Learning strategies and self-regulation in context: how higher education students approach different courses, assessments, and challenges.

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Abstract

This study aim was to analyse the decisions higher education students make about learning strategies. We focus on research questions related to the strategies that students report, their strategy adaptability to different learning situations and the association of learning strategies with students' self-regulated learning and academic performance. We carried out qualitative semi-structured interviews with 17 higher education students of Psychology and Sports Sciences with different self-regulatory profiles and levels of academic performance. The results indicate that students reported mainly basic learning strategies, but the level of elaboration of their cognitive and metacognitive operations was different although they use the same terms to identify their strategies. In addition, we found that students change their learning strategies depending on different factors, with a noticeable influence of assessment activities, and that students with low academic performance showed organization problems and limited knowledge of learning strategies. We present some implications for the promotion of critical use of learning strategies.

Keywords: learning strategies, self-regulated learning, higher education, academic performance, strategy adaptability.

Educational systems worldwide stress the need to enhance higher education students' learning and critical thinking skills in order to help them to adapt to this changing environment and be ready for lifelong learning (Yang, Schneller, and Roche 2015). In this line, self-regulated learning (hereafter, SRL) skills have been claimed to be crucial for lifelong learning, being an effective predictor of academic performance and satisfaction in different educational levels (Dignath and Büttner 2008; Dignath, Büttner, and Langfeldt 2008; Sitzmann and Ely 2011) and later at the workplace (Lord, Diefendorff, Schmidt, and Hall 2010).

The term SRL comes from the application of the more general concept of self-regulation to academic settings (Dinsmore, Alexander, and Loughlin 2008). Self-regulated learners are capable of setting realistic and specific learning goals, maintaining their motivation, regulating their emotions, and monitoring and evaluating their progress towards the learning goals (Panadero and Alonso-Tapia, 2014; Zimmerman and Moylan 2009). Importantly, students need to deploy several self-regulatory skills, such as strategic planning, time management, or environmental structuring for the comprehension and assimilation of the learning materials (Panadero and Alonso-Tapia, 2014; Khiat 2019). Here, we use the term learning strategies to refer to all the cognitive, metacognitive, emotional and motivational self-regulated learning operations performed by a student in order to create meaningful memories of the learning contents (Valle, Rodríguez Martínez, González Cabanach, Núñez Pérez, and Rosário 2009; Weinstein, Acee, and Jung 2011). In other words, learning strategies are the different regulatory actions that a student makes to assimilate the content of the different courses and complete the assessment activities required by the teachers.

From a theoretical point of view, we would expect that an effective use of learning strategies would be associated with higher academic performance. However,

while SRL in general has been associated in numerous studies with increased academic performance (e.g., Dignath and Büttner 2008; Dignath et al. 2008), the relation between learning strategies and academic performance is not always direct, and some studies have found a weak association (Credé and Phillips 2011). This could be partially explained by the fact that the association between self-regulatory learning strategies and academic performance might be modulated by other variables that seem to have a strong influence, like prior knowledge and self-efficacy (Richardson, Abraham, and Bond 2012).

Furthermore, studies on the relationship between self-regulatory learning strategies and academic performance present another important difficulty because, although academic performance (measured usually as grade point average –GPA–) certifies learning and it is an easy-to-compare outcome, it construes a partial view of what learning entails. Academic performance informs us of short-term learning and test performance, but learning implies long-term understanding and transfer to other situations which hardly ever get assessed in the classroom (Boud and Falchikov 2006; Soderstrom and Bjork 2015). Therefore, students with more elaborated critical thinking skills and strategies might struggle in more constrained and memory-based assessment contexts affecting their GPAs, while it could be expected that under different assessment conditions those students would perform better (Credé and Phillips 2011; Rovers et al. 2018).

To better understand the complex relation between self-regulated learning, learning strategies and achievement, the use of learning strategies must be explored paying more attention to the contextual influences that shape the instructional setting (e.g. assessment activities required in the classroom), while using more in-depth data methods that go beyond the predefined constructs of a questionnaire. In this sense,

several researchers have argued that there is a lack of studies in learning strategies using instruments different from standardized questionnaires (Kikas and Jõgi 2016; Panadero et al. 2016; Rovers, Stalmeijer, van Merriënboer, Savelberg, and de Bruin 2018). Although self-reports like interviews and questionnaires do not measure actual performance and they are susceptible to memory distortions (Schellings and Van Hout-Wolters 2011; Venmaan 2011), they are still an essential tool to understand all kinds of cognitive, affective, physiological and behavioural processes of self-regulated learning (Pekrun 2020). In our study, we selected the method of qualitative interviewing, which could help us to understand the students' subjective thoughts and perceptions about the use of learning strategies (Pekrun 2020). In addition, qualitative interviewing techniques could help us to explore a key factor to frame learning strategies, related to the use of learning strategies in different circumstances and the reasons to do so, i.e., their strategy adaptability.

The term strategy adaptability (Broekkamp and Van Hout-Wolters 2007) calls attention to the fact that students select and adapt their strategies to external and internal characteristics of study tasks. Precisely, the definition of strategy implies that students have to regulate how to act by self-evaluating their knowledge and capabilities, and selecting the different strategies they need to enact for the specific learning conditions (Rovers et al. 2018; Valle et al. 2009; Weinstein et al. 2011).

The literature has found a number of variables affecting how and when students use different strategies. For instance, the strategy adaptability may be affected by assessment activities (Boud and Falchikov 2006; Broekkamp and Van Hout-Wolters 2007), learning challenges (Koivuniemi et al. 2017) and the adaptation to higher education learning environments (Coertjens, Donche, et al. 2017). The strategy adaptability can partially explain the high variability of learning strategies reported by

students of higher education (Coertjens, Donche et al. 2017; Coertjens, Van Daal, Van

Petegem, Donche, and De Maeyer 2013; Heikkilä and Lonka 2006; Rovers et al. 2018).

Students range from surface strategies like just reading the materials several times and

memorizing, to more critical thinking and sophisticated learning strategies like self-

testing. In sum, it is necessary to analyse the within-person variations in learning across

academic tasks and courses (Credé and Phillips 2011), and to understand the reasons

students have to adapt their learning strategies.

Aim and research questions

The general aim of the study was to analyse the decisions higher education

students make about their use of learning strategies in the context of specific courses in

Psychology and Sports Sciences. Our specific research questions are:

- RQ1: What learning strategies do students report?

- RQ2: Do students adapt their learning strategies, and what reasons do they give

  for selecting the learning strategies?

- RQ3: Is there a pattern in the relation between learning strategies, self-regulated

  learning and academic performance?

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Method

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Participants and sampling procedures

Participants in this research were 17 undergraduate students of Psychology and

Sports Sciences from two private universities in the region of Madrid, Spain. We used a

purposive sampling process (Merriam 2009) selecting participants from a previous

quantitative study conducted with a wide sample of students (Panadero et al., submitted

for publication), following several criteria. The main criteria that were relevant for the

selection were the combination of different levels of self-regulated learning (low,

middle and high) with diverse levels of academic performance (low, middle and high),

since they were required for pattern analysis in RQ3. The self-regulated learning profile was established according to the scores in the "Learning self-regulation style" second-order scale from the Emotion and Motivation Self-Regulation Questionnaire (Alonso-Tapia et al. 2014), which is an indicator of positive learning strategies use. Participants from the previous study with a score below 29 were selected for the low self-regulatory profile, between 30 and 39 for the middle profile, and more than 40 for the high self-regulatory profile. The academic performance was self-reported, including GPA and courses passed in the last course/semester: low performance (GPA below 6 points – out of 10 – and one or more pending courses), middle (GPA 6 to 8 and one or no pending courses), high (GPA above 8 and no pending courses). Participants were studying a bachelor's degree in Psychology or Sports Sciences, two disciplines that presented a contrast in content structure and assessment practices. To explore differences in the use of learning strategies through different year levels, participants were in the first, second and third year level. In addition, we balanced the participants to obtain a similar number of males and females. In Table 1, we summarize the distribution of the students according to these criteria:

Table 1

Distribution of the 17 participants in the selected criteria

SRL profile according to EMSR-Q	5 low, 5 middle, 7 high
Academic performance	4 low, 5 middle, 8 high
Gender	9 female, 8 male
Bachelor's degree	10 Psychology, 7 Sports Sciences
Year	5 first year, 5 second year, 7 third year

Data collection techniques and research design

The research design was based on qualitative face-to-face interviewing (Kvale 2007; Rubin and Rubin 2012). We interviewed participants using a semi-structured schedule with four sections and topics: 1) students' approaches to their courses during the last term and criteria employed to decide learning strategies to deploy; 2) assessment activities they underwent and their strategic approach to them; 3) learning challenges; and 4) self-perception as students. Sections 1, 2 and 3 were directly connected to research questions 1 and 2, but they were oriented differently. While section 1 was more open in nature to understand the participants' perspective without presenting themes that might have led their answers, sections 2 and 3 asked about specific variables that could influence their answers. Finally, section 4 closed the interview exploring how students assessed their skilfulness on learning strategies and academic performance.

Importantly, qualitative interviewing is still a self-report off-line technique, in contrast to the observation of actual performance provided by on-line techniques (e.g. thinking aloud protocols) (Panadero et al. 2016; Veenman 2017). Therefore, it presents some disadvantages that we tried to compensate for by implementing the following actions. First, we interviewed students at the end of the semester right after they had studied the specific subjects. This should reduce memory distortions, and it provided the opportunity to consider the conditions for strategy adaptability. Second, we used a semi-structured interview, which allows paying attention to individual variations, combining the students' perspectives with the topics we considered relevant. Third, we did not name the learning strategies so participants would use their own terms, and we asked participants detailed questions in order to understand how they deployed those learning strategies.

Procedure

The study was approved by the Ethical Committee of the project principal investigator's (third author) former university. After this approval, we contacted the students by email and scheduled them individually in a quiet room at their university. The interviews took place in 2018, in one session ranging from 30 to 60 minutes. The first and second authors performed the interviews. In most cases, the interviewees were or had been students of the interviewer. Although this relationship could have biased the participants' responses in order to please the teacher/interviewer, we did not ask about our courses. Additionally, many participants had already passed the courses taught by the interviewers. This previous relationship with the participants could facilitate the trust building process beneficial for qualitative interviewing (Edwards and Holland 2013).

Before the interview, participants were informed that it was going to be voice-recorded and they signed an informed consent. All participants followed the same interview schedule, but depending on their answers, the interviewer formulated more in-depth questions to gain information about the participant's perspective. In some cases, after finishing the interview recording, the interviewer spent some time clarifying information and giving some specific advice and counselling to the participant. There was no reward for participating.

Coding categories and data analysis

Following the open design of qualitative studies (Bazeley 2013; Creswell and Creswell 2017), for each block of 3 to 5 interviews, we analysed the data before moving to the next block. Research assistants performed the literal transcriptions of the interviews. Then the first author followed several recursive steps. First, the first author read every interview to gain a general overview. As a second step, the first author

followed a process of mixed coding supported by Atlas ti. The codes were both theoretical (i.e., based on previous research from the field) and in vivo (i.e., based on the participants' responses). These theoretical codes came from self-regulated learning theory and the classification of learning strategies by Weinstein, Accee and Jung (2011) that will be explained in the results section. Third, after coding 3 interviews, the first author cleaned the codes, making lists of all codes with relevant quotations. Through this process, non-relevant codes were deleted, codes that were different but included similar quotations were merged, and quotations that were different, but were included within the same label, were divided. Fourth, a conceptual analysis through networks was performed and, for RQ3, a matrix with the participants' main ideas and attributes was elaborated to search for patterns (Bazeley 2013; Miles, Huberman, and Saldaña 2014). The first author triangulated the codes and the conceptual analysis with group discussions with the other two authors.

After each cycle of analysis, we decided the criteria to select the next participants and whether the interview questions should be modified. The structure of the interview was not changed during the analytical process but, during the third round of interviews, we realized that using only the EMSR-Q as the main criterion to select the participants was not appropriate. At that point, we had not included students with low academic performance, thus it was decided to include 4 students with low performance using the information gathered in the previous quantitative study. After this, a combination of participants' relevant criteria was reached, and data collection was finished.

Results

The results section is organized according to the structure of the research questions. First, we present a general view of the learning strategies reported by the

participants and the meanings of those strategies for the participants (RQ1). Second, we

include the results about participants' strategy adaptability (RQ2) in two subsections, to

differentiate the analysis of students that adapted their learning strategies to different

instructional conditions from those few participants that used the same learning

strategies in all situations. Finally, we present the pattern analysis of the relation

between learning strategies, self-regulated learning and academic performance (RQ3).

RQ1: What learning strategies do students report?

Next, we present the general type and the variety of strategies reported by

participants, and we note differences in the meanings associated by the students to the

strategies from the first section of the interview. In the section devoted to RQ3, readers

can find the specific strategies reported by each participant.

In Table 2, we summarize the type of learning strategies reported by the

participants. These strategies are categorized following the proposal made by Weinstein

et al. (2011): (a) *Rehearsal strategies* consist in the repetitive exposure to learning

materials; (b) *Elaboration strategies* involve the addition or modification of contents to

make them more meaningful; and (c) *Organization strategies* imply the creation of

graphic forms to display the contents. The category *Other* was created to include

strategies that did not fit in the first categories.

Table 2

Type of learning strategies reported by the students

Strategy	N	%
Rehearsal	13	76.5%
Elaboration	9	52.94%
Organization	9	52.94%
Other	9	52.94%

Starting with the category *Other*, we include answers associated with the

strategy of attending the classes and paying attention. For seven participants, this

strategy was a first and essential step in their process of interpreting and processing

learning materials. We illustrate this idea in the following excerpt:

> The truth is that I always attend the lectures, I am never absent because in
>
> my view… listening to the teacher explaining things… it's crucial

Marta, Psychology, 3rd year

Students considered this strategy important for two reasons. First, it was a way

to get an explanation of the materials while helping them to make decisions about the

relevance of the contents and what they should focus on to prepare for the exams.

Second, some students elaborated their own materials in the classes, writing down notes

or complementing the materials provided by the teacher with comments, thoughts and

reflections made in the classroom. When the lectures were not helpful in understanding

the materials, participants reported working harder to prepare for the assessment

activities:

> Normally almost all my work takes place within the class, paying
>
> attention in the lectures and writing down notes, but… when the classes
>
> are not useful for me, then I have to work triple at home, and it is much
>
> more complicated.

Julia, Psychology, 2nd year

When the period of exams got closer, students started to study and prepare for

them, and in this process, the majority of participants reported a few basic rehearsal,

elaboration and organization learning strategies. Most participants (76.5%) reported

learning strategies that relied heavily on some kind of repetitive process to memorize

the materials (rehearsal). However, as well as using rehearsal strategies, participants

also used some other type of strategies, mainly summaries (elaboration) and/or outlines

(organization). There was only one student, with a low level of academic performance,

who reported that he just tried to read the materials several times and memorize everything. Six participants reported a more complex strategy: the elaboration of personal materials using information from different sources. Additionally, other strategies, like discussing contents with classmates, were marginally mentioned.

It is important to notice that although students used the same term to define their strategies, there were marked differences in the way they deployed the specific strategy and its level of cognitive complexity. For example, a low performing student reported using summaries but later explained that the summaries were elaborated by his classmates. This strategy would be firstly labelled as use of summaries, but by letting others prepare it, the participant missed the learning gain associated with this task. By contrast, a student with high academic performance reported that she used summaries but, on top of preparing them every day after each lecture, she asked many questions in the class and included comments about the teacher's responses in her summaries.

RQ2: Do students adapt their learning strategies, and what reasons do they give for selecting the learning strategies?

Here, we went one step further by asking the students if they always use the same strategies regardless of the instructional context and why they used the previously reported strategies in RQ1. Most participants (14) reported strategy adaptability to different circumstances, whereas three participants reported that they always used the same strategies. The results of RQ2 are organized in two subsections, comparing those who reported adapting the strategies and those that reported the same strategies in all situations.

   Strategy adaptability: Adaptation of learning strategies to the context. Starting with the group of 14 students that reported using different learning strategies

depending on the situation, in Figure 1 we present a network that summarizes what factors
were relevant for them to select a certain strategy.

Figure 1

Network: factors reported by participants to justify strategy adaptability
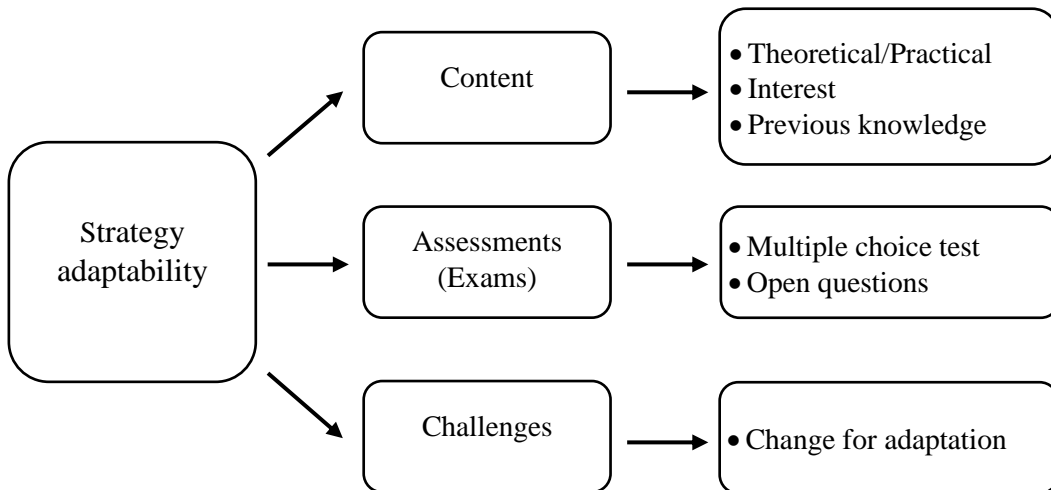
The answers from both Psychology and Sports Sciences are mixed in the figure,
because they had many common ideas. However, students of Sports Sciences gave
greater emphasis to the nature of the content of the courses, their interests and their
previous knowledge about it. With regard to the nature of the contents, for them it was
easier to study the practical courses, taking into account that in Sports Sciences there is
a stronger separation between practical contents (for example, Swimming and
Climbing) and theoretical contents (e.g., Physiology). Here we present an excerpt
illustrating this:

> I worked differently in Sports in the Natural Environment and Paddle
> Tennis. They were more practical, and we barely spent time in the
> classroom. We were there one day or two, so the preparation was
> different, and they were easier to assimilate with regard to the practice.
> That way, I get more concepts than in the classroom.
>
> David, Sports Sciences, 3rd course,

By contrast, only two Psychology students mentioned that theoretical contents were harder to learn (e.g., Psychology of Thought and Language), while more practical contents (Psychological Intervention Techniques) were easier. For Psychology students, the crucial variables were the amount of contents and the way teachers approached their classes, regarding the materials that they uploaded to the virtual campus and used in the classroom, their instructional methods and how they answered the students' questions. This is an example:

> There have been some differences, especially because of the… the kind
> of teacher that we had… the teaching methods used, this influences me a
> lot on how I prepare every course, every exam.
>
>   María, Psychology, 2nd year,

Although no participant spontaneously mentioned the assessment activities as a relevant variable, when we asked explicitly, students remarked that it affected the way they studied. In this line, the most relevant result has to do with facing multiple-choice tests versus open exams (both short-answer questions and essays). Only two participants reported that they needed more preparation for multiple choice exams because they made them feel anxious. However, 12 participants agreed with the idea that multiple-choice required less study time, less memorization and a more superficial approach to the contents. These are some extracts that illustrate this:

> I think that, well, I prepare the multiple-choice even less (…) I read it
> once or twice, and I go to the exam. That's what I do.
>
>   Carlos, Sports Sciences, 3rd year
>
> The multiple-choice is… just trying to make it sound familiar… And I
> am good at taking multiple-choice tests.
>
>   Cristina, Psychology, 1st year

On the contrary, participants explained that preparing for exams with open questions, both short-answer questions and essays, was usually more difficult and required some changes to their strategies. For these exams, nine participants just used the same strategies, but they spent more time studying and put more emphasis on memorizing the materials. Three participants reported using different strategies, especially concerning a deeper elaboration of outlines and summaries and revising more materials to complement the class notes. These fragments exemplify these approaches to open exams:

With open questions, I spend more time, and I repeat the process several

times… because you have to memorize much more.

Nicolas, Psychology, 2nd year

For open questions, I know the key ideas, but I also try to expand them

and get more information about the topic.

Margarita, Psychology, 1st year

Finally, for some participants the academic challenges played a role in their selection of learning strategies. Even though all students reported they had faced an important academic challenge in the year the interview took place, only three students reported that they had decided to change their learning strategies in the process of adaption to the academic challenge. These three were all Psychology students in the first and second year of their studies. For them, the challenge had to do with coping with the transition from secondary to higher education. In the transition, they had to face a new learning environment that required a new set of skills, with different contents and types of examinations. Due to low academic results in their first year or exam period, they decided that they had to change the way they study. These fragments illustrate this:

When I arrived here [this student had moved from another region of

Spain to study Psychology in XXX], after the first trimester, I was

completely lost, because I didn't know how to study […] I contacted my

mentor, and he taught me how to study, how to organize my ideas, and I

also met a student from the second year level who showed me how she

studied. […] The first trimester was for me a real catastrophe. I failed all

the courses because I didn't know how to study […] In the last months, I

now know how to study.

Leticia, Psychology, 1st year,

I couldn't keep up. First, because I realized my approach didn't work at

all […] I don't think I said only that, but I said to myself "If I use this

study method and I am failing, let me change something to see if…" and

that's what I did. I mixed everything, I did a mix of things, and things

that I have learnt, for instance, to do simpler outlines. I learnt that, a

friend taught me. I've seen it also in the courses…So, I got support in all

that for this year.

María, Psychology, 2nd year

Using the same learning strategies regardless of the instructional context.

Within this group, we have to differentiate the students in relation to their

academic performance, because the factors that led them to always rely on the same

approach and the selection of learning strategies were different.

On the one hand, there was a case of a student with a low academic performance

that reported he had no study method, so he always used the same strategies. He

acknowledged that his strategies and his way to study were not effective, but he did not

know how to change. He just read the slides provided by the professors or the class notes

and tried to memorize them. He defined himself as a bad student without an appropriate

organization, who did everything "at the last minute". This is how he expressed it:

I have no specific method for preparing the courses… and so I get these

results. (…) I'm a bad student, but I'm here every day because I'm

interested in the courses at the university. I have a good relationship with

the teachers, I feel close, but I consider myself a poor student.

Javier, Sports Sciences, 3rd year

On the other hand, there were two participants that reported they always used the same learning strategies because they were effective for them. Both participants got high grades, and they highlighted the effects on learning of attending lectures, but the level of elaboration of their strategies was different. Whereas one elaborated complex materials, complementing the slides provided by the teacher with class notes, and information from other sources, the other student reported the use of basic outlines. In these excerpts we can see this contrast:

When I begin to study, which is normally around one month before the

exam, I have a written document of the classes and the slides, and I make

my own document, which has the same structure in all the courses, which

is very, very visual

Julia, Psychology, 2nd year

Mainly, going to classes and outlines (…) I always do the same, to be

honest; I am very basic. But I get good results, so…

Clara, Psychology, 3rd year

RQ3: Is there a pattern in the relation between learning strategies, self-regulated learning and academic performance?

In our results, the relation between learning strategies, self-regulated learning and academic performance did not follow a straight pattern. In Table 3, we present the self-regulation profile, the main learning strategies reported and the academic

performance of each participant. This table is a simplified version of the matrix used for data analysis mentioned in the method section. In order to facilitate its interpretation, here we have reduced the amount of information and the number of columns, and we have ordered the participants according to their self-regulatory profile, instead of the order of their participation.

Table 3

Participants' report of learning strategies, self-regulatory profile and academic performance

Number of participant	Learning strategies reported*	Adapting strategies to different situations	Self-regulatory profile	Academic performance
4	1, 4	Yes	Low	High
6	2, 4	Yes	Low	High
13	1, 2, 3, 5, 6	Yes	Low	Middle
14	1, 4, 6	Yes	Low	Low
15	1, 2, 4	Yes	Low	Low
1	2, 3, 4	Yes	Middle	High
2	1, 2	Yes	Middle	Middle
5	5	Yes	Middle	High
8	3, 4, 5	No	Middle	High
12	1, 3, 4	Yes	Middle	High
3	3, 4, 6	Yes	High	Middle
7	2, 3, 5	Yes	High	Middle
9	2, 3, 4, 5	Yes	High	Middle
10	2, 3, 4	No	High	High
11	4, 5	Yes	High	High
16	1, 3, 4	Yes	High	Low
17	4	No	High	Low

*1=summaries, 2=outlines, 3=class attendance and participation, 4=memorization, 5=elaboration of personal materials, 6=others

When we analysed the relationship between participants' self-regulatory profile and their academic performance, it seems that low, middle and high self-regulatory profiles are associated with different levels of academic performance. All types of combinations between those two variables were found (low-low, low-middle, low-high, etc.), with the absence of the combination of middle self-regulatory profile with low

academic performance. In fact, a large proportion of participants with middle self-regulatory profiles were high performers (four out of five).

It is particularly interesting to direct attention to the cases whose profiles did not match expectations: a) participants 4 and 6, who had a low self-regulatory profile but achieved a high level of academic performance, and b) participants 16 and 17, who had high self-regulatory profiles but had a low academic performance. Participants 4 and 6 did not use sophisticated learning strategies but, according to their own view, they did exactly what was expected of them, and they considered themselves hard-workers. For instance, participant 4 commented:

> I think that I am a good student. I try hard, you know? (…) I like to do my best and do things right, because I think it's important for the future. Even if I have to do something that I don't like… I put up with it and I do it the right way.
>
> Sonia, Sports Sciences, 3rd year

On the contrary, participants 16 and 17 scored high in the self-regulatory profile, but they had low academic performance, they reported basic learning strategies and reported that they had problems in organizing their academic tasks. On this point, participant 16 commented:

> I think I'm going to make it [to pass all the courses], but I think that this year, more than before, I need to organize my work better.
>
> Emilio, Sports Sciences, 3rd year

As reported in Table 3, there were students with middle and high performance that reported using both complex and basic learning strategies (considering not only the strategies they reported but also how they used them). However, in the case of students with low academic performance, all of them reported problems organizing their study

time and having doubts about the quality of their learning strategies. As a critical point, they had limited knowledge of learning strategies, at least on how to use them effectively. They had a strong tendency to memorize all learning materials and, as previously reported, they used learning strategies such as summaries in an ineffective way. Additionally, they did not manage their time of study properly, and also have difficulties in goal setting and strategic planning. An interesting example is a student explanation of how he studied Statistics. Instead of following the logic inherent in the subject (e.g., you need to master the concept of mean if you want to understand the concepts of variance and standard deviation), first he studied the shortest units, and then the longest, and many times he was not able to cover all the contents.

In sum, regarding the relationship between self-regulation, academic performance and learning strategies, we did not find a unique pattern because students' scores in self-regulation and academic performance and their uses of learning strategies were highly variable and not always consistent. The only consistent patterns were that students with low academic performance in all cases reported difficulties in managing their study, and they did not have a clear and coherent use of learning strategies, and students with middle SRL profiles were mostly high achievers.

Discussion

The aim of this study was to analyse the decisions higher education students make about their use of learning strategies in the context of specific courses in Psychology and Sports Sciences. Next, we discuss each research question separately, and then we will present some limitations and general conclusions and implications.

Our RQ1 explored the type of learning strategies reported by the students. In accordance with other studies (Coertjens et al. 2017; Rovers et al. 2018), our participants frequently reported the use of basic elaboration and organization strategies

like summarizing and making outlines, and they relied heavily on rehearsal techniques –
memorizing – (Weinstein et al. 2011). There is then a tendency to use information
processing techniques more than elaborated regulatory strategies. Other strategies, like
searching contents in other sources and discussing contents with classmates, were
reported by fewer participants. It is important to note that students used similar terms to
define their learning strategies, but this does not mean that they performed the same
operations. In the results section, we compared how differently two participants
reported their elaboration of summaries. This result suggests that to understand the use
of learning strategies, we must gather additional information about the specific
regulatory processes followed by the students.

Additionally, a remarkable number of participants included class attendance and
participation as a crucial learning strategy. Although teachers and researchers might
take it for granted, class attendance was so relevant for the participants because the
teachers' explanation helped them to assimilate and discriminate the level of importance
of the learning content. Some participants also emphasized that during the class, they
could elaborate personal materials, including comments, thoughts and reflections
connected to the discussions arising there. These students' perceptions are consistent
with a positive association between class attendance and academic performance in
higher education (Credé, Roch, and Kieszczynka 2010). Whereas absenteeism may lead
to cramming for exams, students attending classes have the benefits of varied contact
with class materials and the time for distributed skill practice and content assimilation
(Credé et al. 2010).

Regarding RQ2, we analysed the adaptability of students' learning strategies. In
our study, most participants adapted their strategies to different instructional contexts
and learning situations, while a minority reported always using the same learning

strategies. For those participants who adapted their strategies, as well as considering the type and quantity of contents, the role of assessment activities was crucial. In general, they informed spending less time and using a more surface approach with multiple-choice exams – which was the most frequent type of exam – than with any kind of open question exams. As argued by other researchers, multiple-choice may lead students to favour short-term retention and not much critical thinking (Credé and Phillips 2011; Rovers et al. 2018). This result is consistent with the idea that assessment activities strongly influence the approach to learning (Angelo and Cross, 1993; Brown 2018; Panadero et al. 2019). This is a crucial reflection that can be extracted from our study: exploring learning strategies in isolation from the instructional context, especially from the type of assessment students undergo, misses a large part of the picture. Students adapt their strategies to how they are assessed, and therefore we need to, at least, account for the type of assessment the participants are experiencing.

A few participants reported that the challenge of adapting to the university environment required a change in their learning strategies, once they realized following their first examination period that they did not pass many courses. Furthermore, a growing body of research is focusing on the transition from secondary to higher education due to the fact that, if students do not adapt successfully to the major changes of this stage, they can obtain poor outcomes and may even abandon their studies (Coertjens et al. 2017; Noyes, Donche, Coertjens, and Van Petegem, 2017). Our results indicate that the knowledge and use of learning strategies was one of the main areas where students experiencing transition problems tried to change and improve.

Nonetheless, not all the participants adapted their strategies to different external and internal determinants. A few participants always used the same strategies, but their reasons differed. On the one hand, a participant with low performance reported a lack of

knowledge of learning strategies. On the other hand, the other participants had found effective strategies that "worked for them". In this sense, we must also acknowledge that learning strategies' suitability also depends on personal criteria of how useful those strategies are in specific learning situations (Weinstein et al. 2011).

Finally, our RQ3 dealt with the analysis of patterns in relation to learning strategies, SRL profile and academic performance. There was no unique pattern of relationship between SRL profiles and learning strategies and our results still reflect the complexity of the relationship between them (Credé and Phillips 2011). Our results indicated that all the participants with low academic performance reported having problems organizing their study and had generally limited knowledge of learning strategies. This is similar to the conclusions of other studies (Sorić and Palekčić 2009; Valle et al. 2009) that not all learning strategies have similar effects on academic performance: the capacity to organize and structure materials, as well as time management skills, seem to be better predictors of academic performance. In addition, recent quantitative research on language strategy use and language performance proposes and evaluates a complex model called *Island Ridge Curve* that can be related to the patterns found in our study (Cai 2019; Cai and Kunnan 2020). Top performers can achieve good results without using elaborated strategies and, therefore, they are not always willing to deploy energy-consuming cognitive and metacognitive strategies (Cai and Kunnan 2020). This could partially explain the variety of SRL profiles and learning strategies used by high performers. By contrast, middle SRL profiles could gain more benefits in their academic performance from deploying self-regulatory and learning strategies as they may have less prior knowledge and cognitive structures to anchor new knowledge.

There are limitations of this study that must be considered. First, we interviewed the students only once. It would have been interesting to perform a follow-up, especially with those participants showing low academic performance and lack of organization skills. Second, we only collected off-line data about learning strategies (Panadero et al. 2016; Veenman 2017). Future qualitative studies should collect and analyse, for instance, in-class and after-class note-taking materials elaborated by the students (Chen 2019), design a short and specific learning task or use thinking aloud protocols. The complementary use of quantitative measures with larger samples and in-depth qualitative analysis could provide a better perspective of the phenomena studied here.

Educational implications

This study provides practical and theoretical implications for teachers and researchers about learning strategies for higher education. As we have discussed, an essential moderator of the adaptability of students' learning strategies is the kind of assessment activities that teachers use, as students adapt their strategies to task demands (Authors 2019; Broekkamp and Van Hout-Wolters 2007). It is true that higher education students strongly rely on what educational psychologists have called surface learning strategies, that are not so effective for long-term learning and learning transference (Rovers et al. 2018). However, they do so partially because teachers do not create optimal assessment conditions that require them to use more critical thinking approaches and in-depth strategies. Many participants in our study did not use deep learning strategies, but still obtained high grades and passed all the courses. Using assessment activities that activate higher cognitive processing would imply that students have to use more advanced learning strategies to respond to those higher cognitive demands (Angelo and Cross 1993).

Additionally, students demand more tools to organize and assimilate their courses. This is especially relevant for students with low academic performance and those that face difficulties in adapting to the university environment. Teaching learning strategies is more effective when it is accompanied by training in motivational and metacognitive strategies (Hattie, Biggs, and Purdie 1996). Therefore, we should provide learning strategies training for students that covers declarative, procedural and conditional knowledge; i.e., they should be trained to learn the possibilities of the different strategies, how to use them and when (Valle et al. 2009; Weinstein et al. 2011). With this kind of intervention, we would help them to self-regulate their learning and adapt their learning strategies to internal and external characteristics of study tasks.

As a conclusion, the results of our study emphasize that learning strategies must be understood in relation to the instructional context and the characteristics of the students. We have offered some suggestions for analysing the relationship between learning strategies, self-regulating skills and academic performance, and we present ideas to improve the study and training of learning strategies.

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