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The Brief-ACRA Scale on Learning Strategies for University Students☆

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ABSTRACT

The examination and promotion of learning strategies in higher education has become a hot topic, not only for academic success, but also for professional and personal development. Among the tools available for evaluating learning strategies, the ACRA adapted for university students stands out as one of the most popular in studies with Spanish-speaking populations. However, there have been no attempts at validation using confirmatory factor techniques and there are no cut-off points available for training purposes. In this paper, the factor structure of the ACRA scale is examined. A cross-validation strategy (combining exploratory and confirmatory factor analyses) was used on a sample of 809 university students. A 17-item version is proposed, showing evidence for structural invariance across genders. The resulting three-factor structure is discussed (micro-strategies, memorizing-keys and metacognition, and emotional-social support), together with its association with other dimensions. Moreover, criteria by gender are provided.

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Evaluación de estrategias de aprendizaje mediante la escala ACRA abreviada para estudiantes universitarios

RESUMEN

Conocer qué estrategias de aprendizaje emplea el alumnado universitario y promoverlas es importante no solo para su éxito académico, sino también para su desarrollo vital y profesional. Entre las herramientas disponibles la adaptación de la escala ACRA para evaluar las estrategias de aprendizaje del alumnado universitario se encuentra entre las más extendidas en el contexto hispanohablante, aunque no se cuenta con estudios de validación empleando técnicas confirmatorias ni con datos de baremación que faciliten su uso con el fin de promover estas estrategias. En este trabajo se examina la estructura factorial del ACRA en una muestra de 809 estudiantes universitarios mediante validación cruzada, proponiendo una versión de 17 ítems económica en su aplicación y con una estructura común para varones y mujeres. Se discute la estructura trifactorial obtenida (microestrategias, claves de memoria y metacognición y apoyo emocional-social) y su relación con otros constructos y se ofrecen datos de baremación por sexo.

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Introduction

Learning strategies are determinant for academic and professional development in the twenty-first century, given the need for continual adaptation to different ways of dealing with tasks, acquiring learning, communicating, etcetera (Longworth & Davies, 2013). The new teaching-learning model being promoted in the European Higher Education Area (EHEA) lays the emphasis firmly on the acquisition of skills to be able to cope in today's knowledge society, implying that university students and future professionals will need to be learning continually throughout their lives (Villardón-Gallego, Yániz, Achurra, Iraurgi, & Aguilar, 2013). In this study, we examine the learning strategies of university students using the brief-ACRA scale.

Despite the roles that learning strategies play in social development, in general and professional development (particularly in the EHEA), empirical evidence with university samples are based on

the predictive power of learning strategies on academic achievement. Several studies have related the use of learning strategies among university students with academic success (Crede & Philips, 2011; Juárez, Rodríguez, & Luna, 2012), academic motivation (Boza & Toscano, 2012), learning styles (Juárez et al., 2012) and creativity (Gutiérrez-Braojos, Salmerón, Martín, & Salmerón, 2013). Less frequently, their relationship has been studied with other components that are not academic but are nonetheless important for social and professional development, such as life satisfaction (Bustos, 2016) and critical thinking (Olivares & Heredia, 2012).

The concept of strategy is well consolidated in cognitive psychology and implies the understanding of cognitive processes as tools for solving problems (Flavell, 1970). From cognitive psychology, learning in formal contexts takes place because the cognitive processes that are activated when faced with a learning task have a strategic nature (Zare-ee, 2010).

Concerning the different types of strategies, Kirby's (1984) distinction between micro- and macrostrategies is a classic. The latter relate to metacognitive aspects (planning and self-regulation) and may be transferred to different contexts, while the former are specific for situations defined for and linked to tasks (underlining or summary), and for that reason they are not generalizable.

In the face of this dichotomist vision, Weinstein and Mayer (1986) make a more gradual proposal that depends on the level of control and elaboration of meaning (repetition, elaboration, organization and regulation) and incorporate affective-emotional strategies. The latter is aimed to regulate the study environment, handle effort and control for emotions. Likewise, although the affective-emotional strategies imply metacognitive efforts, they are directed specifically towards an affective-motivational dimension (Pozo, Monereo, & Castelló, 2001).

From a psycho-educational perspective, it is interesting to examine learning strategies from a socio-cultural approach. This approach emphasizes the importance of social practices and the context in the use of significant learning strategies for different reasons (Paris et al., 1985): (1) What defines a strategy is not its form, but its function; (2) Effective strategies are always personally significant; (3) Context and culture play an important role in the use of strategies; (4) Strategies arise and develop in settings of social relations and shared learning. Therefore, learning strategies are constructive and socio-cultural tools (Cubero, Cubero, Santamaria, Saavedra, & Yossef, 2007).

Hence, for the authors of this paper, learning strategies constitute decision-making processes about the procedures which are best suited to reaching the objectives of each specific situation (López-Aguado, 2010), with it being necessary to create social situations which are suitable for learning (Hortigüela-Alcalá, Pérez-Pueyo, & López-Pastor, 2015). Learning strategies involve planning the design, evaluating and adjust the activities to perform with specific conditions (Pozo et al., 2001). Therefore, learning strategies do not just include microstrategies, but also other elements of control and metacognition, as well as socio-emotional elements.

In line with the strategic and situated nature present in the socio-cultural approach, learning strategies do not occur innately; they come through training, with teaching procedures needing to be adjusted to the capacity for internal regulation of each student (Navarro & Martín, 2006). For that purpose, orientation and tutoring programs provide an ideal context for encouraging these strategies in the university context (Rodríguez, 2004). For all that, there is clearly a need for scales capable of assessing which strategies are best at fostering performance and learning within the processes of university orientation and tutoring.

Work has been conducted in this area, and there are several tools for studying learning strategies in university students. In Spain, this has normally meant adapting tools originally developed in English-speaking countries, such as the adaptation by Nuñez et al.

(1998) of the *Learning and Study Strategies Inventory* (Weinstein, 1987) and the proposal of Roces, Tourón, and González (1995) of the *Motivated Strategies for Learning Questionnaire* (Pintrich, Smith, García, & Mckeachie, 1993). Tools have also been designed that are culturally adapted to our context, such as the *Escala de Estrategias de Aprendizaje ACRA* [ACRA Learning Strategies Scale] (Román & Gallego, 1994), the *Cuestionario de Estrategias de Aprendizaje* [Learning Strategies Questionnaire] (Beltrán, Pérez, & Ortega, 2006), the *Cuestionario de Evaluación de Estrategias de Aprendizaje de los estudiantes Universitarios* [Questionnaire for Evaluating Learning Strategies in Univeristy Students] (Gargallo, Suárez, & Pérez, 2009) and the *Cuestionario de Estrategias de Trabajo Autónomo* [Autonomous Work Strategies Questionnaire] (López-Aguado, 2010). We should mention that recent studies incorporate the role of information technologies as potential support for learning strategies in the university context (Capilla, Torres, & Sánchez, 2015).

Of the instruments designed in the context of Spanish-speaking countries to measure learning strategies, the ACRA is the most widely used (Bahamón, Vianchá, Alarcón, & Bohórquez, 2012). Initially Román and Gallego (1994) design the scale to establish the use that secondary school students make of learning strategies. De la Fuente and Justicia (2003) adapt the scale for university students establishing relations between learning strategies and performance, and quantitative differences in their use depending on gender, age and type of studies (De la Fuente, Soto, Archilla, & Justicia, 1998). These authors offer a reduced version of the scale with three components: strategies of control and learning, support and study habits. Other authors have examined the psychometric properties of the ACRA with university students, obtaining good indicators of internal consistency (Juárez, Pichardo, Escoto, & Luna, 2015) although with varying results in terms of their dimensionality. Juárez, Pichardo and Rodríguez (2015) analyze the structure of the ACRA scale through exploratory factor analysis, informing of a tridimensional structure incorporating strategies of processing, acquisition and support.

The ACRA scale has proven its usefulness for discriminating the use of learning strategies among university students. One of the most consistent results is the relation between the use of strategies measured by the ACRA and academic performance (Bahamon et al., 2012; Camarero, Martín, & Herrero, 2000; Juárez et al., 2012; Villamizar, 2008). It has also be documented the relation between disciplinary knowledge and the use of specific learning strategies. Specifically, some authors find a less frequent and diversified use of strategies in technical-experimental type degree courses (Camarero et al., 2000; Juárez et al., 2012). Others argue that university courses specializing in technical and experimental studies require the strengthening of learning strategies related to their contents (Marugán, Martín, Catalina, & Román, 2013). Likewise, the ACRA scale has shown the contrast in the use of learning strategies between students towards the end of their degree and those at the start of it: The former use strategies with a greater component of information and more control (Camarero et al., 2000; Marugán et al., 2013). Finally, some authors offer a university profile on the use of learning strategies, using gender as the differentiating variable (Bahamón et al., 2012). There are findings suggesting that women use more effective and diverse learning strategies than men do (De la Fuente & Justicia, 2001; Juárez et al., 2012), according to the ACRA scale.

In short, there is empirical evidence supporting the use of the ACRA scale as an instrument with the potential to offer valuable information about how university students tackle learning and the strategies they use to do so. However, there is no available version adapted to university students validated through confirmatory factor analysis, nor by-gender data to enable its use in processes of university orientation and tutoring. To overcome these gaps, this study has two objectives: (1) To examine the factorial structure

of the ACRA scale in a sample of university students using cross validation, testing its invariance for males and females; (2) To analyze its psychometric properties offering indicators of reliability and validity; and (3) To present the most important descriptives of the resulting adaptation and assessment data to facilitate its use in processes of university orientation and tutoring.

Method

Participants

The sample consists of 809 students on a degree course in psychology at a public university in southern Spain. They are mainly women (74.56%), with a mean age of 22.29 (*SD* = 2.44). Most of them still live with their family (71.94%), with 82.57% of them studying exclusively. Roughly, half of the students are financially dependent on their families (50.60%). The students' parents have diverse educational backgrounds: 26.46% had not successfully completed compulsory education or had only primary studies; in 24.34% of the families at least one of their parents had successfully completed secondary studies; and in 49.21% of the remaining families at least one of the parents had university studies.

Instruments

To assess the learning strategies, the *Escala de estrategias de aprendizaje ACRA abreviada* [Brief ACRA Learning Strategies Scale] (De la Fuente & Justicia, 2003) is used: A version for university students of the scale designed by Román and Gallego (1994) which evaluates the use of strategies during the learning process. It is an inventory with 44 Likert-type items with four response options assessing three components of the strategies involved in learning, in accordance with the principles of information processing: cognitive and learning control strategies (e.g., "I prepare summaries using previously underlined words or phrases"), learning support strategies (e.g., "I say things to myself for encouragement and motivation and to stay focused on study tasks") and study habits (e.g., "When exam time is approaching I make a work plan, dividing up the time I will spend on each subject"). The ordinal internal consistency index for all 44 items is α = .92, McDonald's Omega Ω = .91.

To gain a profile of the participants, they fill in a *Sociodemographic Information Inventory:* this is an ad hoc form created to gather information about their gender, age, year of study, where they were living during the academic year, source of income and educational profile of their parents.

To obtain evidence of validity criteria, learning approaches, critical thinking and satisfaction with life are examined as follows:

Cuestionario de enfoques de aprendizaje [Learning approaches questionnaire] (Rodríguez, 2004): An adaptation for university students of the Spanish version of the *Study Process Questionnaire* (Biggs, 1987) which assesses the learning approach used by students. It consists of 30 Likert-type items with four response options, and provides information about the three classic components according to the perspective of learning approaches (Pérez, 2001): Surface, referring to the intention of the student to fulfil assessment requirements through reproduction and rote learning (e.g., "I think the only way to learn things is to memorize them"); Deep, referring to the intention of elaborating personal meaning from learning (e.g., "I find many of the topics interesting when I get further into them"); and Strategic, where students focus on ways of being academically successful (e.g., "I try to work hard during the term to get good grades"). The ordinal reliability for this study is α = .74 for the surface approach, α = .79 for the deep approach and α = .82 for the achieving approach; Ω = .84.

Critical thinking (Zaldívar & Barrasa, 2010): A questionnaire consisting of 14 Likert-type items to assess the ability to adopt perspectives, to recognize one's own assumptions and to evaluate arguments related to critical thinking among university students (e.g., "In general I know when to question an opinion or point of view"). The ordinal reliability for this study is α = .74, Ω = .68. The original response format was adapted to standardize the array of instruments and facilitate data collection (going from 6 to 4 options) (Jiménez et al., 2015).

Life satisfaction scale (Diener, Emmons, Larsen, & Griffin, 1985): The validated Spanish version of this scale (Cabañero et al., 2004) is used, which provides evidence of validity among university students (Garrido, Fernández, Villalba, Pérez, & Fernández, 2010). It is a five item Likert-type questionnaire which assesses the perception of satisfaction with life, understood as a cognitive process comparing one's actual life circumstances with one's ideal of well-being (e.g., "The type of life I lead fits the model of life I've always dreamt about"). Ordinal reliability is α = .89; Ω = .85. The original response formats were adapted to standardize the array of instruments (going from 7 to 4 points) (Jiménez et al., 2015).

Procedure

In the framework of a broader study into processes of university orientation and tutoring, the information provided by students completing a degree in psychology at the University of Seville over four academic years (2010–2014) is used. The evaluation is conducted using a computer application that allows students to complete it online.

The participants receive information about the study objectives, guarantees of anonymity in the use of the data and the voluntary nature of their participation. Furthermore, they are given a way of contacting with the team responsible for the tutorial orientation and action plan so that they could respond to any question. The study has the approval of the university's ethics committee.

Data analysis

This study includes descriptive procedures (measures of central tendency and dispersion), bivariate correlation (*p* > .05), mean comparisons (*t*-test, *p* < .05), including effect size according to Cohen's *d* (1988; small effect size between ≥.20 and <.50; medium between ≥.50 and <.80; and large for ≥.80.), performed using SPSS 22 (IBM, 2013). A combination of exploratory (EFA) and confirmatory (CFA) factor analysis using the two-half method (Floyd & Widaman, 1995) is developed, with FACTOR 10.2 (Lorenzo-Seva & Ferrando, 2006) and EQS 6.1 (Bentler & Wu, 2002) softwares. The EFA is developed following the recommendations of Ferrando and Anguiano-Carrasco (2010), making use of polychoric matrices, factor extraction of weighted least squares, parallel analysis and oblimin rotation, with estimation of internal consistency (ordinal alpha by scale >.70; McDonald's Omega for the total scale Ω > .70). The CFA is developed using the method of maximum likelihood with robust statistics, incorporating the recommendations of DiStefano and Hess (2005), and including several goodness-of-fit indexes (χ^2/df < 5; NNFI > .80; RMSEA < .08; CFI > .90; SRMR < .08). The measurement invariance for males and females is examined following the procedure recommended by Byrne (2008).

Results

To analyze the factorial structure of the ACRA, first an EFA with the first half of the sample selected at random (*n* = 408) is developed. The initial results indicate that a three-factor solution should be retained. After the successive elimination of items which do not saturate in any factor (<.450), and retaining only the scales

Table 1
Factor structure and internal consistency of the ACRA-C for the first half of the sample

Item (extract)	Microstrategies	Keys for memory and metacognition	Emotional-social support
1. I make summaries after underlining	**.775**	.003	−.056
2. I make summaries at the end of each topic	**.807**	−.012	−.092
3. I summarize after each topic, lesson or write down the most important things	**.804**	−.037	−.010
4. I draw diagrams from underlined material and summaries	**.655**	.032	−.044
5. I memorize summaries, diagrams, conceptual maps, etc.	**.469**	.032	.209
10. I use signs and drawings to highlight important information	.013	**.553**	.069
11. I am aware of the importance of using elaboration strategies	.052	**.736**	−.047
12. I recognize the role of learning strategies for memorizing	.134	**.616**	.060
17. It helps me if I recall events or anecdotes to remember	−.141	**.560**	−.019
18. I recall drawings, images or metaphors to elaborate information	−.070	**.652**	−.056
27. I study hard to feel proud of myself	.031	.071	**.489**
31. I avoid distractions where I study	−.047	−.013	**.500**
32. I sort out family problems to concentrate on studying	−.020	−.061	**.515**
34. I solve conflicts with fellow students, lecturers or family	−.059	.014	**.534**
35. I talk to fellow students, lecturers or family to clarify study doubts	.051	.020	**.523**
36. It gives me satisfaction when others value my work positively	−.008	.005	**.668**
37. I encourage and help my fellow students to be academically successful	.023	−.035	**.693**
Explained variance	12.9%	27.0%	10.4%
Correlations (Tau-b)			
Keys for memory and metacognition	.23[*]		
Emotional-social support	.21[*]	.22[*]	
Internal consistency (ordinal α)	.78	.86	.78

Note. Boldface indicates the factor where items saturate the highest.
[*] $p < .005$.
[**] $p < .01$.
[****] $p < .001$.

Table 2
Goodness-of-fit indexes of the two models with the second half of the sample: ACRA-A (44 items) and ACRA-C (17 items)

	ACRA (44 items)	ACRA-C (17 items)
χ^2(Satorra-Bentler)	2425.60	250.92
df	899	116
χ^2/df	2.69	2.16
CFI	.70	.90
NNFI	.688	.888
RMSEA	.06	.05
IC RMSEA (95%)	.06–.07	.04–.06
SRMR	.097	.072
AASR	.073	.052
AVE Factor 1	.29	.51
AVE Factor 2	.28	.38
AVE Factor 3	.41	.33

AASR: Average Absolute Standardized Residuals, AVE: Average Variance Extracted.

with at least four components, a solution that includes 17 of the 44 items from the original set (KMO > .80; Bartlett's statistic $p > .001$; GFI = .99; 50.3% of explained variance) is reached, that distribute in three factors with adequate internal consistency ($\alpha > .70$; $\Omega = .77$) and significant small-size correlations. The new scales are labelled *Microstrategies*, *Keys for memory and metacognition* and *Emotional-social support*. The rotated solution of the ACRA-C (ACRA, brief version) is offered in Table 1.

In a second phase, a confirmatory factor analysis (CFA) with the second half of the sample ($n = 401$) is conducted, analyzing the original solution of 44 items and the new solution of 17 items (ACRA-C). The robust method is used (without assuming normal distribution, due Mardia coefficient is >5 in the tested models (34.15 and 12.98 respectively), with inter-factor correlation in both cases (see Table 2). No problems of identification of the model occurred in any of the cases. The original solution shows adequate levels of fit in two of the three indicators, although its CFI is below the established cut-off point. The short version show adequate goodness-of-fit indexes in all cases. Furthermore, the indicators of fit of the ACRA-C are quantitatively better, showing greater parsimony. The differences of fit between both models are statistically significant, given that

$\Delta\chi^2$ (Satorra-Bentler) = 2180.39, $p < .001$ (Satorra & Bentler, 2001). In the 17-item model with better fit, all the observed variables make a significant contribution and their standardized factor coefficients give $R^2_{adjusted}$ values between .20 and .73. Very high standardized errors associated with any estimated coefficient are not observed (Batista & Coenders, 2000), and composite reliability indexes are .78, .70 and .72 respectively.

To provide evidence for criteria validity of the ACRA-C, correlations (Spearman's rho) between the factors obtained and the overall score on the one hand, and measures of learning focus (surface, deep and achieving), critical thinking and satisfaction with life with the overall sample, on the other (Table 3) are computed. Significant correlations ranging from small to moderate, and positive in all cases apart from the approach of surface learning are obtained.

In order to examine measurement invariance by gender, the four-step process recommended by Byrne (2008) is followed. Firstly, the baseline models for males and females are tested separately with satisfactory results (Males: S-B$\chi^2_{(116)}$ = 143.64, NNFI = .92, CFI = .93, RMSEA = .01, IC RMSEA = .01–.06; Females: S-B$\chi^2_{(116)}$ = 206.36, NNFI = .94, CFI = .95, RMSEA = .04, IC RMSEA = .03–.05). Secondly, the configural equivalence is analyzed, estimating the baseline models within the framework of a multigroup model. The goodness-of-fit statistic reveal a well-fitting multigroup model, with S-B$\chi^2_{(232)}$ = 332.48, NNFI = .95, CFI = .96, RMSEA = .04, IC RMSEA = .03–.05. Thirdly, measurement invariance is confirmed with specifications of equality constraints for factor loadings (S-B$\chi^2_{(243)}$ = 377.42, NNFI = .90, CFI = .91, RMSEA = .03, IC RMSEA = .03–.04). Finally, structural invariance is demonstrated by adding specifications of equality constraints for factor covariances (S-B$\chi^2_{(246)}$ = 386.61, NNFI = .90, CFI = .91, RMSEA = .03, IC RMSEA = .03–.04). The overall model and the more restricted one do not present statistically significant differences, given that $\Delta\chi^2$ (Satorra-Bentler) = 100.52, $p = .97$ (Satorra & Bentler, 2001).

Once checked measurement invariance by gender, several descriptives of the ACRA-C for males and females are obtained. The score distribution fit normality (Kolmogorov–Smirnof and Shapiro–Wilk statistics $p < .001$) in the three factors and in the overall score. Variance homogeneity for the scores obtained by males

Table 3
Bivariate correlations between the factors of the ACRA-C and other variables of interest

	Surface approach	Deep approach	Achieving approach	Critical thinking	Life satisfaction
Microstrategies	−.07[*]	.30[****]	.23[****]	.12[****]	.17[***]
Keys for memory and metacognition	−.14[****]	.18[****]	.31[****]	.22[****]	.17[***]
Emotional-social support	−.09[**]	.37[****]	.40[****]	.16[****]	.24[****]
Total ACRA-C	−.13[****]	.36[****]	.46[****]	.22[****]	.27[***]

[*] $p < .05$.
[**] $p < .01$.
[***] $p < .005$.
[****] $p < .001$.

Table 4
T contrast for ACRA-C scores by gender

	Means		t test			Effect size		
	Males	Females	t	df	p	$M_1 - M_2$	SD	d
Microstrategies	14.45	15.54	4.00	509	.000	1.09	2.95	0.37
Keys for memory and metacognition	14.98	15.80	3.29	509	.001	.81	2.43	0.33
Emotional-social support	22.30	23.55	4.53	509	.000	1.25	2.85	0.44
Total ACRA-C	51.74	54.88	5.66	509	.000	3.15	5.99	0.53

Table 5
Descriptive statistics for the three factors of the ACRA-C for males and females

	Microstrategies		Keys for memory and metacognition		Emotional-social support		Total ACRA-C	
	Males	Females	Males	Females	Males	Females	Males	Females
Min–Max	5–20	5–20	5–20	5–20	7–28	7–28	17–68	17–68
Mean	14.45	15.54	14.98	15.80	22.30	23.55	51.74	54.88
SD	2.96	2.57	2.52	2.40	2.87	2.66	5.97	5.30
Median	15	15	15	16	22	24	51	55
Mode	15	15	14	16	23	21	50	55
Skewness	−.60	−.35	−.38	−.30	−.02	−.28	.19	−.01
Standard error	.21	.13	.21	.13	.21	.13	.21	.13
Kurtosis	1.31	.34	.50	−.09	−.35	−.42	.01	−.23
Standard error	.42	.25	.42	.25	.42	.25	.42	.25
Percentiles								
10	11	12	12	13	19	20	45	48
20	13	14	13	14	20	21	47	50
30	14	14	14	15	20.11	22	48	52
40	14	15	14	15	21	23	50	54
50	15	15	15	16	22	24	51	55
60	15	16	16	16.20	23	24	53	56
70	15	17	16	17	24	25	54.70	58
80	17	18	17	18	25	26	57	59
90	18.90	19	18	19	26	27	59.90	62

and females in all the measures of the ACRA-C is checked (F_{Levene} $p > .05$ in all cases). Significant differences in the use of strategies by gender are observed, with higher means among females (Table 4). These differences have a small effect size (quotient of the difference of means among the overall SD) for the factors of the ACRA-C and median for the overall score. Table 5 includes measurements for central tendency, dispersion and position for males and females.

Discussion

Learning strategies are core components for academic success, in that they enable the planning, monitoring and assessing of one's own learning process (Roces, González-Pienda, & Álvarez, 2002), strategically supporting decision-making in an effective way (Pozo et al., 2001). In the framework of the EHEA, knowing which learning strategies university students use and promoting them is particularly important for their academic success and for their personal and professional development (Villardón-Gallego et al., 2013).

In this paper, a reduced version of the ACRA scale adapted by De la Fuente and Justicia (2003) for university students is offered, providing assessment data to outline a profile of the use of learning strategies measured by the ACRA among university students. The 17-item version presented here provides goodness-of-fit indicators that are an improvement on the original scale, and evidences criteria validity through its relation with a construct that is important for academic success as is the style with which students approach learning (Juárez et al., 2012). In addition to previous research, in this study evidences for validity related to personal and professional development are included. Specifically, a significant relationship between the use of learning strategies measured with the ACRA-C, on the one hand, and a more elaborated critical thinking and greater life satisfaction, on the other are found (Bustos, 2016; Olivares & Heredia, 2012).

The brief version offered in this study provides evidence of three types of learning strategies that are moderately related to each other. In line with the original version for university students and according to the results obtained by Juárez et al. (2015b), supportive learning strategies (emotional and social support) emerge as an important component of strategic behaviour during learning. This

finding situates learning strategies as socio-cultural and constructive tools and lays the emphasis on the social and situated nature of learning processes (Cubero et al., 2007), in line with a vision of strategies as modifiable skills that require explicit and situated training (Hortigüela-Alcalá et al., 2015). These results emphasize the need to create learning environments suited to the acquisition of effective learning strategies in the university context, which consider the personal characteristics of each student and the influencing factors from the surrounding academic context.

Apart from the component of support for the learning process, in the brief version of the ACRA two classic factors emerge in the comprehension of learning strategies. Firstly, a factor which combines metacognitive aspects (the ability to self-regulate the learning process) with cognitive keys for memorizing (organization and elaboration of information). These keys include elements of control that increase the strategic behaviour of the student. Specifically, some of the items refer to the situated, constructive and idiosyncratic nature of some strategies (Cubero et al., 2007), insofar as they entail incorporating personal meanings to the contents learned. In this sense, they fall into the framework of what Weinstein and Mayer (1986) denominated macrostrategies. Secondly, there is the microstrategies factor that incorporates specific skills with a more technical, and therefore less generalizable, component.

This differentiation between micro- and macrostrategies (with the latter understood in terms of keys for memory and metacognition) contradicts the proposal of De la Fuente and Justicia (2003) who incorporate both constructs into one single factor, and that of Juárez, Pichardo et al. (2015) who categorize the strategies in line with the stages of information processing. For the analysis and training of learning strategies in university education, the differentiation of these strategies taking into account the level of personal significance that they encourage and the controlled behaviour they require constitutes a focus of interest; this is because findings have shown that the level of elaboration and control of these strategies differs depending on the types of studies and the stage of the degree course (Camarero et al., 2000; Juárez et al., 2012; Marugán et al., 2013). Furthermore, the procedures for encouraging the strategic behaviour of learners need to be adjusted depending on the degree of regulation that the student presents at each moment (Navarro & Martín, 2006).

Finally, we would like to point out how males and females use the strategies offered by the ACRA-C differently. In line with previous studies, females have a greater and more diversified range of learning strategies compared to the males (De la Fuente & Justicia, 2001; Juárez et al., 2012). Given the over representation of women in the sample (3:1), the statistical invariance of the scale by gender ought to be examined with a more balanced sample.

Continuing with the limitations of the study, academic performance has not been evaluated as a measure of validity. Likewise, the internal consistency of the critical thinking instrument offer moderate values. We should also mention that moderate values in the mean variance are obtained from two of the three factors of the ACRA-C, which leads us to treat the convergent validity of the instrument with this sample with caution. Finally, the reduced version of the scale does not incorporate certain important components such as the role of information technologies as potential support in learning processes (Capilla et al., 2015). In relation to metacognition, some important indicators from a situated approach to learning strategies have been left out such as those related to the structural analysis of tasks, the conditional knowledge of strategies and the emotional supervision of the learning process (Pozo et al., 2001). It would be interesting to incorporate these elements to the scale and replicate its validation in future studies.

Despite these limitations, the results offered in this study have certain practical implications. Thus, combining exploratory and confirmatory techniques, a brief version of the ACRA scale adapted for university students that is economic in its application is offered. This version differentiates three core components of learning strategies, incorporating not only microstrategies of a technical nature, but also processes related to self-regulation and to the socio-emotional support required for effective learning. With the inclusion of descriptive statistics and by-gender data, we hope that the proposed version will be useful in university orientation and tutoring.

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