http://dx.doi.org/10.1590/1982-0275202037e180126

University students profiles of self-regulated learning and motivation

Perfis de autorregulação da aprendizagem e motivação de estudantes universitários

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Abstract

The aim of the study was to identify students' self-regulation through learning strategies adoption in connection with motivation. A sample of 212 freshmen students answered a Likert-type questionnaire with the aim to assess learning strategies, mastery achievement goal, extrinsic goals, procrastination, and discipline valuation. Strategy use consisted in a specific task of writing a text. A person-centered approach was adopted according to the statistical data and four self-regulation clusters were identified, namely, highly self-regulated students, low regulation students, and two clusters with mixed scores. Through variance analysis mastery achievement goal appeared significantly associated only with the highly self-regulated students cluster. Results were discussed in the framework of a self-regulated learning model and achievement goals theory. Finally, future investigations on other specific learning activities were proposed.

Keywords: Psychology, educational; Motivation; Self-regulation; Universty studies.

Resumo

O objetivo do estudo foi identificar a autorregulação de estudantes pelo uso de estratégias de aprendizagem, em relação com a motivação. Participaram do estudo 212 universitários ingressantes, que responderam a um questionário

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Article based on the master's dissertation of F.N. MERETT, entitled "*Autorregulação e Motivação em uma tarefa de aprendizagem: um estudo com universitários*". Universidade Estadual de Londrina, 2018.

How to cite this article

Merett, F. N., Bzuneck, J. A., Oliveira, K. L., & Rufini, S. E. (2020). University students profiles of self-regulated learning and motivation. *Estudos de Psicologia* (Campinas), *37*, e180126. http://dx.doi.org/10.1590/1982-0275202037e180126

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do tipo Likert construído para avaliar estratégias de aprendizagem e procrastinação, meta de realização domínio e metas extrínsecas e valorização da disciplina. O uso de estratégias referia-se a uma tarefa específica de produção de um texto. Pelas análises estatísticas, numa abordagem centrada na pessoa, identificaram-se quatro perfis ou clusters de autorregulação, que combinavam escores diferenciados em estratégias: um cluster era formado por alunos altamente regulados; outro era composto por alunos de baixa regulação; e os dois restantes, por fim, eram compostos por alunos de regulação intermediária. Pela análise de variância, a orientação motivacional da meta de realização domínio apareceu significativamente associada somente ao cluster dos alunos altamente regulados. Os resultados foram discutidos à luz do modelo de aprendizagem autorregulada e da teoria de metas. Novos estudos foram propostos com foco em outras atividades específicas de aprendizagem.

Palavras-chave: *Psicologia educacional; Motivação; Autorregulação; Estudos universitários.*

Rooted in Bandura's Social Cognitive Theory (Bandura, 1997), Zimmerman (2013), among other authors, developed the self-regulated learning model, defined as the degree to which students are active participants in their own learning processes, in metacognitive motivational and behavioral aspects. In this definition it is understood that every student, to be self-regulated in school learning, is proactive in this process, which includes the use of strategies.

Strategies belong to the category of procedural knowledge, that is, they involve knowing how to do, how to study, in short, how to learn. In the educational framework, they consist of students' mental actions and behaviors that influence the coding process, facilitating the acquisition and retrieval of stored information in long-term memory (Weinstein & Mayer, 1986; Weinstein, Acee, & Jung, 2011).

Three broad categories of cognitive, metacognitive, and resource management strategies were described by Pintrich (1989), based on Weinstein and Mayer (1986). Cognitive strategies refer to general methods that students employ to understand learning content. These include strategies for repetition or rehearsal, elaboration and organization. Metacognitive strategies include planning, monitoring and self-regulation of cognitive processes. On the other hand, with resource management strategies, students will control their time and effort, among other factors, that influence the quality and intensity of their involvement in tasks.

About time management, it should be noted that many students tend, for different reasons, to procrastinate their task involvement. Such behavior represents a failure of self-regulation, detrimental to the satisfactory fulfillment of the prescribed activities (Eckert, Ebert, Lehr, Sieland, & Berking, 2016; Ganda & Boruchovitch, 2015).

Research conducted in recent decades (Dörrenbächer & Perels, 2016; Zimmerman, 2013) has shown that self-regulated learners are more likely to perform well. Nevertheless, the adoption of self-regulation strategies requires from each student, in addition to declarative and conditional knowledge of strategies, the application of efforts for their use in different situations, which depends on specific motivation (Pintrich, 2004; Zimmerman, 2013). Pintrich and Zimmerman, among others, included in their relevant self-regulatory models the motivational constructs of self-efficacy, outcome expectations and appreciation of the task according to interest.

Zimmerman (2013) proposed that, in addition to these constructs, guidance on achievement goals should be included in research. This is a socio-cognitive theory that explains motivation in qualitative terms. Goals are not understood here in terms of what is intended to be achieved, but as purpose or motives for acting and persevering in a course of action (Guimarães, 2018; Senko & Hulleman, 2013; Urdan, 1997).

Such motives vary qualitatively, with different effects on effort (Urdan, 1997). In educational contexts, learners may focus primarily on either mastery goals or performance goals or relative ability. In the first case, the purpose is to learn with quality, to master the contents, in short, to be more competent. Studies reviewed

by Senko and Hulleman (2013) have shown that adopting students show the highest quality engagement in their studies and use effective learning strategies. With the performance goal, students aim to appear as intelligent and competent or, conversely, not to appear as incompetent. Successive research has shown that the performance goal should be broken down into two, approach and avoidance, with details reported, for example, by Urdan (1997), quoting the different original authors of the theory.

It was also proposed by Urdan (1997) that, alongside these achievement goals, they considered extrinsic goals, as they constitute motives or purposes in studies, distinct from performance goals. External rewards belong to this category, such as receiving good grades or being recognized by the teacher, which are normally valued motives in schools, covered in theories as self-determination (Ryan & Deci, 2017). Urdan argued that, despite the widespread presence of external rewards in educational contexts, the motivation for their pursuit was scarcely examined in research in light of achievement goal theory and, moreover, the results were not consistent. Therefore, it was suggested to include external rewards in studies that seek to elucidate the role of this motivational variable in the context of goal theory.

Higher education courses, in many respects, present new challenges for freshmen, described extensively in the literature (Basso, Graf, Lima, Schmidt, & Bardagi, 2013; Ganda & Boruchovitch, 2015; Ketonen et al., 2016; Moos & Ringdal, 2012). Among such challenges stand the greater complexity of the different disciplines and inherent activities as well the peculiarity, pointed out by Moos and Ringdal that teachers tend to focus almost exclusively on the contents they teach thus assuming motivation and appropriate study skills on the part of their students who therefore need to be more autonomous, self-regulating and proactive. Studies have shown that even highly motivated and well-selected university entrants may have self-regulating learning problems, primarily for lack of knowledge of effective strategies and self-regulatory skills (Basso et al., 2013; Ketonen et al., 2016; Polydoro et al., 2015.

Earlier research (Dörrenbächer & Perels, 2016) and Boruchovitch and Santos (2015), evaluated the use of learning strategies with reference to studies in general. However, authors such as Bembenutty (2011) and McCardle and Hadwin (2015) argue that learning self-regulation measures address the peculiarities of each task and context, which has been termed the micro-analytic approach, and McCardle and Hadwin, who adopted it in their study with college students, argued that students tend to adjust the study strategies to the specificity of the task and the conditions under which they must be fulfilled. In this aspect, according to the same authors, the microanalytical approach is more ecologically valid.

Students can combine the use of different strategies and hence form homogeneous groups or profiles. This approach has been little explored in the literature to associate motivation indices. For this reason, the general objective of the present study was to identify learning self-regulation profiles in relation to the motivation of freshmen students in higher education, facing a learning task. Specifically, the objectives that guided the present investigation were: (1) identify the level of adoption of cognitive, metacognitive learning strategies and time management by academics in fulfilling the task of producing a text related to the discipline of philosophy; (2) examine the motivational orientation to the mastery-approach achievement goal and extrinsic goals, and to what extent they value that discipline; (3) in a person-centered approach, forming groups or profiles based on grouped strategy scores; and (4) relate motivational orientation scores to achievement goals with different strategy use profiles. The evaluation of learning strategies will follow the microanalytical approach (Benbenutty, 2011; McCardle & Hadwin, 2015), whereby the strategies will have as reference the task of producing a Philosophy text, called Effective Student Work (TDE, *Trabalho Discente Efetivo*), with specific compliance requirements.

Method

Participants

The sample consisted of 212 students from the 1st year of law, medicine and psychology courses from a private university in the State of Paraná. Out of the total participants, which accounted for 92.0% of the number of students enrolled, 67.6% were female and 32.4% male, all with a mean age of 19.2 (*SD* = 2.8). Law students (*n* = 133, 62.8%) predominated, followed by Medicine (*n* = 51, 24.0%) and Psychology (*n* = 28, 13.2%).

Instruments

The students were given a Likert type scale questionnaire with representative items of the variables selected for the study. In the category of learning strategies, 19 items were created, in which the TDE task was explicit: five items related to elaboration, four to organization, five to metacognitive and another five to time planning. An item example: To organize my thoughts for TDE, I gathered the necessary materials. A five-item subscale was added to measure procrastination behavior in the accomplishment of the task, considered a self-injurious strategy for counteracting the planned execution of the actions (Ganda & Boruchovitch, 2015). All the items in this set were anchored in a continuum of answers from 1 (not true) to 5 (totally true).

The construction of the strategy scale adopted, firstly, data from a previous investigation with a random group of academics from the same institution, whose objective was to evaluate the level of knowledge and the use of learning strategies in their studies. In addition, other existing instruments such as those of Boruchovitch and Santos (2015), Klassen, Krawchuk, and Rajani (2008) and Pintrich (1989) served as inspiration.

The Principal Component Analysis for the strategy scale led to the resolution of three factors, concerning metacognitive strategies (factor 1, with alpha = 0.75), time planning (factor 2, alpha = 0.72) and cognitive strategies (factor 3, alpha = 0.65) respectively, which combined the elaboration and organization strategies. The three factors explained 47.4% of the variance. The five items intended to measure procrastination in the accomplishment of the task exhibited a 0.74 alpha.

Students' motivation to perform the task at hand was measured with a four-item questionnaire related to orientation toward the mastery achievement goal domain (e.g., my goal was to fully master the contents of the TDE) and four to extrinsic goals (example: *I did the TDE to receive recognition from the teacher*). The responses marking mode was identical to that of the strategy scale. By Principal Components Analysis, the same original items were kept forming two factors, with alpha 0.84 for mastery goal and 0.52 for extrinsic goals. The two factors explain 50.1 of the variance.

Based on the expectation-value theory (Wigfield, Tonks, & Eccles, 2004), an item was designed to assess the perception of instrumental value of the discipline of which the target task was part – the TDE. The limitation to the single item ("For my professional education, the discipline of philosophy is important, has value") was supported by authors such as Gogol et al. (2014), who argued that it is acceptable to measure a variable with only one item when dealing with a restricted, familiar and unambiguous construct, as considered in the present case. The marking mode in this question also followed a scale with values from 1 (not true) to 5 (totally true).

Procedures

The research project was approved by the *Universidade Estadual de Londrina* (*Paraná*), Brazil. Research Ethics Committee and, without any refusal to participate the students signed the free and informed consent form. The questionnaires were collectively applied in the students' classrooms.

Data Analysis

The initial descriptive statistics included the survey of means and standard deviations of each selected variable, followed by the analysis of Pearson correlations between group mean scores for the entire sample. Then, due to the person-centered approach, student profiles or clusters were formed based on the scores in the three strategy categories. This is an alternative procedure to the traditional method of comparing group scores in the different variables in a given sample. Due to the person-centered approach, the perspective is to identify how people and groups can be classified based on both the actual level of each variable and the level of one variable relative to another. The unit of analysis will be the individuals (hence the person-centered method) and they are grouped based on similar scores in strategy measures. More extensively used with motivational variables (Linnenbrink-Garcia et al., 2018; Gonçalves, Niemevirta, & Lemos, 2017) this method was adopted, among others, by Dörrenbächer and Perels (2016) and by Liu et al. (2014), with self-regulatory variables, and by Ketonen et al. (2016), who examined profiles that included engagement and lack of self-regulation.

For the formation of clusters, the statistical tool K-means was used in this study, by which participants are grouped based on their distances to the average, initially choosing the most representative cluster as the organizer so that the other groups can be formed. Finally, the analysis of variance of the participants' scores in each achievement goal, mastery and extrinsic goals was applied, discriminated by the relationship with the strategy adoption clusters.

Results

Table 1 exhibits descriptive data, with means and standard deviations of all variables, as well as Pearson correlation values. Using the Kolmogorov-Smirnov test, the scores in the three strategy categories and the two

Table 1
Mean in variables and Pearson's Correlation Coefficients (N = 212)

Variables	*M*	*(SD)*	Metac. Strat.	Time Plann.	Mastery Goal	Extrinsic Goals	Procrast.	Discipl. Value
Cognit. Strat.	2.61	(0.81)	0.51	0.34	0.54	-0.09	-0.24	0.40
			$p = 0.01$	$p = 0.01$	$p = 0.01$	$p = 0.14$	$p = 0.01$	$p = 0.01$
Metac. Strat.	3.16	(0.92)	-	0.40	0.64	-0.13	-0.33	0.35
				$p = 0.01$	$p = 0.01$	$p = 0.04$	$p = 0.01$	$p = 0.01$
Plann. Time	2.91	(0.93)		-	0.40	-0.10	-0.74	0.13
					$p = 0.01$	$p = 0.11$	$p = 0.01$	$p = 0.04$
Mastery Goal	3.08	(0.97)			-	-0.21	-0.36	0.50
						$p = 0.02$	$p = 0.01$	$p = 0.01$
Extrinsic Goal	2.68	(0.89)				-	0.21	-0.12
							$p = 0.02$	$p = 0.06$
Procrastinat.	2.95	(1.11)					-	-0.07
								$p = 0.26$
Discipl.Value	3.49	(1.19)						-

Note: *M*: Mean; *SD*: Standard Deviation; *p*: statistically significant; Cognit. Strat: Cognitive Strategies; Discipl. Value: Instrumental Value; Metac. Strat: Metacognitive Strategies; Procrast: Procrastination; Time Plann: Time Planning.

motivational variables were normally distributed. With the adoption of the person-centered approach, the students were grouped into four profiles, or clusters, based on the average scores in each strategy. The variance analysis revealed a statistically significant difference (p = 0.001) between these scores by the four clusters. In Figure 1, two contrasting clusters stand out. The cluster 3 (n = 51) consisted of students with the highest scores in the three strategies, being termed "highly regulated". In contrast, students in cluster 2 (n = 42), given the lowest scores in the three measures, were identified as "low regulation". On the other hand, clusters 1 (n = 47) and 4 (n = 68) were considered as intermediates, due to the relative mixture of means in the three variables. It should be observed that a total of 114 students (53.77%), belonging to clusters 2 (n = 46) and 4 (n = 68), reported a failure behavior in the time management strategy.

Finally, we sought to establish the relationship between the different self-regulation profiles by strategies with qualitative motivation levels, expressed in the two measures of achievement goals. The results (Table 2) revealed that among the four clusters there was no significant difference between the extrinsic goal measures. In contrast, the mean in the mastery goal was significantly higher among students in cluster 3.

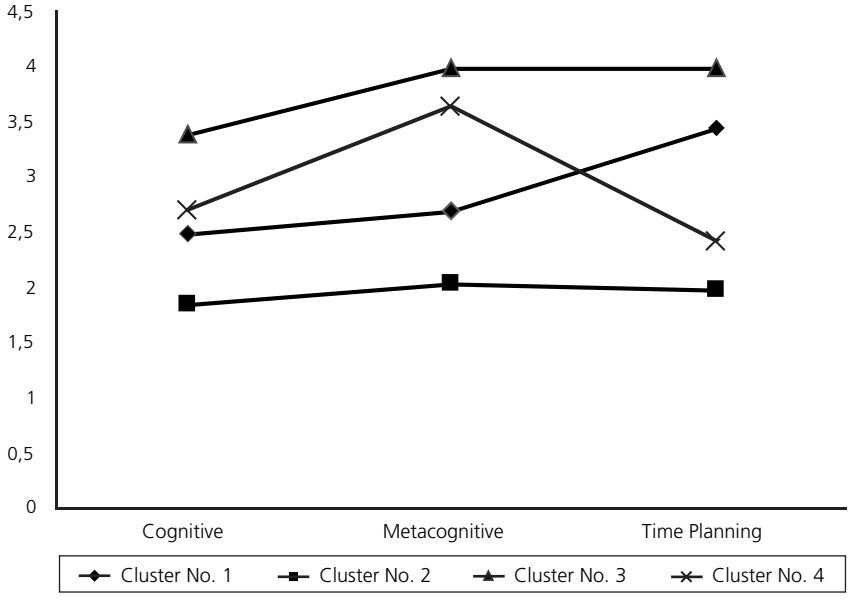

Figure 1. Cluster representation as a function of scores in the three strategy measures.

Table 2
Variance Analysis between the average Goals as a function of clusters

Clusters	Cluster 1 (N = 47)		Cluster 2 (N = 46)		Cluster 3 (N = 51)		Cluster 4 (N = 68)		gl	F	p
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*			
Mastery Goal	2.69[b]	0.77	2.28[c]	0.75	3.96[a]	0.65	3.21[b]	0.83	3	43.87	0.001
Extrins. Goals	2.66	0.89	2.89	0.91	2.52	0.86	2.67	0.88	3	1.40	0.240

Note: The means of the four clusters in the mastery goal with same letters were not statistically significant (p = 0.05) by the *post hoc* Tukey's HSD (Honestly Significant Difference) test.
M: Mean; *SD*: Standard Deviation.

Discussion

The present study aimed to examine the extent to which higher education freshmen students are self-regulated by the use of effective strategies when performing a specific task. Another objective was to

evaluate the motivational quality of the same sample in the compulsory fulfillment of that task, in relation to learning self-regulation.

Initially, it is noteworthy that the three adaptive learning strategies correlated positively with the motivational orientation to the domain goal and negatively with the orientation to extrinsic goals. Procrastination values, a dysfunctional strategy, were negatively correlated with the three strategy measures, similar to those found by Klassen et al. (2008) and by Sampaio, Polydoro, and Rosário (2012), and with the domain goal, a result consistent with that of Eckert et al. (2018), who found positive correlations between procrastination measures and lack of motivation. In summary, all these early results are in line with what was proposed, for example, by Pintrich (2004) and confirm the trend already found empirically (Dörrenbächer & Perels, 2016; Liu et al., 2014; Zimmerman, 2013) of the close association between motivation and use of strategies and, in particular, the negative relationship between motivation and procrastination. The perception of the instrumentality value of the discipline (Wigfield et al., 2004) was moderately related to the averages in the three strategies. The data suggest that the valorization of a discipline is associated, to some extent, with the commitment in using strategies.

It was an important objective of this research to examine, with person-centered methodology, how beginning college students form self-regulating profiles or clusters, based on the scores in each evaluated strategy and, additionally, how these profiles differ in motivational orientation towards two achievement goals. The K-means analyses produced four clusters, among which cluster 3 (n = 51) stood out as "highly regulated" students, given the significantly higher averages in the three strategies compared to the other groups. In contrast, students in cluster 2 (n = 46) revealed an opposite pattern, characterized as "low regulation".

Quantitative and qualitative differences were also evident between clusters 1 (n = 47) and 4 (n = 68), intermediate between the previous two. Students in cluster 1 were characterized by higher scores in time planning strategies, but by average scores in cognitive and metacognitive strategies. Those in cluster 4 scored relatively higher in metacognitive strategies; however, scores in cognitive strategies and time planning were lower.

As in the studies by Dörrenbächer and Perels (2016) and by Liu et al. (2014), which had also formed four self-regulating clusters, this result allows us to identify the occurrence of combinations of different strategies, revealing, in each individual and in each group, both strengths and weaknesses. In this case, learning self-regulation has appeared to varying degrees, as predicted by theorists such as Zimmerman (2013). The highly regulated group, which featured mostly metacognitive and time planning strategies, still ought to improve regarding knowledge and use of cognitive strategies. All other groups presented more severe deficiencies, sometimes in one strategy, sometimes in another strategy, or in all strategies. The finding that 53.77% of the entire sample reported a major failure in the time management strategy is consistent with that found by Ganda and Boruchovitch (2015) on college students' procrastination.

Vansteenkiste and Mouratidis (2016), in the framework of motivational studies, argued that the person-centered approach provides a powerful support for potential problems diagnosis and for appropriate educational interventions. If this advantage for strategy self-regulation is extrapolated, the identification of different specific student profiles leads to the need for social support (Basso et al., 2013; Polydoro et al., 2015; Weinstein & Mayer, 1986), which declarative, procedural, and conditional strategy knowledge, with training, is made available to student groups that reveal flaws in one or another strategy category or in all. Successful intervention experiences, such as those reported by Basso et al. (2013) and by Polydoro et al. (2015) serve as references.

The strategy questionnaire was characterized for leading participants to focus on a specific task, which was a text production. It is suggested that future studies adopt the same microanalytical analysis to investigate self-regulation in other activities, such as preparation for a given test, discriminating the multiple

choice or dissertation modalities. Particularly for the construction of self-regulatory instruments, comparisons may be made between the strategies used in these different situations.

Regarding the motivation to perform the task with the proper strategies, all students in the sample revealed a moderate level of orientation towards extrinsic goals, with no significant difference between the four clusters. That is, both highly regulated and low or intermediate regulated students showed this motivational modality, with similar and not high markings on the scale items. Extrinsic motivators have incentive potential for action (Schunk, Meece, & Pintrich, 2014), with more developed meaning in the Self-Determination Theory (Ryan & Deci, 2017), which Urdan (1997) referred to. Thus, the relative orientation to this goal will have given some motivational support for the execution of the task. However, the present result does not help to settle the issue of inconsistency effects of extrinsic goal orientation revealed in the few studies reported by Urdan, given the absence of any significant association with the self-regulated learning levels revealed by the clusters.

As for the mastery goal, students from clusters 3 had exhibited higher scores than all others. According to the achievement goals theory (Urdan, 1997) this orientation is of the best quality, because of its effects on the involvement in the studies, giving meaning to the significant prevalence of this motivational orientation in the case of highly regulated students, even if accompanied by some degree of extrinsic goals. In addition, the data is in line with the results of several studies reviewed by Senko and Hulleman (2013), which documented the association between this specific orientation and better quality engagement in studies, perseverance, and the use of effective learning strategies and self-regulation. It is worth mentioning that such higher quality motivation is particularly required when it comes to the time management strategy, which appeared to fail in all groups except cluster 3. Students may be overwhelmed by the temptation to engage in extracurricular activities, a behavior that is incompatible with the learning activity which is consequently postponed (Duckworth, White, Matteucci, Shearer, & Gross, 2016).

On the other hand, the motivation for the simultaneous orientation towards two different goals of achievement was evident throughout the sample. Just as mastery and performance goals orientations can advantageously coexist in the same person, from a multi-goal perspective (Gonçalves et al., 2017; Urdan, 1997), it would have been equally beneficial in the present case the dual motivational mode. Under this condition, students will have been involved in the task motivated for enhancing their skills and achieving good grades or other benefits, expressed in the relevant items. However, except in the case of cluster 3, the means indicate that the degree of motivation reported by participants for that task was not high.

The present study, however, is not free of limitations. Firstly, the averages of the extrinsic goal orientation subscale were considered, although their items had an internal consistency of alpha 0.53, below the acceptable minimum. Although the loadings of the items in the factor ranged from 0.50 to 0.70, it is suggested that, in future studies, this limitation be overcome with possible reformulations, simulations and new analyses, so that the set of items reaches acceptable reliability.

As a data collection method, a retrospective self-report was used, which consisted of participants answering a questionnaire after completing the TDE task. It turned out that some groups filled out the protocols two days after TDE, while others, for uncontrollable reasons, somewhat later. This fact may have caused, at least in part and with some classes, distortions in memory and even unreliable reconstructions, as it has been warned by Veenman (2011) about retrospective self-reports. However, Pintrich (2004) proposed not to rule out the use of this method in self-regulation investigations, provided that it is ensured that learners focus on the actual learning and regulation processes, not far from the performance of an academic task.

Another limitation to be mentioned refers to the selection of strategies and items to be placed on the scales. Regarding the task of text production, no requirements for more specific mental actions were considered. For example, there was no question about using lesson notes, careful exploration of handouts, and the seeking of instrumental help. Future studies may seek further refinement in measuring strategies in similar tasks.

Final Considerations

The present study revealed that university freshmen students do not form a homogeneous group in self-regulation by strategies intended to fulfill a specific learning task; distinct profiles or clusters regarding the use of strategies have been identified. Likewise, motivation by orientation towards the achievement mastery goal was variable. It is reasonable to suppose that admission into university of most of these students, given the new conditions found in higher education, lacked some declarative knowledge of strategies or, even more, those students did not know how to use it in fulfilling the task of higher education text production.

Such a negative condition, however, is remediable. Intervention studies with university students reported in the literature have shown that cognitive and metacognitive strategies are skills that can be developed or improved. Hence the suggestion that educational and training programs in study skills for freshmen students should be implemented in institutions.

On the other hand, the very best motivation itself will be fostered by actions of the teachers themselves. Proponents of the Achievement Goal Theory argue that, at any level of education, certain teaching actions have the potential to favor the development and maintenance of the prevailing orientation towards the mastery goal. Such actions include how tasks are presented, with challenges at the appropriate level, criteria for evaluating and giving feedback, and in particular acknowledging the effort with good strategies.

Contributors

F.N. MERETT contributed to the planning, literature review, data collection and processing, and writing for publication. J.A. BZUNECK contributed to the planning, data processing and writing and final proofreading. K.L. OLIVEIRA and S.E. RUFINI contributed to the statistical treatment of data and final revision of the text.

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Received: October 25, 2018
Final version: October 16, 2019
Approved: December 13, 2019