

The effectiveness of a learning strategies program for university students

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Abstract

Background: University lecturers often complain about their students' lack of learning strategies, but not many universities in Spain offer specific courses in this area. Studies on their effectiveness are also rare. **Method:** This study presents the results of a Learning Strategies Course implemented at the School of Teacher Training and Education, University of Oviedo, Spain. A quasi-experimental design was used with an experimental ($n = 60$) and a control group ($n = 57$) of students on the Educational Psychology course. A Spanish adaptation of the Motivated Strategies for Learning Questionnaire (MSLQ): the CEAMR2 was used as a pre and post-test measure. Group A (EG) received training in learning strategies, while group B (CG) received no training. **Results:** Post-test measures showed significant differences in five out of the ten learning strategies assessed: elaboration, organization, repetition, self-questioning and study space, and also an improvement in one out of the six motivational scales: control of learning beliefs. **Discussion:** The results suggest that learning strategies courses with proven effectiveness should be offered to university students.

Keywords: Learning strategies, university students, CEAM, MSLQ, higher education.

Resumen

Eficacia de un programa de mejora de las estrategias de aprendizaje en la enseñanza superior. Antecedentes: los profesores universitarios se quejan de la forma de estudiar sus alumnos, pero escasean en nuestro país cursos específicos en este área y estudios sobre su eficacia. **Método:** presentamos los resultados obtenidos con el Curso de Estrategias de Aprendizaje en un grupo de estudiantes de la Facultad de Formación del Profesorado y Educación de la Universidad de Oviedo. Se utilizó un diseño quasi-experimental con grupo experimental ($n = 60$) y grupo de control ($n = 57$), formados por estudiantes de primer curso de la asignatura Psicología de la Educación. Se utilizó el Cuestionario de Estrategias de Aprendizaje y Motivación (CEAM-R2), adaptación del MSLQ, como medida pre y post-test. El grupo A (GE) recibió entrenamiento en estrategias de aprendizaje, mientras que el grupo B (GC) no lo recibió. **Resultados:** el posttest muestra diferencias significativas en cinco de las diez estrategias de aprendizaje evaluadas: elaboración, organización, repetición, auto-interrogación y lugar de estudio, y también en una de las seis escalas motivacionales: creencias de control del aprendizaje. **Discusión:** los resultados sugieren que se deberían ofertar a los universitarios cursos de estrategias de aprendizaje eficaces.

Palabras clave: estrategias de aprendizaje, universitarios, CEAM, MSLQ, enseñanza superior.

There is a concern in higher education about students' lack of preparation to face the demands of university. They have important gaps in aspects related to their learning strategies and to the control of the variables involved in learning (Rosário et al., 2007, 2015).

In recent decades, many studies in the area of Educational Psychology have been focused on the qualities of a good learner. Specifically, research on self-regulated learning (SRL) conducted in the eighties has been crucial to understanding the key processes involved. Zimmerman (1989), Schunk (1989), and Pintrich (1989) set the basis for the development of a large body of research in this field.

Models of SRL include cognitive, metacognitive and motivational components to explain learning and academic achievement. Self-

regulated learners are those who "set goals for their learning and then attempt to monitor, regulate and control their cognition, intentions and behavior" (Pintrich, 2000, p. 453). Pintrich (2001, 2004) identified four stages: planning, monitoring, controlling and reacting, and four areas where the learner actively engages in these processes: cognition, motivation, behavior and context.

Zimmerman (2000, 2002) introduces similar components in his cyclical model of three interrelated stages 1) previous: task analysis, motivational beliefs, 2) completion or volitional control: self-control, self observation, and 3) self-reflection: self-evaluation, reaction.

Researchers agree that self-regulation processes can be trained (Schunk, 2005; Zimmerman, 2015), and this can lead to a better learning and performance (Zimmerman, 2000). This becomes crucial in higher education, as good learning is related to strong SRL skills (Kizilcec, Pérez-Sanagustín, & Maldonado, 2017).

Some institutions provide this type of training, either in-class or online, which helps students to overcome to the difficulties they encounter at university (Tuckman, 2003a).

Our research is centered on in-class programs. With respect to e-learning, there is a growing body of research (Tsai, Shen,

& Fan, 2013), some which focus on technologies that promote self-regulation (e.g. Auvine, 2015), while others are centered on training in learning strategies. Cerezo et al. (2010) reviewed a number of them.

Claire Weinstein is one of the first researchers to implement a learning strategies course: in 1977 at the University of Texas (Weinstein & Underwood, 1985). Four components were included: skill, will, self-regulation and context variables. Positive effects were found in performance, reading comprehension and self-reported strategies (Weinstein, Husman, & Dierking, 2000).

Learning to Learn (Pintrich, McKeachie, & Lin 1987) was developed at the University of Michigan. It is based on Pintrich's research and focuses on teaching cognitive, metacognitive, resource management and motivational strategies. It promotes increases in academic achievement, self-reported use of learning strategies (Hofer, Yu, & Pintrich, 1998), and self-efficacy, and decreases in anxiety (Pintrich, Smith, García, & McKeachie, 1993).

Tuckman (2003a) developed an intervention in Ohio state University that had a positive impact on students' academic performance (Tuckman, 2003b). Afterwards it was implemented in other institutions.

There are also interventions in specific fields, e.g. a "program implemented in accounting principles to develop SRL" (Schloemer & Brenan, 2009, p. 81). Three components were included: goal setting, self-monitoring and modifying strategies. The results showed increases in motivation and positive learning behaviors. A review of other interventions can be found in Cerezo, Núñez, Fernández, Suárez, and Tuero (2011).

In Spain, the intervention by Román (2000, 2004) for developing strategies for meaningful reading contains five operations: underlying, paraphrasing, structure identification, self-questioning and conceptual maps. The results show a good mastery of the strategy, a transfer of the training and durability of the effects.

Carbonero, Román, and Ferrer (2013) developed a program to learn strategically that included organization, elaboration and application-transfer strategies. They found positive effects on elaboration, transfer and performance in the course tasks.

Rosário et al. (2007) designed an intervention, based on Zimmerman's work, organized around the reflections of a fictional student about his experiences, emphasizing the role of strategies and processes of self-regulation while learning (Rosário, Núñez, & González-Pienda, 2006).

The results (Rosário et al., 2015) showed improvement of knowledge about strategies, reduction of surface approaches to studying, and extended the acquired skills to other tasks. Similar results are obtained with the adaptation to Moodle format (Núñez et al., 2011) that also showed an increase on academic achievement in the trained students.

There is no overall analysis of these experiences in Spain. The meta-analysis carried out by Hattie, Biggs, and Purdie (1996) indicated that, in many of the interventions, the results were satisfactory in the short term: students improved their strategies, and there was transfer. However, long-term transfer was much less intense.

The reasons "may be teaching strategies of faculty members, organization of course contents, simplicity of learning tasks (...) types of exams..." (Simsek & Balaban, 2010, p. 43). The students' perception of the utility of the strategies is closely related to the perceived demands of the learning context (Rosário et al., 2010,

2015). Unless the strategies are perceived as *useful* students are not going to use them (Rosário et al., 2015).

At university, emphasis is often placed on the acquisition of knowledge, despite the fact that the goals of higher education are much broader and include the improvement of SRL to develop lifelong learners. Favoring factual learning produces little development of a deep approach to learning (Biggs, 1987) and of the learning strategies that promote it (Biggs, Kember, & Leung, 2001).

Weinstein stated in 1994 that *learning to learn* is perhaps the most important goal of university education. Her article *Learning how to learn: an essential skill for the 21st century* (Weinstein, 1996), summarizes this view.

International organizations' main demand for higher education is that the students develop the lifelong capacity to learn (UNESCO, 1998). In Europe this concern has acquired prominence within the framework of the construction of the European Space for Higher Education. In the Prague Declaration (2001), one of the goals added to the prior Declaration of Bologna (1999) was permanent lifelong learning (Ministry of Education, Culture and Sport, 2003).

Professionals are interested in the necessary reforms in higher education (Goñi, 2005; Jacobs & Van der Ploeg, 2006). Some studies show how to change teaching to contribute to autonomous learning (e.g., De la Fuente, Martínez, Peralta, & García, 2010), and others focus on the design of programs to improve learning strategies, as we showed above.

Both objectives are complementary because of the relation between the demands of the context and the development of SRL. Rosário et al. (2015, p. 184) compared different continents and expressed a concern: "our results indicate that the participating European students do not report using learning strategies in responding to the demands of their academic tasks (...) Future studies should consider investigating students' perception of academic demands and teachers' expectations in relation to the reported use of SRL strategies".

The aim of our study is to contribute to the promotion of self regulated learning through the teaching of learning strategies. We have adapted a program: *Learning to Learn* (Pintrich et al., 1987), and a questionnaire: the *MSLQ: Motivated Strategies for Learning Questionnaire* (Pintrich, Smith, García, & McKeachie, 1991).

Both are based on Pintrich's model, that assumes "that learning strategies can be learned and brought under the control of the student" (García & McKeachie, 2005, p. 117), and they are focused on the course level (García & McKeachie, 2005, p. 118).

Nevertheless, as Pintrich (2004) points out "it is crucial that it is understood, that the MSLQ, which was developed well over 10 years ago, does not represent an instrument designed to assess all components of the current conceptual model" (p. 392) of SRL.

The goal of this study is to verify the effectiveness of the *Learning Strategies Course* with the *CEAM-R2* (Learning Strategies and Motivation Questionnaire, 2nd Revision) (Rocés, 2003).

Method

Participants

A pretest-posttest quasi-experimental design was selected, with two natural groups of first year students enrolled in the Child Education degree and attending the Educational Psychology course.

The participants were 117 students who attended class and completed both the pretest and the posttest: 60 in the experimental group (EG), who were trained with the course, and 57 in the control group (CG).

With regard to gender, most were women (89.5% in CG and 96.7% in EG). More than 95% of the students were between 17 and 24 years old, with a higher percentage of 18-year-old students (36.8% in CG and 41.7% in EG).

Instruments

We used the “Cuestionario de Estrategias de Aprendizaje y Motivación. 2ª Revisión (CEAM-R2)” [Learning Strategies and Motivation Questionnaire. 2nd Revision] (Roces, 2003), which is the translation and adaptation of the *Motivated Strategies for Learning Questionnaire (MSLQ)* (Pintrich et al. 1991). It is a self-report questionnaire answered on a seven point Likert scale.

Items 1 to 81 are the translation of the original; seven new items have been added (82-88), because previous analysis performed (Roces, 1996) showed a different factorial structure from the original one, with more dimensions that required new items: three about teacher’s help, two about rehearsal strategies and three regarding study environment.

There are two sections: motivation ($\alpha = .79$) composed of 31 items and learning strategies ($\alpha = .89$), with 57 items. The scales are detailed on tables 1 and 2.

Procedure

The CEAM-R2 was administered at the beginning of the semester (pretest) to Group A ($n = 90$) and Group B ($n = 84$). The

instructor for both groups was the same and has a theoretical and practical knowledge of learning strategies due to many years of research. The questionnaire was applied again at the end of the semester (posttest). The EG ($n = 60$) and CG ($n = 57$) were made up of the students that regularly attended class and took both the pretest and the posttest.

Between the two measures, we carried out the *Learning Strategies Course*: explicit teaching and practice of learning strategies to the EG, in the hours dedicated to classroom practices: 13 sessions of 2 hours= 26 hours, plus individual work estimated between 6 and 13 hours.

We drew on the *Course in Learning to Learn* (Pintrich et al., 1987) which includes: (a) active reading: approach, questions, structuring, review, (b) comprehension and recall: mnemonics, preparation, organization, and (c) metacognition: reflection, self-perceptions.

We grouped these topics as in the classic work of Weinstein and Mayer (1986): (a) elaboration strategies, (b) organization strategies, and (c) metacognition. The contents are displayed on table 3.

A four-step sequence was followed for each session: *informing*, *modeling*, *practicing*, and *feedback*, according to the model used in other programs (Román, 2000; Carbonero et al., 2013). The texts were taken from the “*Manual de Psicología de la Educación*” ([Handbook of Educational Psychology] by González-Pienda, González-Cabanach, Núñez and Valle (2002).

Data analysis

We took measures of some of the variables that might interfere with the intervention. Specifically, we performed analysis of

Table 1
Motivation scales in the CEAM R2

Scale	α	Nº items	Sample item
Intrinsic motivation	.57	4	I prefer course material that really challenges me so I can learn new things
Extrinsic motivation	.71	4	If I can, I want to get better grades in this class than most of the other students
Task value	.80	6	I think I be will able to use what I learn in this course in other courses
Performance self-efficacy	.84	4	I believe I will receive an excellent grade in this course
Control of learning beliefs	.75	8	If I study in appropriate ways, then I will be able to learn the material in this course
Anxiety	.75	5	When I take a test I think about how poorly I am doing compared to other students

Table 2
Learning strategies scales in the CEAM R2

Scale	α	Nº items	Sample item
Elaboration	.83	9	When I study, for this class, I pull together information from different sources, such as lectures, readings and discussions
Time-effort	.77	9	I find it difficult to stick to a study schedule
Perseverance	.67	3	I work hard to do well in this class even if I don't like what we are doing
Organization	.78	8	I make simple charts, diagrams, or tables to help me organize course material
Classmates' support	.71	6	When I do not understand some subject content, I ask another classmate for help
Metacognition	.62	7	When I study for this class, I set goals for myself in order to direct my activities in each study period
Self-questioning	.74	3	When reading for this course, I make up questions to help focus my reading
Study environment	.76	4	I usually study in a place where I can concentrate on my course work
Repetition	.79	4	When I study for this class, I practice saying the material to myself over and over
Teacher's help	.70	4	I ask the instructor to clarify concepts I do not understand well

variance (ANOVA) on age, gender, and grades (prior achievement, which was self-reported).

We performed multivariate analysis of variance (MANOVAs) in order to determine the effect of the course. We also conducted descriptive analyses of the target variables of the sample.

Results

Analysis of variance revealed no statistically significant pretest differences in any of the variables measured. Table 4 displays the means and standard deviations of the variables age, gender and grades and table 5 shows the results of the analysis of variance.

The study of the efficacy of the intervention showed that, for the dimension *learning strategies*, taking the ten variables conjointly, there were statistically significant differences between the two groups (Wilks' Lambda= 0.751, $F(10, 106) = 3.509$, $p = .001$, $\eta_p^2 = .249$). The partial Eta squared value, attending to the classic work by Cohen (1988), indicates a large effect size.

Elaboration	Mnemonic techniques
	Paraphrasing
	Connecting
	Relating
	Summarizing
Organization	Clustering
	Selecting
	Structuring
	Outlining
	Making charts
	Drawing diagrams
Metacognition	Goal setting
	Self-questioning
	Controlling comprehension
	Adjusting activities
	Reflecting
Evaluating	

	M		SD	
	CG	EG	CG	EG
Age	19,60	19,37	2,631	2,610
Gender	1,89	1,97	0,310	0,181
Grades	26,34	26,22	4,565	4,776

Scores for variable gender: 1 (male), 2 (female); minimum and maximum for grades: 10-50

	df, error	F	p
Age	1, 115	0.225	.636
Gender	1, 115	2.382	.125
Grades	1, 106	0.016	.898

In the motivational dimension, taking the six dimensions, there were not statistically significant differences between the two groups. It is nonetheless interesting to see the results for each of the dimensions.

With regard to the learning strategies, statistically significant group differences were found in five out of ten (table 6): *elaboration, organization, repetition, self-questioning, and study environment*. Considering the means of the two groups, the EG obtained higher levels in all the strategies with the exception of repetition, that is lower than in the EC.

Regarding the motivation factors, significant differences were obtained only in one: *control of learning beliefs*, $M_{CG} = 4.93$, $SD_{CG} = 0.68$, $M_{EG} = 5.18$, $SD_{EG} = 0.78$, $F(1, 115) = 3.356$, $p = .070$, $\eta_p^2 = .028$.

Although statistically significant, the effect size, in four out of the five learning strategies scales and in *control of learning beliefs* is small if we take into account the partial Eta squared value. A medium effect size is only found in *organization*.

	M		SD		df, error	p	η_p^2
	CG	EG	CG	EG			
Elaboration	4.32	4.66	0.75	0.75	1, 115	.014	.051
Organization	5.26	5.74	0.90	1.00	1, 115	.007	.061
Repetition	5.82	5.50	0.93	0.98	1, 115	.069	.028
Self-questioning	4.49	4.84	1.11	1.09	1, 115	.091	.025
Study environment	6.44	6.56	0.72	0.71	1, 115	.070	.028

Discussion

The main goal of this study was to test the efficacy of a program to improve the use of learning strategies. Our findings show that the *Learning Strategies Course* was efficacious both in promoting the use of some learning strategies and in improving one motivational variable: *control of learning beliefs*.

These results reinforce the idea that the competences for self-regulated learning can be improved with appropriate training (Núñez, Rosário, Vallejo, & González-Pianda, 2013; Rosário et al., 2015) even when the number of sessions are limited.

The results obtained indicate that the program promotes change in some of the variables of interest: *elaboration, organization, repetition, self-questioning, and study environment*. Although in all of them a higher effect of the intervention would have been expected, the results are enough to consider that the program is useful.

The higher level of the EG in all the strategies, except *repetition*, indicates the efficacy of the training to improve some of the qualities that learning in higher education should have. As Pintrich (2004) pointed out, when analyzing the relations between SRL and students approaches to learning (SAL) models: "the use of rehearsal strategies in the MSLQ would parallel a more surface approach to learning (or reproductive styles) in SAL models. The other four cognitive scales on the MSLQ should be related to deeper approaches to learning" (p. 393).

The motivational aspects changed significantly only in one dimension: *control of learning beliefs*. The students' positive perceptions in the EG are higher than in the CG. This finding is in line with other studies that claim that the effective use of strategies makes the student become more confident of their potential to learn better (Lavasani, Mirhosseini, Hejazi, & Davoodi, 2011; Zimmerman & Martínez-Pons, 1990). As Pintrich and De Groot (1990) pointed out: "student involvement in self-regulated learning is closely tied to students' efficacy beliefs about their capability to perform classroom tasks" (p. 38). Teaching effective strategies is one of the ways to build self-efficacy (Schunk, 2003), that is sustained by attributions formed due to effective self-regulation (Schunk & Ertmer, 2000).

Although our goals did not include motivational changes, the lack of changes in the rest of the motivational dimensions is surprising, taking into account the relation between learning strategies and motivation, frequently found by researchers (e.g., Pintrich, 1993; Pintrich & De Groot, 1990; Schunk, 2003; Weinstein et al., 2000).

The small global effect is similar to other studies, e.g. Núñez et al. (2011), who suggest that "self-report methodology would be conditioning the results" (p. 279), and recommend the use of other measures, such as qualitative and micro analytic methodologies. Rosário et al. (2015) also attribute the effect size to the use of

self-reports. Similar suggestion is given by Torrano, Fuentes, and Soria (2017), who state that it is very difficult to analyze the dynamic, procedural and social nature of SRL with self-report questionnaires.

Our results suggest that the *Learning Strategies Course* can contribute to optimize the strategies used by students and this may increase their control of learning beliefs. This is an incentive to replicate and expand the study, leading us to recommend designing, implementing, and studying the efficacy of the interventions with different types of measures, and also studying the degree of maintenance of the improvements over time.

The integration of the training within the practice classes in a course arouses the idea of expanding the experience to other disciplines. This would stimulate the ongoing debate about the appropriateness/inappropriateness of teaching strategies associated with specific domains or doing a more general training, and about the transfer of the results: "research is needed to determine the extent that explicit instructions and practice in each area improves transfer" (Schunk & Ertmer, 2000, p. 644).

If we really expect to achieve the goals that are underlined by the international institutions, if we want the development of self-regulated learners, it is essential to introduce changes in higher education. Programs that promote the development of learning strategies are one important step in that direction.

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