

Academic self-regulation and learning strategies assessed in elementary school students

Carmem Silvia Lima Fluminhan¹; <https://orcid.org/0000-0002-0342-2474>

Camélia Santana Murgo²; <https://orcid.org/0000-0003-3932-7580>

Abstract

The aims of this study were: 1) to identify the extent to which participating students resort to the use of strategies at the time of learning; 2) to verify if there was change of the values obtained between the first and second application of the scale; and 3) to analyze possible differences in the scores of the two applications considering the gender variable. Sixteen sixth grade students participated in the study. The data was collected through the Learning Strategies Assessment Scale for Elementary Education (EAVAP-EF). The results showed that students make unsatisfactory use of learning strategies at the time of the study, there was no statistically significant difference between the first and second application, the girls demonstrated that they make more use of learning strategies in relation to boys. The data had discussed in light of the literature and educational implications has extracted as well as suggestions for future research

Keywords: Self-regulation; learning; elementary School.

Autorregulación académica y estrategias de aprendizaje evaluadas en estudiantes de lo enseñanza primaria

Resumen

Los objetivos de este estudio fueron: 1) identificar en qué medida los alumnos participantes recurren al uso de estrategias en el momento del aprendizaje; 2) verificarsi hubo alteración de los valores obtenidos entre la primera y la segunda aplicación de la escala; y 3) analizar posibles diferencias en los escores de las dos aplicaciones considerando la variable sexo. Participaron del estudio 16 alumnos de sexto año de la enseñanza primaria. Se recolectaron los por intermedio de la Escala de Evaluación de las Estrategias de Aprendizaje para la Enseñanza Primaria (EAVAP-EF). Los resultados revelaron que los alumnos hacen uso insatisfactorio de estrategias de aprendizaje en el momento del estudio, no hubo diferencia estadísticamente significativa entre la primera y la segunda aplicación, las niñas demostraron que hacen más uso de las estrategias de aprendizaje en relación a los niños. Se discutieron los discutidos a la luz de la literatura y fueron extraídas implicaciones educacionales, así como sugerencias para futuras investigaciones.

Palabras clave: Autorregulación; aprendizaje; enseñanza primaria.

Autorregulação acadêmica e estratégias de aprendizagem avaliadas em estudantes do ensino fundamental

Resumo

Os objetivos deste estudo foram: 1) identificar em que medida os alunos participantes recorrem ao uso de estratégias no momento da aprendizagem; 2) verificar se houve alteração dos valores obtidos entre a primeira e a segunda aplicação da escala; e 3) analisar possíveis diferenças nos escores das duas aplicações considerando a variável sexo. Participaram do estudo 16 alunos de sexto ano do ensino fundamental. Os dados foram coletados por meio da Escala de Avaliação das Estratégias de Aprendizagem para o Ensino Fundamental (EAVAP-EF). Os resultados revelaram que os alunos fazem uso insatisfatório de estratégias de aprendizagem no momento do estudo, não houve diferença estatisticamente significativa entre a primeira e a segunda aplicação, as meninas demonstraram que fazem mais uso das estratégias de aprendizagem em relação aos meninos. Os dados foram discutidos à luz da literatura e foram extraídas implicações educacionais, bem como sugestões para futuras pesquisas.

Palavras-chave: Autorregulação; aprendizagem; ensino fundamental.

1 Centro Paula Souza / Faculdade de Tecnologia – FATEC – Presidente Prudente – São Paulo – Brasil; carmem.slima@hotmail.com

2 Universidade do Oeste Paulista – UNOESTE – Presidente Prudente – São Paulo – Brasil; camelia@unoeste.br

Introduction

The perspective of self-regulated learning has profound implications not only on how teachers should interact with students but also on how educational institutions should be organized in order to help students become able to learn by themselves continuously (Emílio & Polidoro, 2017). The concept of self-regulation of learning can be defined as an active process in which students systematically direct their thoughts, feelings and actions to achieve their previously established goals (Zimmerman, 2000).

Learning self-regulation strategies can and should be taught to students; however, such procedures, although fundamental, are not sufficient (Rosário & Polydoro, 2014; Veiga Simão, Frison, & Machado, 2015). It is fundamental that these strategic behaviors are experienced by the students, that they engage with the study proposals and develop strategies that will lead them to the effective practice of learning (Fernandes & Frison, 2015; Silva & Veiga Simão, 2016).

Students who self-regulate their learning are proactive and able to direct their own efforts to learn rather than reactively position themselves to teaching, depending on teachers, parents and other agents to teach them. Such students are aware of their strengths and limitations; thus, they are able to recognize when they have or do not have certain knowledge or skill. In addition, students who set goals proactively monitor their learning intentionally, adjusting it as necessary toward their goals, and respond to personal feedback adaptively. They not only achieve their goals more quickly, but are also more motivated to maintain their learning efforts (Zimmerman, 2013; Rosário & Polydoro, 2014).

According to Schunk (2015), a student can be qualified as self-regulated when his/her learning involves the conscious choice of specific strategies to achieve goals based on the perceptions of self-efficacy, that is, when the student is able to choose when, where, why and how to carry out the learning itself. In this sense, the author emphasizes that self-regulated learning involves perceptions of self-efficacy, personal commitment to academic goals, and self-regulation strategies of learning. Bandura (1994) defines self-efficacy as people's beliefs about their ability to organize and execute courses of action required to achieve certain types of performance.

The use of learning strategies in the educational context is a tool of undeniable importance for the achievement of a good academic development. Learning strategies are understood by Oliveira, Boruchovitch and Santos (2011) as resources that students use to retain, store and subsequently retrieve information, which is a targeted and intentional activity.

The process of self-regulation of learning refers to activity analysis and identification of specific and effective learning methods (Zimmerman, 2000). However, before the strategy can be identified and chosen for the accomplishment of a certain task, it is necessary to know it and to be able to use it. Thus, a typical characteristic of self-regulated students is that they have mastery of learning strategies and

better academic achievement (Boer, Donker-Bergstra, & Kostons, 2012).

Authors such as Dembo (2004) and Oliveira (2008) classify learning strategies into two main groups: cognitive and metacognitive strategies. For these authors, cognitive strategies consist of organizing, elaborating and integrating information. These strategies are related to the fact that the person perceives analytically the parts in order to understand the whole (Oliveira, Boruchovitch, & Santos, 2010). The metacognitive strategies have the function of taking the student to the reflection about his own learning, allowing the search of new solutions to learn in order to overcome the obstacles.

Oliveira et al. (2011) point out that cognitive and metacognitive strategies must be addressed in an integrated and cohesive way so that learning is satisfactory. Even if the student already demonstrates conscious perceptions about himself and knows a variety of learning strategies, if he does not know how to plan, monitor and regulate learning, his learning will probably still be poor. The literature on the subject allows the realization that the intentional, systematic and contextual teaching of learning strategies benefits school performance. One point to be emphasized is that the improvement in the quality of learning reflects on subjective aspects of the students, that is, the teaching of learning strategies can improve school and personal well-being, self-esteem, satisfaction, reduce anxiety and contribute for the exercise of reflections as much about the academic tasks as of itself.

It is also an essential factor that teachers should be given the opportunity to know and experience the concept and types themselves and to define when and how to use learning strategies appropriately. This assertion is especially appropriate for the Brazilian context, since the literature of the area reveals that the undergraduate courses have not explored the subject in depth with the future teachers and that, therefore, they must endeavor to enable future professionals to promote the use of (Santos & Boruchovitch, 2011; Ávila & Frison, 2016; Magalhães & Santos, 2017).

From this perspective, the present research proposes to investigate to what extent students use some type of strategy at the time of learning, to verify if there was a change between the first and second application of the scale and to analyze possible differences in the scores of both applications considering the variable sex.

Method

This research is characterized as a cross-sectional study with a quantitative approach.

Participants

Sixteen students from the sixth grade of elementary school of both sexes, 56.2% (n = 9) males and 43.8% (n = 7) females. The age range of the students varied between 10 and 13 years (Dp = 0.81) and all of them came from a state

public school in countryside of São Paulo State, Brazil. Only students authorized through a Free and Informed Consent Term were selected. This research was approved by the Research Ethics Committee after registration under the protocol 50459115.0.0000.5515 in Plataforma Brasil.

Instrument

The Learning Strategies Assessment Scale for Elementary School - (EAVAP-EF) - Boruchovitch and Santos (2010) was applied. The scale aims to evaluate the learning strategies reported and used by elementary students in learning situations. Through the analysis of its items, it is possible to delineate a profile of strategic behavior directed to learning. The answer alternatives are arranged in a likert three-point scale: 'always', 'sometimes' and 'never'. All 31 items that make up the scale were used in this research. In order to reach the aforementioned objectives, all factors of the scale were used in the analysis.

Procedure

EAVAP-EF was applied in two occasions: test and post-test, always in the context of the classroom and during school hours. The first application happened at the beginning of the first semester of 2016 and the other one in the last week of the same semester. Between the first and second applications, that is, during a semester, an intervention was carried out with a classroom teacher, whose main objective was to strengthen the self-regulation of students' learning in order to improve school performance, as well as to know and discuss actions to teach students about learning strategies in a self-regulatory model. In order to do so, the participating teacher began to make use of methodological resources in the classroom favoring the expansion of the repertoire of student learning strategies.

Although the intervention process with the participating teacher is not the object of the present study, the following will detail the objectives of each intervention session so that the reader understands the path taken by the students investigated: 1) To know the professional trajectory of the teacher involved in the research and to detail the course of the research; 2) Understand the teacher's conceptions about the concept of self-regulation of learning; 3) Present and discuss the concept of self-regulation of learning; 4) Present and discuss the concept of learning strategies. To present the results obtained from the first application of EAVAP-EF in the 6th grade students. Discuss actions to train students about the use of learning strategies; 5) Evaluate the result of the training the teacher offered to her students, as described in section 4. Plan the continuation of the training about the learning strategies that the participating teacher will continue to develop with her students. 6) Evaluate the result of the training that the teacher offered to her students, as described in section 5. Plan the continuity of the training on the use

of the strategies of learning offered by the teacher to their students; 7) Evaluate the result of the training that the teacher offered to her students, as described in section 6. Plan the continuity of the training on the use of the strategies of learning offered by the teacher to their students; 8) Discuss the advances in teaching and learning processes, which may or may not have taken place during the semester.

Results

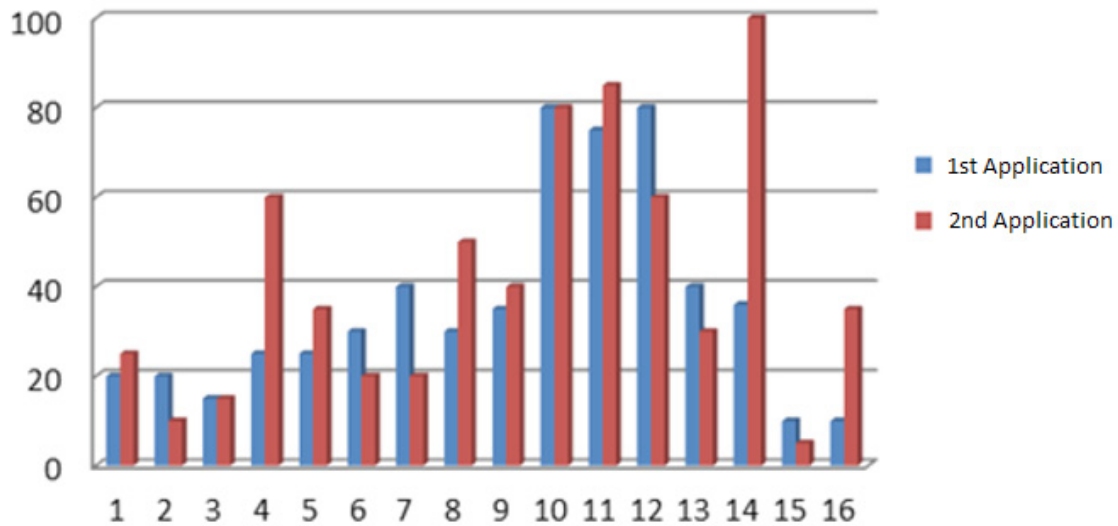
The results are presented following the order of the objectives proposed for this study. In order to reach the first objective, the students' scores were analyzed considering the general percentile of the three factors of the EAVAP-EF (absence of dysfunctional cognitive strategies, cognitive strategies and metacognitive strategies) in both applications. The data revealed that 18.8% (N = 3) of the participants reported a satisfactory use of the learning strategies in the first application of the scale, reaching a score above 60%. In the second application, 31.0% (N = 5) of the participants indicated that they use the learning strategies satisfactorily at the time of the study.

In general, the data indicated that the mean obtained by the group in both applications was 38.78 points or 60% and a standard deviation of 25.62, the mean being 35.69 points (Dp = 23.16) in the first application and 41.87 (Dp = 28.28) in the second application. In relation to the gross score of each participant and its corresponding percentile, it was possible to observe that 11 students scored between 10 and 36 on the first application of the scale. That is, 68.75% of students use 40% or less of the learning strategies listed in EAVAP-EF, according to the normative table of said scale. On the other hand, in the second application, 9 students reached the same score, which indicates that 56.25% of the students achieved the same performance. This means that students do not usually make satisfactory use of learning strategies at the time of study. Thus, it is possible to affirm that the majority of participants need guidance so that such strategies are taught and can be used in a learning situation.

According to these data, it is possible to verify that, although partial, there was a positive tendency towards the understanding of the adequate use of the learning strategies, highlighting a participant that managed to reach the total of points in the second application of the scale. Graph 1 presents the students' scores on the three factors of the EAVAP-EF scale and on the set of their items, revealing the overall performance of the participants in both applications.

Table 1 was constructed with the intention of observing if values obtained in the first and second applications revealed any difference, which is the second objective of this study. This table contains, for each strategy, the tests used to verify the normality of the data, the homogeneity of the variances and to carry out the comparison between the first and the second application.

The results of the applied tests revealed that there was no statistically significant difference between the two



Graph 1. Participants score on the first and second application of EAVAP-EF.

applications in any of the strategies. Notwithstanding such data, it is imperative to point out that the results obtained in the second application indicate that promising and successful changes have occurred in the sense of learning and the expansion of the use of learning strategies.

The same procedure was used to compare the results of the girls and boys in both applications, third objective of this study. In the normality test, the p-value obtained was 0.002, lower than the level of significance adopted (0.05). Therefore, the data does not follow a normal distribution. As

the data are not normal, the Levene test is most suitable for testing the homogeneity of the variances and the resulting p-value was 4.97×10^{-5} , which means that the variances between the groups are not homogeneous. Therefore, a nonparametric test, Kruskal-Wallis test, was applied again. The test had a p-value of 0.041, which indicated that there is a difference between the results of boys and girls.

Figure 1 presents the Box-plots of each group (boys and girls) in order to identify which group obtained the best results in the general average of the three factors of the sca-

Table 1. Comparative statistics between the two applications of the EAVAP-EF scale for each learning strategy.

Strategy	Test of Normality	Test of Homogeneity of Variance	Test of Multiple Comparisons	Conclusion
Absence of strategies (A)	Kolmogorov-Smirnov 0,0177	Levene 0,7357	Kruskal-Wallis (Non-parametric) 0,7766	There was no difference between the 2 applications
Cognitive Strategies (C)	Kolmogorov-Smirnov 0,0999	Bartlett 0,9171	Tukey (Parametric) 0,9434	There was no difference between the 2 applications
Metacognitive Strategies (M)	Kolmogorov-Smirnov 0,0302	Levene 0,0522	Kruskal-Wallis (Non-parametric) 0,9847	There was no difference between the 2 applications

Discussion

In relation to the repertoire of learning strategies used by the participants, the average obtained by the group in the two applications was 38.78 ($Dp = 25.62$), which allows to observe low ability in the use of learning strategies. This result is not in line with the findings of Perassinoto, Boruchovitch and Bzuneck (2013) who demonstrated in their study that the students analyzed are good users of learning strategies. However, the authors pointed out that there was less frequency in the use of cognitive strategies in relation to the others. In addition, the study points to the fact that students report a lower use of dysfunctional metacognitive strategies, and emphasize that it is desirable to have a more frequent and diversified use of the two types of learning strategies by the students.

The study conducted by Veiga Simão and Frison (2013) states that the student, in his/her agent role, must develop cognitive, metacognitive and motivational processes in his/her learning. The authors affirm that the student must take up the challenge of positioning themselves in an active and motivated way throughout the learning. However, the authors caution that "early student accountability for their studies or an exacerbated allocation of personal competencies in school success or failure can have very negative effects on self-efficacy beliefs and subsequent motivational and affective states" (p. 6).

In compliance to the studies presented and the results achieved by this research, it is clear that the learning strategies must be gradually inserted in the daily practice of schools with a view to fostering self-regulated learning that is effective and that can be maintained and adapted over the long term.

In order to achieve the second objective of this study, we sought to verify the possible alteration of the values obtained between the first and second applications. The applied tests revealed that in no learning strategy there was a statistically significant difference between the first and second applications.

Considering the study conducted by Polydoro et al. (2015), the data obtained in the present research are not convergent. The author reports the impact of an intervention on self-regulation of learning with university students. The analysis of the 124 students' responses to the evaluation questionnaire indicated changes in all dimensions and phases of self-regulation. Among the factors that lead to changes is the knowledge of learning strategies.

The intervention work carried out by Fernandes and Frison (2015) confirms that the experience and the development of self-regulatory strategies are fundamental in the promotion of competences for the student to make reflections and find meaning in academic activities. The purpose of their study was to analyze whether self-regulatory learning strategies developed during six meetings would contribute to the formation of self-regulated students for the writing of a scientific article. Eight university students participated in the study. The research began with the application of the CEA

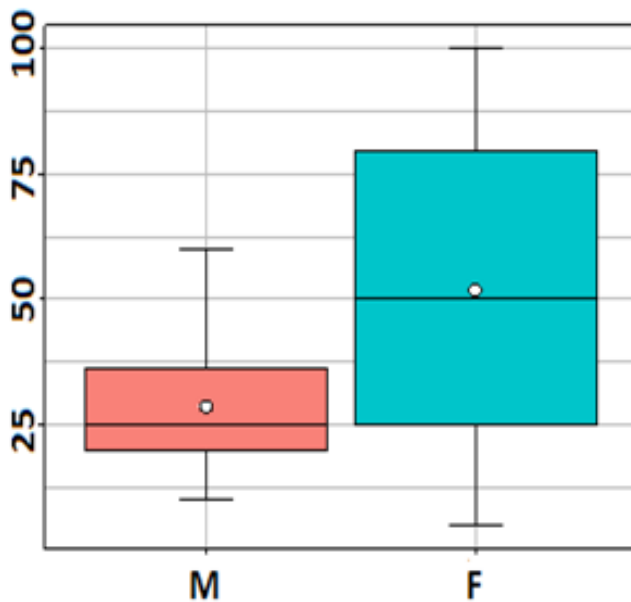


Figure 1. Statistical comparison considering the general mean of the three factors of the scale based on sex.

M = male sex F = female sex

le. From the image, it is possible to observe that the results of the girls (blue chart) were superior to those of the boys (pink chart), the average of girls was 51.86, while that of boys was 28.61. However, it is noticed that the amplitude of the score in the scale obtained by the boys is much smaller, that is, there was little variation between the notes of them, evidencing, then, very similar notes. In the case of the girls, the amplitude was much higher, the lowest was 5 and the highest was 100, demonstrating that there was a great variation in the results obtained among the participants of this group. This data is presented in the graph through the much flattened box that represents the values obtained by the male sex, while the graph box representing the female is broader, indicating a greater variation among the data.

Normality tests, homogeneity of variances and multiple comparisons were conducted to verify the possible differences in the scores of the two applications considering the sex of the participants in each learning strategy alone. The results indicated that there was a statistically significant difference (p -value = 0, 0355) between the female and the male only in the metacognitive strategies, and the girls scored more in relation to this factor. Regarding the absence of strategies and cognitive strategies (p -value equal to 0.1639 and 0.3887, respectively) there was no statistically significant difference.

(Knowledge of Self-Regulatory Strategies) questionnaire and, at the end of the intervention, the CEA questionnaire was again applied in a semi-structured interview. The results showed that the participants benefited from the use of self-regulatory learning strategies, especially metacognitive strategies, because they favored the control and awareness of their cognitive abilities.

It is clear from the foregoing that the intervention with the students about the appropriate use of the learning strategies presents favorable results in the students' performance. In agreement with the findings of Gomes and Boruchovitch (2011), this research confirms that the intervention conducted by the teacher offers a propitious way to guide the students to increase their knowledge regarding the pertinent use of the learning strategies, which consequently, produces positive results concerning the use of appropriate strategies during learning.

When analyzing the possible differences in the scores of the two applications considering the sex variable, the third objective of this study, the data verified statistically significant difference between girls (mean = 51.86, Dp = 31.92) and boys (mean = 28.61, Dp = 12.93). These data pointed out that girls, in general, resort to learning strategies more than boys. However, it should be noted that the girls' standard deviation was higher than boys' by 18.99 points. This means that the girls' grades were more heterogeneous than the boys' grades. Thus, these data provide support for the teacher to note that some girls scored far less than others, providing a careful look at the treatment of two distinct groups of girls in relation to the appropriate use of learning strategies. On the other hand, the boys' group was more homogeneous, with scores close to each other. In this case, the data indicate that boys, in general, reported making inappropriate use of available strategies.

More specifically, with regard to metacognitive strategies it is possible to verify that there was a difference of 20 points between boys and girls in the total of both applications, and the girls scored more. This implies that there has been a notable improvement in girls' metacognitive performance, such as "realizing that they are not understanding what they are studying" or having the initiative to "ask for help when they do not understand something." In other words, girls can plan, monitor and regulate learning more effectively than boys. These data corroborate previous studies (Rosário, Soares, Núñez Perez, Gonzáles-Pienta, & Rubio, 2004; Oliveira, 2010; Oliveira et al., 2011) that also found differences between girls and boys regarding the use of learning strategies at the time of study.

The data obtained by the present research are in the same direction of the results revealed by the study of Oliveira et al. (2011). The results obtained by these authors indicated that the girls presented better scores of the Learning Strategies Scale than the boys in all the series surveyed, that is, from the second to the eighth grade of elementary school. In this same direction, the research data for Oliveira's dissertation (2010) showed highly significant differences for cognitive strategies and for the total of the Learning Scale (EAVAP-

-EF), and significant differences for metacognitive strategies, always with girls scoring more than the boys.

Also with regard to sex, the results verified by Oliveira et al. (2011) widen the debate on the subject by indicating that boys and girls may differ in the form of study and learning. According to the authors, the girls showed more difficulty in maintaining their attention and revealed that they were unable to establish a focus, whereas the boys reported that they used the figure of the teacher to stay focused and pay attention.

The literature on the subject emphasizes that the students who self-regulate their learning know which strategies to use, when, why, how and where to make use of each one (Polydoro et al., 2015; Silva & Veiga Simão, 2016; Schunk, 2015). Researchers also point out that learning strategies do not have an innate origin, that is, both well-known strategies such as underlining or copying the content, and more complex strategies such as creating analogies or paraphrasing can and should be taught intentionally (Santos & Boruchovitch, 2011; Rosário & Polydoro, 2014; Prates, Lima, & Ciasca, 2016) from the first school years (Perassinoto et al., 2013; Piscalho & Veiga Simão, 2014a, 2014b). Specific teaching and appropriate training regarding the use of learning strategies in the school context would result in higher scores on cognitive and metacognitive strategies in subsequent years (Oliveira, 2010).

It is important to recognize some factors that may have influenced the presented results. The first one is related to the instrument used to identify if the participants make use of the learning strategies at the time of the study. Researches based on data extracted from scales of learning strategies have been widely recognized in scientific community. The advantages, as well as the weaknesses of this method, can be observed in the literature (Perassinoto et al., 2013). Holtgraves (2004) investigated the cognitive processes involved in responding to self-reports under various socially desirable conditions. According to the author, participants can interpret the meaning of sentences and response options in different ways. In addition, the study demonstrated that people can create a response that is socially expected and thus not respond to what truly happens to themselves. This idea is supported by Fulmer and Frijters (2009), who report that some students may find it difficult to interpret terminology, multiple concepts or even common words inserted in scale items, leading to biased responses.

In this regard, Alexander (2008) pointed out that people have a notorious difficulty in identifying the main reasons that motivate their own actions, even if they find appropriate affirmations presented in the scales. Thus, the same author suggests that other research methods be associated with self-report instruments, such as interviews, classroom observation, identification of representative actions of the construct under study, among others. According to Pintrich (2004), although self-report questionnaires are capable of evaluating students' abilities and predispositions for the use of self-regulation strategies, this method is not as effective in capturing real events in self-regulation processes, that is to

say, it does not access as in fact the students behave in each learning situation. In addition, the author emphasizes that the use of self-report questionnaires still plays a prominent role in self-regulated learning research because of its practical utility over other methods (Pintrich, 2004).

Another aspect that may have influenced the results of this investigation was the number of participants. Only the students authorized by their legal responsible parent to participate in this research were evaluated. This procedure, although mandatory, excluded a significant number of students, which may raise questions regarding the representativeness of the sample. Thus, it should be clarified that the data obtained for this research can not be generalized to contexts other than the one in which it is inserted.

Final considerations

This research confirms that the strategies used by the student at the time of the study constitute an effective tool in academic performance in order to contribute to the active participation of the student in his/her learning and to promote the awareness of his/her own learning. The strategies provide a secure foundation for the student to reflect, understand, organize, develop ways, solve, and adjust their study practice. Adequate use of learning strategies is intrinsically related to success in achievement of academic goals and is, therefore, a strong predictor of school performance. In this sense, there is no doubt that knowing students' study habits is a mandatory condition for the prevention of difficulties, as well as for adopting a systematic educational practice that favors the learning process.

In order to continue the research on learning strategies, it is suggested that further studies assess the need to use other methods of research, associated or not, with self-report methods, so that the data can be validated more accurately, the use of interviews and focus groups. In addition, other self-report measures that are associated with self-regulation of learning could be used in future research, such as motivation and self-efficacy assessment scales. It is important that a control group be included so that the data can be compared and thus provide more comprehensive and consistent information regarding the use of student learning strategies.

Finally, a demand for future interventional work is presented, with a larger and more representative sample, with a longitudinal cut, and evaluating the teacher's self-regulation so that the teaching and self-regulation experience of the students can occur in a deeper and more solid condition.

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