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Motivational and cognitive variables with impact on academic performance
Preliminary study

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Abstract

The aim of the present pilot study was to identify a series of motivational and cognitive variables that shape the students' academic performances. The study sample was represented by 72 students from the Psychology specialization, selected according to academic performance during the first two study years. The portfolio of tests used included: Motivated strategies for learning questionnaire (Rao & Sachs, 1999); Thinking Style Inventory (Sternberg & Wagner, 1992); Achievement Goal Questionnaire (Elliot & McGregor, 2001). The results obtained highlighted differences between students with high performances and those with lower performances, in terms of self-efficacy and self-regulated learning strategies.
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1. Introduction

Out of the multitude of variables that influence academic performance, at least four main categories are distinguishable: organizing the teaching activity (adapting the contents to be taught), carrying out the actual teaching activity (choosing the methods and means of teaching), motivating the students in the learning process and managing the interactions between the agents involved in teaching (Choi, 1986).

Motivation influences student engagement and achievement behavior, and the activities chosen, the effort invested, the persistence in tasks, and the performances achieved, respectively. Also, there is a tight interdependence between the motivational and cognitive components involved in the learning process. Self-efficacy, achievement goals, and perceived instrumentality (the intrinsic value of a task) are three motivational factors that shape cognitive engagement in terms of the cognitive and metacognitive strategies used (Greene, Miller, Crowson, Duke & Akey, 2004). In a much wider sense, self-efficacy does not only refer to the ability to carry out a task and to the confidence in one's capacity to achieve performance, but also to expectancy regarding success in the given task (Garcia & Pintrich, 1995). Cognitive interpretations of success or failure influence the beliefs regarding self-efficacy, and these in turn influence the effort, the persistence and the cognitive resources that the subject invests in the activity (Greene, Miller, Crowson, Duke & Akey, 2004).

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Achievement goal theory emphasizes the manner in which the subject interprets the situations encountered and processes the information regarding these situations, in order to then adopt the right strategies for engaging in achievement activities (Dweck & Leggett, 1988, as cited by Muis & Edwards, 2009). In other words, the goals are rather social-cognitive schemes, according to which a person interprets situations, processes information, approaches tasks and copes with challenges (Kaplan & Maehr, 2002, as cited by Kaplan & Flum, 2010). In the academic environment, this theory is used to make predictions and understand results such as self-regulation, students' interest in a certain study subject or student achievements (Kaplan & Flum, 2010). Achievement goal theory – 2x2 achievement goal framework – speaks about four goal orientations: mastery-performance approach and mastery-performance avoidance (Elliot & McGregor, 2001, as cited by Muis & Edwards, 2009). In mastery-approach goal orientation, the person is oriented toward learning new things, toward improving competencies, whereas in mastery-avoidance goal orientation, the focus is on avoiding the loss of already formed knowledge or skills. Persons with performance-approach goal orientation aim at obtaining favorable judgment regarding their own competencies or at avoiding negative judgment of these (Finney, Pieper & Barron, 2004). Mastery objectives imply the belief that in order to learn and develop, one must invest effort, explore study materials, collaborate, accept challenge, assume risks, be creative and express one's feelings and values. Performance objectives aim at proving one's competence, validating, developing or protecting one's self-esteem (Kaplan & Flum, 2010). Each of these goal orientations is accompanied by certain affective and behavioral patterns and by certain cognitive results. Students who target mastery objectives use much more elaborate learning strategies, prefer stimulating tasks, are perseverant and have a positive attitude toward learning. Those who target performance objectives use superficial learning strategies, look for simple tasks and do not invest effort when faced with difficulties (Finney, Pieper & Barron, 2004).

Achievement motivation is also reflected in the students' cognitive, thinking and learning styles. The persons who obtained high scores on Type I thinking styles (legislative, judicial, global, hierarchical and liberal) possess more characteristics related to success such as creative behavior, higher-level cognitive action and engagement in novel work. Also, they are open to experiences, have a stronger sense of purposefulness concerning vocational purpose and high levels of self-esteem. Type II thinking styles (executive, local, monarchic and conservative) have more characteristics that favor behavior in compliance with existing norms and rules and a lower cognitive complexity (Zhang & Sternberg, 2005). Likewise, some studies indicate that persons who had a field-independent style show lower motivation for learning (Retzke, 1976, as cited in Fan & Zhang, 2009), and motivation to achieve success correlates with abstract learning, while motivation to avoid failure correlates with concrete learning (Ismail, 1983, as cited in Fan & Zhang, 2009).

Through this preliminary study, the authors set out to identify certain motivational and cognitive variables that influence academic performance and, also, to establish which variables highlight differences between students according to performances obtained along the study years.

2. Methodology

2.1. Objectives and research hypotheses

The objectives established for reaching the proposed target were the following:
O1. Identifying the motivational and cognitive variables that influence the students' academic performance;
O2. Capturing the differences regarding motivational and cognitive variables according to the students' academic performance.

2.2. Participants

This research sample is represented by 72 third-year students from the Psychology specialization, selected according to academic performance. 36 of the subjects are students with high performances during the first two

study years (the annual average for each of the two years is above 8.50), and 36 are students with lower performances during the first two study years (the annual average for each of the two years is below 7.50).

2.3. Tests

The portfolio of tests was made up of the following questionnaires: Motivated strategies for learning questionnaire (Rao & Sachs, 1999) which measures the motivational orientation and the learning strategies used by students during courses; Thinking Style Inventory (Sternberg & Wagner, 1992) which identifies the 13 thinking styles, as favored styles in using one's abilities; Achievement Goal Questionnaire (Elliot & McGregor, 2001) which sets out to capture goal orientation in the academic field.

2.4. Procedures

The questionnaires were applied to a sample of 72 students from the Psychology specialization (3rd year – academic license), distributed according to the academic performances obtained during the first two study years. Their results (the annual averages for the two study years) were verified by comparison to official documents attesting the students' academic situation. For the statistical processing of data, the SPSS 15.0 program was used. For the verification of formulated hypotheses, the "significance between means" test was used – the t test for independent samples and the correlations between various variables – by calculating the Pearson coefficient.

2.5. The analysis and interpretation of the results

O1. Identifying the motivational and cognitive variables that influence the students' academic performance. H1. The students' academic performances are influenced by the motivational and learning strategies used by them.

Following the statistical processing of data obtained by applying the questionnaire developed by Rao & Sachs (1999), which measures motivational orientation and learning strategies used by students, the only statistically significant correlation identified was the one between performance and the „method" subscale ($r = - .414**$, $p=.000$, $N=72$). The „method" subscale refers to self-regulated learning strategies, which the students activate during the learning process, highlighting the difficulties encountered when going through the study material and following the curriculum. In other words, the statistically significant negative relationship between the two variables reveals better learning process management by the students who obtain academic performances.

H2. The motivated strategies for learning used by the students are influenced by their thinking style. Self-efficacy refers to one's belief in the abilities to carry out a task and to one's confidence in the skills to achieve performance, depending on the level of cognitive engagement in the given task (Silver, Smith & Greene, 2001). Thinking style refers to one's preference in thinking about the material already learned or being learned. (Sternberg, 1994). The judicial thinking style belongs to the category of creative thinking styles, which show a greater cognitive complexity, being centered on analyses, assessments, and comparisons of different ideas. The executive thinking style, less creative, focuses on implementation and action, with a preference for pre-structured problems and problematic situations (Zhang & Sternberg, 2005). The relationships captured between "self-efficacy" – "judicial thinking style" ($r= .284*$, $p=.05$), and "method" – "judicial thinking style" ($r= .375**$, $p=.01$), respectively "self-efficacy" – "judicial thinking style" ($r= .319**$, $p=.01$), show that students who trust their capacity to solve tasks and to achieve performance are more focused on analyses and assessments of the materials subject to learning, on practical application of the knowledge they possess; at the same time they need structure, a learning environment that offers a series of guidance points. This also helps them to better manage the learning process. In a study carried out by Fan and Zhang (2009), the two authors identified a positive relationship between the type I thinking styles (in which we find the judicial thinking style) and the motivation to approach success, indicating that persons who tend to use creative thinking styles when facing uncertain situations, also tend to be much more self-confident and are inclined to take challenges.

H3. The type of achievement goals established by the students influences the motivated strategies for learning used by them.

Table 1. Correlation between achievement goal orientation and motivated strategies for learning

	Self-efficacy	Intrinsic value	Anxiety	Strategy
Performance-approach	.504**	.448**	.283*	.359**
Performance-avoidance			.310**	.232*
Mastery-avoidance		.276*	.450**	.285*
Mastery-approach		.533**		.527**

Note: N=72; *p<0.05; ** p<0.01 (2-tailed)

The mastery goals are based on a person's belief that effort leads to success and that attention must be focused on the intrinsic value of the task, of learning. The person is oriented towards developing new skills, towards understanding and improving their own level of competence. In mastery-avoidance goal, the person's aim is to avoid showing that he/she did not understand, did not learn or does not master a given task, in other words – avoid failure. In the performance goals, the focus is on one's abilities and one's own value, on doing something better than others and attaining public recognition, respectively. Students with a performance-approach goal orientation wish to do better than their colleagues and have their competence acknowledged by the others, whereas students with a performance-avoidance goal orientation approach tasks mainly by fear of being perceived by colleagues as incompetent (Elliot, 1999, as cited by Lee, McInerney, Liem & Ortiga, 2010).

Regarding the sample of students that were tested in this study, one can notice that those who set mastery objectives give intrinsic value to learning tasks, understand their importance and utility (Table 1). A task perceived as valuable to reaching goals valorized by the subject influences the type of achievement goals set, which then become a "driving force" similar to individual needs (Miller & Brickman, as cited by Liem, Lau & Nie, 2008). Thus, the student invests effort and time into engaging in and mastering academic tasks, which the student perceives as important and useful in the future. Research suggests that the value attributed to a task is a predictor for adopting mastery objectives (Liem, Lau & Nie, 2008). Mastery objectives have a motivational value in that they imply using in depth cognitive strategies, metacognitive and self-regulated learning strategies (Lee, McInerney, Liem & Ortiga, 2010). The persons who target mastery goals see failure as a challenge, and the negative feedback is constituted into information on the current level of skills, which can be improved by intensifying one's efforts (Dickhaüser, Buch & Dickhaüser, 2011).

Also, the strategies used give the students the possibility to control their effort and attention in solving the tasks. When referring to „avoidance motivation", one speaks about the possibility of a failure, and the purpose of the established objectives is to avoid failure (Dickhaüser, Buch & Dickhaüser, 2011). This fact can explain the statistically significant correlations with „anxiety" – which accompanies the three types of goals (approach-avoidance performance and mastery avoidance), and which is more likely related to a person's fear of embarrassment in front of others, of not obtaining the wanted performances.

O2. Capturing the differences regarding motivational and cognitive variables, according to the students' academic performance. H4. There are differences between students with high and those with lower academic performances in terms of motivated strategies for learning.

Table 2. Differences at the motivated strategies for learning according to academic performance

Motivated strategies for learning	Tag variable	N	Mean	Std. dev.	t	p
Self-efficacy	Performance above 8.50	36	48.277	5.639	4.555	.000
	Performance under 7.50	36	41.111	7.569	4.555	
Method	Performance above 8.50	36	20.111	4.041	3.803	.000
	Performance under 7.50	36	16.027	5.017	3.803	

From among the variables that shape academic performance, some are related to the student, others to the teaching methods used by the teacher, or to the difficulty of the contents to be taught. Within the present study, the

authors have highlighted the existence of differences between students with high and those with lower performances, regarding self-efficacy and self-regulated learning strategies (Table 2). The students who have managed to obtain high performances during the first two college years, show greater confidence in themselves and in their own abilities, and have developed efficient self-regulated learning strategies, therefore achieving a better management of the learning process.

2.6. Limits of the study

Among the limits of this preliminary study one finds the small number of subjects distributed according to academic performance, which imposes the necessity to continue research on a more extended sample. Increasing the number of subjects will allow the identification of statistically significant differences in terms of the types of goals set by the student and of the way in which these influence the motivation for learning and the cognitive strategies adopted.

3. Conclusions and future research directions

Establishing the mastery or performance objectives, and then choosing the motivational strategies for learning, influences the process of learning and its results. In the case of the students who obtained high academic performances during the first two study years, one can notice a better use of self-regulated learning strategies and a better learning process management. Also, these students show greater confidence in themselves and in their capacity to cope with learning situations and tasks. At the base of self-efficacy and of the capacity to adjust one's behavior in the process of carrying out tasks, lies their need to analyze, to assess the study materials, to practically verify the knowledge obtained. The need for a secure and structured learning environment is another factor that shapes academic performance.

Knowing these aspects becomes essential precisely for creating conditions for the development and practice of efficient cognitive and metacognitive strategies, but also an environment favorable to developing and consolidating personal efficacy. As essential to determining performances, the motivational and cognitive aspects, as well as those regarding the student's personality, offer the teachers valuable information on the way they manage to adapt to the academic context, and, at the same time, create a source for adapting the teaching process to the students' needs.

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