and with the theoretical model presented here.

Method

Participants

The sample comprised a total of 487 undergraduate university students from 5 different faculties at the University of Deusto (Bilbao, Spain), of which 144 were men and 343 were women. The mean age of students was 19.44 (sd =2. 09), with a minimum value of 18 and maximum of 43. First-year students made up 35.1% of the sample, and second-year students, 64.9%. Their distribution among the respective Faculties was as follows: 31% in Economics and Business Sciences, 24.4% in Social Sciences and Humanities, 16.6% in Law, 6.8% in Engineering and 21.1% in Psychology and Education.

Procedure

The students' instructors were contacted in order to inform them about the investigation, and request their collaboration in applying the instrument to the student groups during a class hour. Students were informed about the characteristics of the study and that participation was voluntary. The scale was administered through a computer application. The persons who administered the application were professionals trained for that purpose. The instrument was applied during the months of April and May 2011.

Instruments

In order to collect information on affective strategies in the learning process, the EEAA scale was designed according to the theoretical model presented above; its full name is *Escala de Estrategias Afectivas en el Proceso de Aprendizaje* [scale of affective strategies in the learning process]. The process followed to create and valídate this scale is presented here.

The starting point for the new instrument was the *Escala de Evaluación de las Estrategias Motivacionales de los Estudiantes* [scale for assessment of student motivational strategies], for university students (Suárez & Fernández, 2005). Its original study presented

adequate reliability values between .74 and .81, and it was revised and adapted for secondary students in 2011.

The following process was used to develop the scale for assessment of affective strategies in the learning process (hereafter, EEAA): First, items were selected from the motivational strategies scale whose content referred to a strategy; in other words, items referring to an affective state or emotion were discarded. A total of 44 items were selected. Next, the wording of the selected items was revised and adapted as needed. Finally, expert judgments were used to classify the items into the different theoretical dimensions of affective strategies in the learning process: Internal Control of Anxiety, External Control of Anxiety, Intrinsic Motivation and Social Image. Seven experts participated in the classification; all were professors in the Faculty of Psychology and Education at the University of Deusto, in the areas of education and research methodology.

Three items were eliminated (14, 22 and 27) due to discrepancy between the judges in assigning them to their dimension, leaving the final scale with a total of 41 items. The items consist of statements where the participant must indicate his or her level of agreement on a Likert-type scale, with five response options from 1 (strongly disagree) to 5 (strongly agree).

The second instrument used was the *Escala de Competencia para Aprender* [learning competence scale] (Villardón-Gallego, Yániz, Achurra, Iraurgui & Aguilar, 2013). The scale is composed of 17 items distributed along four dimensions: Knowledge Transfer, Personal Knowledge as a Learner, Knowledge Construction and Self-managed Learning. This scale has adequate internal consistency, with .86 reliability for the total scale, and reliabilities ranging from .57 to .75 for the subscales. In addition, its factor structure has been largely confirmed.

Statistical Analyses

Central tendency measures (Mean: M) and dispersion measures (Standard Deviation: SD) were calculated in order to describe the degree to which different affective strategies were used during the learning process. For items on the EEAA (affective strategies scale), the following statistics were computed: M, SD, Asymmetry (As), correlation coefficient of the item with the rest of the scale (r), and Cronbach alpha coefficient if the item were removed.

In order to validate the instrument, designed on the basis of the Affective Strategies of Learning theory, different analysis procedures were carried out. A five-factor, structural model, built on the theoretical framework, was tested. Based on the results of this analysis, different variations of the model were tested, so that fit might be improved, while maintaining an adequate theoretical basis. To calculate how well the models fit the data, confirmatory factor analyses (CFA) were carried out using covariance structure techniques with EQS (Bentler, 1995; Bentler & Wu, 1995). Parameters were estimated using the maximum likelihood method. In every case, the chi-squared test (χ^2) was used to measure the corresponding model's goodness of fit; this indicates the probability that the divergence between the sample variances-covariances matrix and the matrix generated from the hypothetical model is due to chance. Given that χ^2 is very sensitive to variations in sample size (Schermelle h-Engel, Moosbrugger & Müller, 2003), additional goodness-of-fit measurements were taken (Hu & Bentler, 1999), such as the root mean square error of approximation (RMSEA), the non-normed fit index (NNFI) and the comparative fit index (CFI).

The final model will indicate the structural relation parameters through standardized factorial coefficients and estimation errors. A significance level of $p < .05$ for a confidence interval of 95% was chosen for interpreting results.

We verified the suitability of the correlations matrix for factor analysis using the Kaiser-Meyer-Olkin test and Bartlett's sphericity test. Additionally, instrument reliability and criterion validity analyses were carried out. Reliability was calculated using Cronbach's alpha; criterion validity was measured by analyzing the correlation between scores on the EEAA and its dimensions, and scores on the learning competence scale (Villardón-Gallego et al. 2013).

Results

Table 1 shows the results of the descriptive analyses of the EEAA scale items. The total mean was 3.31 in a possible range of 1 to 5, with the lowest mean at 2.54, and the highest mean at 3.96, for the items on this scale. In no case does asymmetry of score distribution exceed 1; moreover, except for items 8, 18, 26 and 34, it is negative or to the left, indicating a tendency toward higher values on the scale. Kurtosis is greater than 1 only for item 18 and for the scale total. An analysis of variance was carried out in order to verify a difference in means

for each item as a function of the Faculty students were enrolled in; F was not significant for any of the items ($p > .05$).

Table 1. **EEAA descriptive statistics and analysis of internal consistency (n=487)**

		M	*SD*	*As*	*K*	*r*	*α*
1	When doing tasks, I remind myself that I will get a good score if the teacher is not very demanding.	3.29	1.009	-.476	-.331	.305	.920
2	When facing a difficult task or class subject, I remind myself of similar occasions that weren't so difficult in the end.	3.56	.927	-.590	.174	.375	.919
3	When I don't feel like working, I start with parts of the work that I find more enjoyable.	3.96	.926	-.947	.900	.169	.921
4	When facing a task, I consider that my objective will be to learn something new.	3.41	.952	-.409	-.180	.477	.918
5	Before I start a complicated task, I usually think of how interesting it might be.	3.17	1.070	-.228	-.572	.466	.918
6	I aim to do the tasks better than others.	3.28	1.089	-.375	-.546	.475	.918
7	My aim is to not look incompetent or make a fool of myself in front of others.	3.22	1.160	-.337	-.781	.422	.918
8	I try to avoid difficult tasks or class subjects.	2.66	1.130	.188	-.875	.247	.921
9	I usually look for positive assessments of my academic work from my friends or classmates.	3.25	1.058	-.442	-.509	.502	.918
10	At some point in the course of my academic activities, I usually stop and tell myself that I am doing a good job and I praise my own work.	3.13	1.047	-.304	-.609	.572	.917
11	When I run into difficulties on a task, I tell myself that there's no need to worry, things are bound to come clear later on.	3.43	.947	-.523	-.136	.496	.918
12	When doing a task, I consider that I will get a good score if it is not too difficult.	3.37	.968	-.636	-.018	.449	.918
13	When facing a task or a class subject, I remind myself that I am able to make the effort required to be successful.	3.73	.891	-.725	.618	.488	.918
14	Eliminated						
15	When facing a task, I consider that I will find it rewarding to do.	3.41	.977	-.470	-.090	.514	.917
16	I aim to answer questions and do tasks that others are not able to.	3.07	1.061	-.169	-.599	.450	.918

17	When participating in class, I try to not look incompetent in front of my classmates.	3.32	1.061	-.396	-.483	.262	.921
18	I aim to get a passing grade, but to do as little work as possible.	2.58	1.251	.249	-1.06	.507	.917
19	In order to feel satisfied with my learning, I look for others to recognize my efforts.	3.20	1.070	-.367	-.552	.452	.918
20	When facing a complex task, I tell myself that I am able to make the effort required to do a good job.	3.70	.898	-.782	.725	.378	.919
21	When I get into difficulties, I try not to worry about making mistakes.	3.26	.966	-.303	-.389	.527	.917
22	Eliminated						
23	When facing a difficult task or class subject, I remind myself that I have the ability needed for success.	3.64	.907	-.702	.479	.421	.918
24	I aim to get higher grades than my classmates.	3.08	1.163	-.101	-.863	.340	.919
25	When answering the teacher's questions, I try not to look foolish in front of my classmates.	3.43	1.057	-.594	-.273	.517	.917
26	I choose class subjects or tasks where I can pass with as little work as possible.	2.69	1.138	.184	-.919	.447	.918
27	Eliminated						
28	In order to feel satisfied with my learning, I look for my parents and/or teachers to speak well of me.	3.16	1.109	-.324	-.699	.508	.918
29	I motivate myself by cheering myself on.	3.58	.982	-.720	.273	.547	.917
30	When I run into difficulties in learning, I try to not worry about the grade and to keep my thoughts positive.	3.41	.967	-.534	-.097	.518	.917
31	When I face a difficult task, I remind myself of similar occasions when I was successful.	3.61	.922	-.740	.388	.356	.919
32	Before starting a task, I think that my objective is to learn to solve the problems I am assigned.	3.43	.911	-.335	-.273	.488	.918
33	I try to keep my classmates from noticing my mistakes.	2.98	1.088	-.156	-.745	.589	.917
34	I aim to work as little as possible in class and at home.	2.54	1.187	.339	-.912	.540	.917
35	Before starting a task, I usually take note of the aspects that I find new and novel.	3.31	.999	-.346	-.286	.418	.918
36	I try to get others to recognize my ability so I can feel more satisfied.	3.23	1.022	-.259	-.607	.520	.917

37	When facing a complicated task, I tell myself that I have the ability I need to do it.	3.64	.914	-.754	.591	.578	.917
38	In order to avoid getting nervous when I do academic tasks, I try to focus and not worry about the grade.	3.40	.950	-.460	-.296	.550	.917
39	Before starting a complex task, I make it my goal to improve my skills/abilities.	3.44	.940	-.461	-.070	.322	.919
40	I aim to not look bad academically in front of my family or my teachers.	3.13	1.130	-.136	-.854	.454	.918
41	When facing a difficult task, I tell myself that I will get positive results.	3.49	.979	-.544	-.049	.518	.917
42	When I get bored with academic tasks, I make myself pay more attention.	3.45	.963	-.502	-.253	.322	.919
43	When facing difficult tasks, I tell myself that I will get positive results if I make an effort.	3.70	.891	-.862	.924	.454	.918
44	Before starting academic tasks, I usually look for the most interesting aspects, or aspects that challenge me.	3.34	.947	-.329	-.280	.518	.917
	Scale	3.31	0.50	-.282	1.063		

As for the scale's internal consistency, the correlation coefficients between the items and the total scale fall between .17 and .59, with an average correlation value of 45. Eliminating items 3, 8 and 18 improves the scale's total reliability only by 0.001, so it was decided to include them at this point of the analysis.

The KMO test (= .913) and Bartlett's sphericity test (χ^2= 8835. 1; p < 0. 001) were performed on the correlations matrix, both of them indicating the suitability of factor analysis for the EEAA. Parallel tests calculated for the correlations matrix indicated that five factors should be retained.

In order to validate the dimensional construct of the EEAA, a structural model consisting of five correlated factors (M1a) was tested: Avoidance of Effort, Social Image, Intrinsic Motivation, Internal Control of Anxiety, and External Control of Anxiety. Confirmatory factor analysis was performed in order to test the theoretical model; goodness-of-fit indices are shown in Table 2. Improvements were made to the model as a function of these results.

Since the data are not multivariate normal (Mardia's multivariate kurtosis estimator is equal to 75.76 > 1.96), we used robust maximum likelihood estimators. Satorra-Bentler's chi-

squared (χ^2, as a measurement of general fit) was statistically significant, indicating that the empirical model does not fit well with the theoretical model. However, the χ^2 value tends to increase in large samples (n > 100), due to the error in model specification (Jöreskog & Sörbom, 1989). For this reason, additional indices are called for.

***Table 2*. Confirmatory factor analysis (n=487) of the theoretical model of the EEAA. Robust Maximum Likelihood Estimators.**

Model (M) of the *learning competence scale*		Goodness-of-fit indices								
		χ^2	χ^2 / *df*	*AIC*	*NNFI*	*CFI*	*SRMR*	*RMSEA*	90% CI	
M1a	Five correlated factors	1726.4	2.24	188.488	.83	.84	.069	.051	[.047	.054]
M1b	Five correlated factors without items 1, 3, 21, 42	1422	2.30	184.045	.85	.86	.067	.052	[.048	.055]
M1c	M1b (except correlations F1 with F3 and F1 with F4)	1428.9	2.30	186.943	.85	.86	.068	.052	[.050	.055]

χ^2 –Chi squared; χ^2 / df –Normed chi squared: chi divided by degrees of freedom; *AIC* –Akaike Information Criterion; *NNFI* –Non-normed fit index; *CFI* –Comparative fix index; *SRMR* – Standardarized root mean square residual; *RMSEA* **–** Root mean square error of approximation; 90% *CI* – Confidence interval

Considering the normed χ^2 value (χ^2/df) in Table 2, we observe that it is greater than 1 and less than 3 for the model analyzed, in other words, it falls within acceptable values. NNFI and CFI values approach the minimum criterion for good fit (.90). The SMRM and RMSEA values are acceptable < .08).

In order to improve the model, we decided to eliminate items whose square root of R was less than .20 in the standardized solution (M1b). These items were 1 (.12), 2 (.19), 3 (.023), 21 (.16), and 42 (.15). Item 2 was kept, since the square root of R was close to .20, and it was part of a dimension that contained few items. As can be seen in Table 2, the NNFI and CFI indices improve, although they fail to reach a score of .90. The AIC index and the chi-squared comparison χ^2 (150) = 304.45 (p < . 01) indicate improvement in terms of model parsimony.

The next step for improving the model was to eliminate inter-factor correlations of less than .30. Thus, a variation of model M1b was considered, with all correlating factors, but eliminating the correlation between F1 and F5 (r =.090, p < . 05) and between F1 and F4 (r =

-.016, $p < .05$). NNFI and CFI indices, the normed chi squared, and the RMSEA did not vary with respect to the M1b. The rest of the indices experienced slight variation. The scaled chi square difference test between models M1c and M1b is not statistically significant at 99%. Given that M1b and M1c were similar in terms of fit, model M1c was kept due to its consistency with the theoretical model, when considering the content of F1 (Avoidance of Effort), F5 (Internal Anxiety Control) and F4 (Motivation). Factor weights and estimation errors are presented in Table 3. One can observe that the factor weights (lambda coefficients) are always greater than .45, except in item 2 ($\lambda = .43$).

***Table 3*. Factor weights of EEAA items (n=487)**

Dimension	Item	*Lambda-Y*	*Error*
Avoidance of Effort	8. I try to avoid difficult tasks or class subjects.	0.70	0.71
	18. I aim to get a passing grade, but to do as little work as possible.	0.78	0.63
	26. I choose class subjects or tasks where I can pass with as little work as possible.	0.81	0.58
	34. I aim to work as little as possible in class and at home.	0.82	0.57
Social Image	6. I aim to do the tasks better than others.	0.55	0.84
	7. My aim is to not look incompetent or make a fool of myself in front of others.	0.60	0.80
	9. I'm usually looking for positive assessments of my academic work from my friends or classmates.	0.64	0.77
	16. I aim to answer questions and do tasks that others are not able to.	0.52	0.85
	17. When participating in class, I try to not look incompetent in front of my classmates.	0.64	0.77
	19. In order to feel satisfied with my learning, I look for others to recognize my efforts.	0.68	0.74
	24. I aim to get higher grades than my classmates.	0.61	0.80
	25. When answering the teacher's questions, I try not to look foolish in front of my classmates.	0.64	0.77
	28. In order to feel satisfied with my learning, I look for my parents and/or teachers to speak well of me.	0.65	0.76
	33. I try to keep my classmates from noticing my mistakes.	0.66	0.76
	36. I try to get others to recognize my ability so I can feel more satisfied.	0.74	0.68
	40. I aim to not look bad academically in front of my family or my teachers.	0.73	0.68
External Control of Anxiety (task)	2. When facing a difficult task or class subject, I remind myself of similar occasions that weren't so difficult in the end.	0.43	0.90
	11. When I run into difficulties on a task, I tell myself that there's no need to worry, things are bound to come clear later on.	0.69	0.72
	12. When doing a task, I consider that I will get a good score if it is not too difficult.	0.49	0.87
Intrinsic motivation	4. When facing a task, I consider that my objective will be to learn something new.	0.62	0.78
	5. Before I start a complicated task, I usually think of how interesting it might be.	0.62	0.78
	15. When facing a task, I consider that I will find it rewarding to do.	0.58	0.81
	32. Before starting a task, I think that my objective is to learn to solve the problems I am assigned.	0.71	0.70
	35. Before starting a task, I usually take note of the aspects that I find new and novel.	0.57	0.82
	39. Before starting a complex task, I make it my goal to improve my skills/abilities.	0.71	0.71
	44. Before starting academic tasks, I usually look for the most interesting aspects, or aspects that challenge me.	0.65	0.76
Internal Control of Anxiety (by self-affirmation)	10. At some point in the course of my academic activities, I usually stop and tell myself that I am doing a good job and I praise my own work.	0.57	0.82
	13. When facing a task or a class subject, I remind myself that I am able to make the effort required to be successful.	0.69	0.73
	20. When facing a complex task, I tell myself that I am able to make the effort required to do a good job.	0.68	0.73
	23. When facing a difficult task or class subject, I remind myself that I have the ability that is needed for success.	0.72	0.69
	29. I motivate myself by cheering myself on.	0.63	0.77

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	30. When I run into difficulties in learning, I try to not worry about the grade and to keep my thoughts positive.	0.57	0.82
	31. When I face a difficult task, I remind myself of similar occasions when I was successful.	0.67	0.74
	37. When facing a complicated task, I tell myself that I have the ability I need to do it.	0.75	0.66
	38. In order to avoid getting nervous when I do academic tasks, I try to focus and not worry about the grade.	0.48	0.87
	41. When facing a difficult task, I tell myself that I will get positive results.	0.66	0.75
	43. When facing difficult tasks, I tell myself that I will get positive results if I make an effort.	0.66	0.76

All the correlation coefficients shown in Table 4, except for the correlation coefficient between Factor 1 Avoidance and Factor 5 Internal Control of Anxiety ($p > .05$), are significant ($p < .01$). Factor 4 Intrinsic Motivation shows a strong positive correlation with F5 Internal Control of Anxiety and with F3 External Control of Anxiety. Factor 3 External Control of Anxiety has a moderate positive correlation with F5 Internal Control of Anxiety. Factor 1 Avoidance has a positive, moderate correlation with F2 Social Image and a positive, low correlation with F3 External Control of Anxiety. For their part, F2 Social Image has a positive, low relationship with F4 Intrinsic Motivation, and a positive, moderation relationship with F3 External Control of Anxiety and with F5 Internal Control of Anxiety.

Table 4. **Correlation coefficients between Factors of the EEAA**

	F1 Avoidance of Effort	F2 Social Image	F3 External Control of Anxiety	F4 Intrinsic motivation	F5 Internal Control of Anxiety
F1 Avoidance of Effort	---	.423**	.331**	.149**	.080
F2 Social Image	--	---	.437**	.395**	.431**
F3 External Control of Anxiety	--	--	---	.802**	.652**
F4 Intrinsic Motivation	--	--	--	---	.809**
F5 Internal Control of Anxiety	--	--	--	--	---

** $p < .01$

The alpha coefficient for the total scale is 92, and for each dimension, as follows: Avoidance of Effort ($\alpha = .82$), Social Image ($\alpha = .89$), External Control of Anxiety ($\alpha = .54$), Intrinsic Motivation ($\alpha = .82$), Internal Control of Anxiety ($\alpha = .88$). All of these are adequate; the lowest was for External Control of Anxiety, although this result can be explained by the fact that this dimension is composed of only three items.

Table 5. **Correlation coefficients between factors of the EEAA and the learning competence scale**

Lrng Comp /EEAA	F1 Avoidance of Effort	F2 Social Image	F3 External Control of Anxiety	F4 Intrinsic Motivation	F5 Internal Control of Anxiety
F1 Transfer	-.180**	.128**	.281**	.396**	.317**
F2 Self-knowledge	-.034	.134**	.276**	..296**	.386**
F3 Construction of knowledge	-.111*	.107*	.224**	.315**	.371**
F4 Self-managed learning	-.149**	.265**	.325**	.608**	.605**

** p < .01 *p < .05

For criterion validity, the correlation coefficient was calculated between the EEAA score and the score on the learning competence scale by Villardón-Gallego et al. (2013). The correlation is significant, positive and moderate (.487, p < .01). As one can observe, the correlations between the EEAA factors and the learning competence scale factors are significant and positive, except for correlations between the EEAA factor Avoidance of Effort and learning competence factors, which are very low and negative. The EEAA factors that have the strongest correlation with dimensions of learning competence are Intrinsic Motivation and Internal Control of Anxiety, and above all Self-managed Learning, which show a moderate, positive correlation.

Discussion and Conclusions

This investigation served to elaborate and validate an instrument for measuring affective strategies that university students use during their learning process. The assessment of affective strategies can contribute to regulation of affective states that are present in learning processes. Assuming that students wish to improve their competencies and maintain a reasonable level of well-being (Boekaerts, 2007; Kiener & Weaver, 2011), the assessment of affective strategies contributes useful information for both purposes. On one hand, it offers information that can be used by educational authorities to better orient teaching toward improved learning processes and outcomes, including intentional instruction in certain affective strategies or techniques so that students may use them strategically (Boekaerts & Corno, 2005; Corno, 2011; Dierdorff, Surface & Brown, 2010; Pekrun, Cusack, Murayama, Elliot & Thomas, 2014). On the other hand, it helps students identify methods to improve their own well-being while learning, and boosts their motivation to incorporate useful strategies to do so.

In order to design the scale, we began with a model of five correlated dimensions, and made improvements to the models in the different phases of analysis. To start, the instrument contained 44 items; expert judgments were used to validate the content, from which three items were excluded due to disagreement as to which dimension they should be assigned to. CFA was used to confirm the five-factor model structure, and the instrument and the model were progressively refined to improve fit. In this way, four other items were eliminated, as well as the relationship between certain factors.

The resulting model shows goodness-of-fit indices very close to .90, indicating that the five-factor theoretical model is acceptable, but more research should be done along these lines in order to achieve better fit. The dimensions that make up affective strategies are Avoidance of Effort, Social Image, External Control of Anxiety, Motivation and Internal Control of Anxiety. Except for Avoidance of Effort, which had no correlation with Internal Control of Anxiety and a very weak correlation with Motivation, the rest of the dimensions are positively correlated to each other. The strongest correlations are found between Motivation and the two Control of Anxiety factors, Internal and External, which may indicate that these three dimensions make up the nucleus of affective strategies. Moreover, it may be inferred that they are the most effective, given their positive relationship to Self-managed Learning.

The expert judgments and reliability of the total scale and its dimensions vouch for the instrument's internal consistency. Although the reliability coefficients are adequate, the factor structure of External Control of Anxiety should be improved by increasing the number of items. Similarly, it would be worthwhile to review the wording of scale items and the dimension assigned to each; item 2, for example, has very low factorial weight. On the other hand, given that scale reliability is quite high, and for the sake of the parsimony principle, it would be appropriate to reduce the number of items in Internal Control of Anxiety and in Social Image, so as to avoid any possible overlap between the elements, and that the dimensions might be more evenly balanced.

The correlations between the affective strategies scale and its dimensions, and the learning competence scale and its dimensions, support the instrument's criterion validity. The data confirm what has been suggested by topic experts (Zimmerman, 2011), in that Intrinsic Motivation and Control of Anxiety have a moderate, positive correlation with Self-managed

Learning, and Avoidance of Effort is not related to any dimension of learning competence. These results are consistent with those found by Gargallo, Almerich, Suárez Rodríguez and García-Félix (2012) and by Gil, Bernaras, Elizalde and Arrieta (2009), according to whom Intrinsic Motivation shows the priority influence on strategic learning, followed by Internal Control of Anxiety. Similarly, Bracacevic and Licardo (2010) conclude that motivational self-regulation has a positive impact on students' performance.

Elsewhere, the lack of correlation between Avoidance of Effort and the dimensions of learning competence contrasts with results from Domenech Betoret and Gómez Artiga (2011), according to whom avoidance strategies have a negative mediating role between different variables and learning outcomes. Nonetheless, both results suggest that the use of avoidance strategies indicates deficiencies in learning competence.

Consequently, we recommend that the use of positive, adaptive affective strategies be encouraged -- strategies oriented toward improved learning and toward consolidating learning competence. Negative strategies, oriented toward avoiding situations that require effort or coping with difficulties, should be substituted as much as possible by more effective alternatives for learning, concurring with conclusions from González, Donolo and Rinaudo (2009).

Finally, it is noted that one of the study limitations is its sample composition, with uneven representation from the different degree programs, and all students enrolled at a single university. It would be interesting to carry out research studies with broader samples and with proportional representation from different institutions and different degree programs in order to validate the improved instrument based on the above.

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References

Alarcón, G. M., & Edwards, J. M. (2013). Ability and motivation: Assessing individual factors that contribute to university retention. *Journal of Educational Psychology, 105*(1), 129-137. doi: 10.1037/a0028496

Alvarez, J., Aguilar, J.M. & Lorenzo, J.J. (2012). Test Anxiety in University Students: relationships with personal and academic variables. *Electronic Journal of Research in Educational Psychology, 10*(1), 333-354.

Brígido, M., Caballero, A., Bermejo, L & Mellado, V. (2009). Las emociones sobre la enseñanza y aprendizaje de las ciencias en estudiantes de Maestro de Primaria. [Emotions about teaching and learning science in pre-service primary education teachrs.] *Revista electrónica de motivación y emoción*, *11*(31). Accessed from http://reme.uji.es/articulos/numero31/article11/texto.html

Boekaerts, M. (1995). Self-regulated learning - bridging the gap between metacognitive and metamotivation theories. *Educational Psychologist, 30*(4), 195-200.

Boekaerts, M. (2007). Understanding students' affective processes in the classroom. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education* (pp. 37–56). San Diego, CA: Elsevier Academic Press. doi:10.1016/B978-012372545-5/50004-6

Boekaerts, M & Corno, L. (2005). Self-Regulation in the Classroom: A Perspective on Assessment and Intervention. *Applied Psychology: an International Review*, *54*(2), 199-231. doi: 10.1111/j.1464-0597.2005.00205.x

Boza Carreño, A, & Toscano Cruz, M.O. (2012). Motivos, actitudes y estrategias de aprendizaje: aprendizaje motivado en alumnos universitarios. [Motives, attitudes and strategies in learning: motivated learning in univesity students.] *Revista de Currículum y Formación del Profesorado, 16*(1), 126-142.

Bracacevic Vukman, K. & Licardo, M. (2010). How Cognitive, Metacognitive, Motivational and Emotional Self-Regulation Influence School Performance in Adolescence and Early Adulthood. *Educational Studies, 36*(3), 259-268.

Bueno Garcia, C., Teruel Melero, M.P. & Valero Salas, A. (2005). La Inteligencia Emocional en alumnos de Magisterio: La percepción y comprensión de los sentimientos y las emociones. *Revista interuniversitaria de formación del profesorado, 19*(3), 169-194.

Corno L. (2011). Studying self-regulation habits. In B. J. Zimmerman, & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 361–375). New York, NY: Routledge.

Dierdorff, E.C., Surface, E.A. & Brown, K.G (2010). Frame-of-Reference Training Effectiveness: Effects of Goal Orientation and Self-Efficacy on Affective, Cognitive, Skill-Based, and Transfer Outcomes. *Journal of Applied Psychology, 95*(6), 1181-1191. doi: 10.1037/a0020856

Doménech, F. & Gómez-Artiga, A. (2011). Relationship between the student's psychological needs, learning approach, avoidance strategies and performance. *Electronic Journal of Research in Educational Psychology, 9*(24), 463-496.

Gamboa Araya, R. (2014). Relación entre la dimensión afectiva y el aprendizaje de las matemáticas. [Relationship between the affective dimensión and learning mathematics.] *Revista Electrónica Educare, 18*(2), 117-139. doi: 10.15359/ree.18-2.6

García-Ros, R., Pérez-González, F., Pérez-Blasco, J & Natividad, L.A. (2012). Evaluación del estrés académico en estudiantes de nueva incorporación a la universidad. [Assessing academic stress in newly enrolled university students.] *Revista Latinoamericana de Psicología, 44*(2), 143-154. doi: 10.14349/rlp.v44i2.1038

Gargallo, Bernardo, Almerich, Gonzalo, Suárez-Rodríguez, Jesús M. & García-Félix, Eloina (2012). Estrategias de aprendizaje en estudiantes universitarios excelentes y medios. Su evolución a lo largo del primer año de carrera. [Learning strategies in excellent and average university students. Their evolution over the first year at university.] *RELIEVE, 18*(2), art. 1. doi: 10.7203/relieve.18.2.2000

Garritz, A. (2010). Personal Reflection: Pedagogical Content Knowledge and the Affective domain of Scholarship of Teaching and Learning. *International Journal for the Scholarship of Teaching and Learning, 4*(2), Article 26. Accessed from http://digitalcommons.georgiasouthern.edu/ij-sotl/

Gil. N., Blanco, L.J. & Guerrero, E. (2005). El dominio afectivo en el aprendizaje de las matemáticas. Una revisión de sus descriptores básicos. [The affective domain in learning mathematics. A review of its basic descriptors.] *Revista Iberoamericana de educación matemática, 2,* 15-32. Accessed from http://www.fisem.org/www/union/

(2006). El papel de la afectividad en la resolución de problemas matemáticos. *Revista de Educación, 340*, 551-569.

Gil, P., Bernaras, E., Elizalde, L.M. & Arrieta, M. (2009). Estrategias de aprendizaje y patrones de motivación del alumnado de cuatro titulaciones del Campus de Gipuzkoa. [Learning strategies and motivation patterns in students from four degree programs at the Gipuzkoa campus.] *Infancia y Aprendizaje: Journal for the Study of Education and Development, 32*(3), 329-341. doi: 10.1174/021037009788964132

González, A., Donolo, D. & Rinaudo, C. (2009). Emociones académicas en universitarios: su relación con las metas de logro. [Achievement emotions in university students: their relationship achievement goals.] *Ansiedad y estrés, 15*(2-3), 263-277.

Hervás, G. & Vázquez, C. (2006). La regulación afectiva: Modelos, investigación e implicaciones para la salud mental y física. [Affective regulation: models, research and implications for mental and physical heatlh.] *Revista de Psicología General y Aplicada, 59(1-2),* 9-36.

Hugo, D., Sanmartí, N. & Adúriz-Bravo, A., (2013). Estilos de trabajo emocional del futuro profesorado de ciencias durante el prácticum. [Emotional work styles of pre-service science teachers during practice teaching.] *Enseñanza de las Ciencias, 31*(1), 151-168.

Kiener, M. & Weaver, C. (2011). Examining How Cognitive And Affective Learning Strategies Change As Students Complete Coursework. *Transformative Dialogues: Teaching & Learning Journal, 5*(1), 1-12. Accessed from http://www.kpu.ca/td/past-issues/5-1

Koballa, T.R. & Glynn, S.M. (2007). Attitudinal and Motivational constructs in science learning. In S. K. Abell, & N. G. Lederman, (Eds.). *Handbook of Research on Science Education,* (pp. 75-102). Mahwah, NJ, USA: Erlbaum.

Marins, P. R., & Guijarro, J. R. (2010). Afectividad y competencia existencial en estudiantes de español como lengua extranjera en Brasil. [Affectivity and existential competence in students of Spanish as a foreign language in Brazil.] *RLA, Revista de lingüística teórica y aplicada*, *48*(1), 51-74. doi: 10.4067/S0718-48832010000100004

Marcos-Llinàs, M. (2007). Variables afectivas en la clase de lenguas extranjeras. [Affective variables in the foreign language classroom.] *Interlingüística, 17*, 676-678.

Núñez, J. C., Valle, A., Cabanach, R. G., González-Pienda, Julio A., Rodríguez, S., Rosario, P. (2009). Perfiles motivacionales en estudiantes universitarios. [Motivational profiles in university students.] *Revista de Psicología y Educación, 1*(4), 15-30.

Nuñez, J.C. & González-Pienda, J.A. (1994). *Determinantes del rendimiento académico. Variables cognitivo-motivacionales, atribucionales, usos de estrategias y autoconcepto*.

[Determinants of academic performance: cognitive-motivational, attributional, strategy use and self-concept variables.] Oviedo: Universidad de Oviedo.

Páez, D. & Carbonero, A.J. (1993). Afectividad, cognición y conducta social. [Affectivity, cognition and social behavior.] *Psicothema, 5*(suplemento*),* 133-150.

Palacios, A., Hidalgo, S., Maroto, A. & Ortega, T. (2013). Causas y consecuencias de la ansiedad matemática mediante un modelo de ecuaciones estructurales. [Causes and consequences of mathematics anxiety using a structural equations model.] *Enseñanza de las Ciencias, 31*(2), 93-111.

Panadero, E. & Alonso-Tapia, J. (2014). ¿Cómo autorregulan nuestros alumnos? Revisión del modelo cíclico de Zimmerman sobre la autorregulación del aprendizaje. [How do our students self-regulate? A review of Zimmerman's cyclical model on self-regulated learning.] *Anales de Psicología, 30*(2), 450-462. doi: 10.6018/analesps.30.2.167221

Pekrun, R., Maier, M. A. & Elliot, A. J. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology, 101*(1), 115-135. doi: 10.1037/a0013383

Pekrun, R, Cusack, A., Murayama, K., Elliot, A.J. & Thomas, K. (2014). The power of anticipated feedback: Effects on students' achievement goals and achievement emotions. Learning and Instruction 29, 115-124. doi: 10.1016/j.learninstruc.2013.09.002

Putwain, D. (2007). Researching academic stress and anxiety in students: some methodological considerations. *British Educational Research Journal, 33*(2), 207-219. doi: 10.1080/01411920701208258

Schutz, P.A. & Zembylas, A. (Eds.)(2009). *Advances in Teacher Emotion Research: The Impact on Teachers' Lives.* EEUU: Springer. doi: 10.1007 / 978-1-4419-0564-2

Suárez, J. M. & Fernández, A. P. (2005). Escalas de evaluación de las estrategias motivacionales de los estudiantes. [Assessment scales of students' motivational strategies.] *Anales de Psicología, 21*(1), 116-128.

Suárez, J. M., & Fernández, A. P. (2011). Evaluación de las estrategias de autorregulación afectivo-motivacional de los estudiantes: Las EEMA-VS. [Assessment of students'] *Anales de Psicología, 27*(2), 369-380.

Valle, A., Núñez, J.C., González-Cabanach, R., Rodríguez-Rodríguez, S., González-Pienda García, J.A. & Rosário, P. (2007). Academic goals and self-protection motivational strategies. *Electronic Journal of Research in Educational Psychology, 5*(3), 617-632.

Valle, A., Rodríguez-Martínez, S. González-Cabanach, R., Núñez, J.C., González-Pienda García, J.A. & Rosário, P. (2009). Academic goals: historical and conceptual perspec-

tive and academic implications. *Electronic Journal of Research in Educational Psychology 7*(3), 1073-1106.

Vázquez, S.M. (2009). Motivación y voluntad. [Motivation and will.] *Revista de Psicología, 27*(2), 185-212.

Villardón-Gallego, L., Yániz, C., Achurra, C., Iraurgui, J. & Aguilar, M.C. (2013). Learning Competence in University: Development and Structural Validation of a Scale to Measure. *Revista de Psicodidáctica, 18(2),* 357-374. doi: 10.1387/RevPsicodidact.6470

Walshaw, M & Brown, T (2012). Affective productions of mathematical experience. *Educational Studies in Mathematics, 80*(1-2), 185-199.

Zembylas, M (2007). Emotional ecology: The intersection of emotional knowledge and pedagogical content knowledge in teaching. *Teaching and Teacher Education, 23*(4), 355-367. doi: 10.1016/j.tate.2006.12.002

Zimmerman, B.J. (2011). Motivational sources and outcomes of self-regulated learning and performance. In B. J. Zimmerman, & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 49–63). New York, NY: Routledge.

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