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SELF-REGULATION STRATEGY TO IMPROVE COGNITIVE FLEXIBILITY LEVELS IN THE CLASSROOM

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Abstract: The study investigated the role of executive functions, specifically cognitive flexibility and self-regulation, in learning. A mixed research with a quantitative explanatory approach and a quasi-experimental pretest-posttest design was conducted, involving 335 high school students, divided into an experimental and a control group. The Wisconsin letter sorting subtest of the ENI-2 was used to assess the level of cognitive flexibility and a sociodemographic questionnaire. The self-regulation program “Caminando ando ando Soñando” was implemented to establish its correlation with cognitive flexibility. The corresponding statistical comparison analyses were carried out to determine the effects of the self-regulation program. Likewise, the qualitative research was based on ethnographic research, and four categories were identified: emotion recognition, identification of stressors, solution strategies and intervention methodology. The results showed that the self-regulation program had a significant impact on the students’ level of cognitive flexibility, measured through comparison tests in the control and experimental groups. Significant values were observed in the subscales “trials”, “correct T”, “categories”, “perseverative responses” and “% perseverative responses”, but not in the inability to maintain organization, i.e., “IMO”.

Keywords: cognitive flexibility, self-regulation, intervention program.

INTRODUCTION

Neuroeducation seeks to integrate neuroscience findings in the educational field to improve teaching and learning processes (García and Fernández, 2020; Figueroa et al., 2021; Cañola, 2021; Barrios, 2016; Manes and Niro, 2015; Mora 2021), with a particular emphasis on the development of executive functions that regulate behavior, metacognition and emotion, especially cognitive flexibility that

allows generating responses with functional inhibitory control when considering the effects of one’s own behavior on others and the environment. This makes it possible to improve self-regulation and control of negative emotions, aggression and rejection, as well as to optimize self-management of information to solve academic problems (Diamond, 2013; Rosselli et al., 2008).

In this regard, it should be noted that executive functions are a set of cognitive processes that allow regulating behavior and adapting to the environment, and include skills such as working memory, cognitive flexibility, response inhibition, planning and decision making (Korzeniowski, 2018). These self-regulatory processes are fundamental to complex activities such as learning and academic performance (Fonseca et al., 2016; Zimmerman, 2008). In other words, cognitive flexibility is the ability to easily adjust behavior and thinking to changing, unexpected and novel situations. This ability allows analyzing multiple concepts simultaneously, adapting previous thoughts and behaviors to new contexts, and is essential for solving interpersonal and academic problems. It improves self-regulation, control of negative emotions and information management in the academic environment (Jódar, 2004; Miller and Cohen, 2001)

In this study, the conceptualization of self-regulation was used to present the “Caminando ando ando Soñando” program, with the aim of influencing cognitive flexibility. In this sense, self-regulation is defined as the ability to control and direct one’s own behavior, which is essential for academic and personal success (Panadero and Alonso, 2014). Self-regulation involves goal setting, planning, self-monitoring, self-evaluation and self-reinforcement, and research indicates that this can be strengthened through cognitive, metacognitive, behavioral and social strategies (Panadero and Alonso, 2014; Zimmerman, 2002). Thus,

self-regulated learning involves students setting goals, monitoring their progress, and regulating their thoughts, motivation, and behavior to achieve those goals (Zimmerman, 2002).

In the educational context, cognitive flexibility helps students adapt to new materials, approaches and educational environments, thereby fostering critical thinking and overcoming ingrained habits. Its development can prevent learning difficulties and school dropout, which is fundamental for learning, academic performance and students' ability to learn new concepts, solve problems and adapt to change (Miller and Cohen, 2001). It is essential to emphasize that the educational system can intervene to strengthen these functions and prevent school difficulties that could result in academic dropout. Therefore, academic performance is considered essential in the educational process, where the brain provides the fundamental basis for learning (Gavilán et al., 2014). In the case of executive function training programs related to self-regulation, these can generate better academic performance in students. Thus, Shanker's (2013) model proposes five interrelated self-regulation domains: biological domain, emotional domain, cognitive domain, social domain and prosocial domain.

The designed program included strategies such as concept mapping, underlining of key ideas, application of child neuropsychological assessment tests (ENI 2) and a workshop with instruments from the "Caminando ando Soñando" program focused on self-regulation. These activities sought to develop self-regulation and improve cognitive flexibility in sixth grade students, based on the models of Shanker (2013) and Martínez and De la Fuente (2004).

Finally, the working hypothesis of the research established that the self-regulation strategy improves the levels of cognitive flexi-

lity in sixth grade students. In doing so, the research demonstrated that self-regulation is a skill that can be developed and strengthened through practice and repetition, and that it is fundamental for academic and personal success.

METHODOLOGY

This study used a mixed research approach, after combining quantitative and qualitative methods. This approach allows the integration of different methodologies with the purpose of achieving a greater understanding of the object of study (Creswell, 2008). In addition, the model or research paradigm employed was positivist, based on the idea that reality is objective and can be known through observation and experimentation. It also had an interpretive approach, because it sought to interpret the meanings that people give to their subjective experiences; and the central interest of the study was to interpret the variables that occur in the phenomenon of cognitive flexibility and under what conditions they manifest themselves, in order to establish the effects of the implementation of a self-regulation program (independent variable) on the level of cognitive flexibility (dependent variable) in students between 10 and 12 years of age (Hernández et al., 2014).

From the qualitative perspective, the study had an interpretive and ethnographic approach, by conceiving reality as complex, dynamic, holistic and divergent. This approach made it possible to understand how students construct their history from the practice of intervention and the application of strategies to solve problems in their immediate environment (Hernández, 2018). Likewise, the design was ethnographic, which made it possible to describe and explain the elements and categories that integrate the social system of the classroom. For this, we started from an inductive study, focused on the meaning that social actors give to their own practice in the field

of action (Finol and Vera, 2020). In a second step, the four categories obtained in the process of applying the self-regulation strategy called “Caminando ando Soñando” were presented, after recording the perceptions of the participants. In sum, this study used a mixed research design, with a quantitative quasi-experimental component and a qualitative ethnographic component.

Now, in the quantitative part, a quasi-experimental pretest-posttest design was used with an experimental and a control group (Hernández et al., 2014). The objective was to determine the effect of a self-regulation program (independent variable) on the level of cognitive flexibility (dependent variable) of the students.

Thus, the participants in this research were 335 students of the IEM Ciudad de Pasto in the morning and afternoon shifts; and of these, 167 were selected for each group (control and experimental). In this order of ideas, the research was conducted with two groups of sixth grade students, both boys and girls, aged between 10 and 12 years old, and also with students who were out of school. In this regard, out-of-school age refers to the gap between the chronological age of a student and the age considered appropriate for the grade he/she is attending, such as when a student is 2 or more years older than the average age expected for that grade (Ministry of National Education [MEN], n.d.). These groups belonged to the IEM Ciudad de Pasto, with students in the morning (control group) and afternoon (experimental group). Thus, the control group consisted of 147 women and 21 men, while the experimental group had 147 women and 20 men. Finally, cognitive flexibility was evaluated in both groups before and after the application of the self-regulation program.

Finally, regarding the ENI 2, it is used to measure cognitive flexibility in children by means of card sorting. In this process, the

student must identify the principle that links a set of cards, which can be sorted by color, shape, or number. The examiner provides feedback on the student’s responses, which helps assess the student’s ability to adapt to different situations and change strategies as needed.

INCLUSION CRITERIA

- Students chronologically enrolled in the IEM Ciudad de Pasto, in the afternoon, between the ages of 10 and 12 years old, including extra-age students.
- Students whose parents have given informed consent for their children to participate in the research.
- Students who have accepted informed consent to participate in the research.

EXCLUSION CRITERIA

- Students academically enrolled in the IEM Ciudad de Pasto.
- Students whose ages do not meet the eligibility criteria.
- Students whose parents have not signed the informed consent for their children to participate in the research.
- Students who have not accepted informed consent to participate in the research.

This study was conducted under strict ethical and bioethical considerations, with the objective of favoring the development of neuropsychopedagogy through an ethical and responsible administration of the information obtained during the research, in order to ensure at all times the well-being of the participants and their consented participation through assent and the signing of the informed consent.

Thus, the students were recognized as active agents in the process, and the necessary information on the objectives, purposes, benefits and procedures of the research was shared with them. Since we worked with minors,

a written document (informed consent) was presented to the parents in order to request their authorization for their children's participation. Likewise, informed consent was obtained from the students themselves, who agreed to participate freely and voluntarily, in accordance with Law 1010 of 2006 and Resolution 8430 of 1993 .

ANALYSIS OF RESULTS

Descriptive analyses of the sociodemographic, clinical and study variables (level of cognitive flexibility) were performed to determine the levels of presentation of the variables from the main measures of central tendency. Likewise, to determine the size of the representative sample of the target population, a simple random probability sample was obtained. With this, a total population of $N = 2628$ sixth grade students of the IEM Ciudad de Pasto was demonstrated.

Subsequently, a confidence level of was developed, with a margin of error of $\pm 5\%$. Also, a p -ratio= 0.5 was calculated to maximize the sample size. With these parameters, and after applying the formula corresponding to simple random sampling, a required sample size of 335 male and female sixth grade students of the educational institution was obtained. This sample size was considered adequate and representative for the purposes of the study, with 168 students for the control group (morning session) and 167 students for the experimental group (afternoon session).

The study sample consisted mainly of women (147 in each group). This is positive, since it promotes greater female participation, thus obtaining results that are more representative and free of gender bias. On the other hand, the control group consisted of 21 men, while the experimental group consisted of 20 men, where cognitive flexibility was evaluated before and after the application of the self-regulation program.

Regarding the socioeconomic level of the students participating in the study, these corresponded mainly to strata 1, 2 and 3, which are considered low levels in the Colombian classification. Similarly, the ages of the participants ranged from 10 to 15 years, with a mean of 11.579 years ($SD = 0.776$). Thus, in the morning session, 97.6 % were between 10 and 12 years old, while 2.4 % were 13 years old; and in the afternoon session, 82 % were between 10 and 12 years old, and 18 % were between 13 and 15 years old, so the latter are classified within the extra-age group.

On the other hand, the study participants were underage students living with their families. In the control group (morning session), most males live with their mother (57.2 %), while most females live with their father (55.4 %). More men (60.4 %) than women (39.6 %) live with their grandparents, and more men (56.2 %) than women (43.8 %) live with their siblings.

Regarding family type, in the control group most men belong to extended () and nuclear (56.8%) families, while most women belong to single-parent/reconstituted () and nuclear (43.2%) families. In contrast, in the experimental group, the majority of women belong to nuclear (52.7%), single-parent/reconstituted (53.3%) and extended (50.8%) families, while the majority of men belong to extended (49.2%) and nuclear (47.3%) families.

With respect to the detailed analysis of the measures obtained in each subtest evaluated, this allowed us to determine the level of cognitive flexibility according to each group evaluated (control, experimental in the pretest and experimental in the posttest). This made it possible to identify the performance of the participants throughout the evaluation process, both before and after the application of the self-regulation program. With the above, the differences between the groups were observed, since the performance of the control and experimental groups was appreciated, as shown in

	Conference							
	Tomor-row M	Control group DE	Pre Min	Max	After-noon M	Experimental group DE	Pre Min	Max
Number of tests	12,55	13,906	7	98	8,39	2,581	7	17
Total correct	20,78	25,311	0	95	10,03	3,446	1	16
Percentage of correct	14,93	16,761	0	91	8,81	3,084	1	14
Total errors	16,08	18,623	1	91	9,49	2,965	2	15
Percentage of errors	16,93	18,971	0	95	9,56	3,067	1	15
Number of categories	16,41	19,245	0	75	8,84	3,543	1	12
IMO	16,83	19,611	0	68	9,7	2,778	1	12
Persevering answers	22,24	25,221	1	91	10,17	2,352	3	14
Percentage of persevering responses	23,85	27,205	1	95	10,17	6,28	3	67

Table 1. Level of cognitive flexibility by control and experimental groups

	Afternoon M	Experimental group DE	Min	Pos max
Number of tests	8,57	3,63	7	40
Total correct	10,05	5,029	1	50
Percentage of correct	8,56	3,578	0	14
Total errors	9,4	3,381	1	15
Percentage of errors	9,37	3,489	1	16
Number of categories	8,05	3,963	0	12
IMO	9,68	3,963	1	11
Persevering answers	10,26	3,02	3	15
Percentage of perseverative responses	10,58	3,288	1	15

Table 2. Cognitive flexibility level by experimental group pos

Tables 1 and 2. This suggests that the self-regulation program had a significant impact on the level of cognitive flexibility of the participants, especially in the experimental group.

INFERENCE STATISTICAL ANALYSIS

DIFFERENCES IN THE LEVELS OF COGNITIVE FLEXIBILITY IN THE PRETEST AND POSTTEST

Before performing the between-group comparison analyses, a data distribution analysis was performed to determine the type and statistical analysis to be used. For this purpose, the Kolmogorov-Smirnov normality test was used to evaluate the distribution of the data in the subscales of the test. The

results showed a p-value < 0.05, indicating that the data do not fit a normal distribution. Therefore, it was decided to use a nonparametric statistic for comparison between groups, as shown in Table 3. This is because the assumption of normality was not met, which is common in many studies. In addition, the intervention program called “Caminando ando ando soñando” was implemented between the pre-test and post-test. Finally, nonparametric statistics were applied in this case because the data did not fit a normal distribution.

Kolmogorov-Smirnov				
	Group	Statistician	Gl.	Sig.
Number of tests	1	,435	167	,000
	2	,416	167	,000
Total correct	1	,197	167	,000
	2	,142	167	,000
Percentage of correct	1	,153	167	,000
	2	,124	167	,000
Total errors	1	,090	167	,000
	2	,109	167	,000
Percentage of errors	1	,153	167	,000
	2	,111	167	,000
Number of categories	1	,316	167	,000
	2	,275	167	,000
IMO	1	,488	167	,000
	2	,487	167	,000
Persevering answers	1	,152	167	,000
	2	,165	167	,000
Percentage of persevering responses	1	,293	167	,000
	2	,138	167	,000

Table 3. Kolmogorov-Smirnov test

To compare the pre and post results in the experimental group, the Wilcoxon test was performed. The results revealed significance values for the subscales “trials”, “correct T”, “categories”, “IMO”, “perseverative responses” and “percentage of perseverative responses”, as detailed in Table 4. This indicates that significant differences were observed in these subscales between the results obtained before and after the application of the intervention program in the experimental group. Thus, the Wilcoxon test was used because the data did not follow a normal distribution, which made it an appropriate tool for analyzing nonparametric data and evaluating significant changes in the measurements taken.

	Z	Sig. asin. (bilateral)
Number of tests	-0,187 ^b	0,042
Total correct	-0,371 ^c	0,011
Percentage of correct	-0,453 ^c	0,651
Total errors	-0,073 ^c	0,942
Percentage of errors	-0,526 ^c	0,599
Number of categories	-2,264 ^c	0,024
IMO	-0,012 ^c	0,040
Persevering answers	-0,913 ^b	0,036
Percentage of persevering responses	-1,236 ^b	0,021

Table 4. Wilcoxon pre and post test statistics of the experimental group.

To analyze the post-test results of the control and experimental groups, the Mann-Whitney W test for independent samples was used. The objective of this test was to determine if there were significant differences between the post-test applications of the control group and the experimental group. Given this, the results showed that there are statistically significant differences in all subscales except IMO, as detailed in Table 6. This suggests that the self-regulation program had positive effects on most of the scores of the experimental group compared to the control group. In sum, the Mann-Whitney W test was used because the data did not follow a normal distribution, which made it a suitable nonparametric tool for comparing two independent groups

	Z	Sig. asin. (bilateral)
Number of tests	12448,500	0,028
Total correct	11850,500	0,014
Percentage of correct	11350,500	0,002
Total errors	11093,000	0,001
Percentage of errors	11362,500	0,003
Number of categories	11920,500	0,014
IMO	13184,500	0,186
Persevering answers	11533,000	0,005
Percentage of persevering responses	11719,500	0,009

Table 5. Mann Whitney W test post test statistics control and experimental group

QUALITATIVE ANALYSIS

The qualitative analysis was carried out by emptying the information into matrices, which allowed an organization and structuring of the data for analysis. Similarly, coding was carried out using a deductive and emergent approach, where ATLAS.ti 22.2 software was used to analyze and categorize the information. This coding allowed us to identify patterns and relationships between the data. Subsequently, semantic networks were created from the coding, which helped to analyze the relationships between the emerging codes and categories. These semantic networks made it possible to visualize and understand the connections between the identified concepts and categories. Finally, the coded information and semantic networks were analyzed and interpreted to understand the phenomenon studied, which allowed significant conclusions and findings to be drawn.

From the coding process conducted in the qualitative analysis of this study, the following categories were highlighted:

- Emotion recognition: this category was reflected transversally throughout the intervention program, where students expressed phrases that denoted the identification of their emotional states, such as “I feel happy because I know what I want to be when I grow up” or “I feel anger for the dirty space”. The application of muscle relaxation techniques at the beginning of each session facilitated this recognition of internal states.
- Identification of stressors: in this category, students recognized stressful situations in different contexts, such as *bullying*, discrimination and drug use at school; punishment by adults in the family context; and jealousy or envy in relationships at the social level. This allowed them to understand how these situations can alter their emotional state and cause them to lose control of their impulses.

- Information management: the students’ ability to dramatize problems and situations of their immediate context, such as school, family and neighborhood, was identified, which allowed them to express their experiences in a creative way, by developing communication and critical thinking skills.
- Solution strategies: two subcategories were identified in this category, *difficulties that prevent problem solving* and *results of the solution*. Students recognized obstacles, such as economic ones, but also identified strategies such as dialogue and active listening to solve conflicts. In addition, appropriate solutions were found to assume prosocial roles to improve their environments.
- Methodology of the intervention: refers to the way in which the intervention program was applied, highlighting the importance of adapting the activities to the interests and characteristics of the population to be worked with. In this sense, playful-recreational characteristics based on role-playing dynamics were integrated to transmit sensations related to the game, which provoked confidence and security in the students. Finally, the students responded positively to the processes carried out.

DISCUSSION OF RESULTS

Descriptive statistics were initially calculated for the sociodemographic variables, age and the cognitive flexibility variable, evaluated through the ENI 2 instrument and card sorting. At this point, it is important to highlight that in the educational field, diversity is observed in variables such as gender, age, social class, endowment, ethnicity, religion and culture.

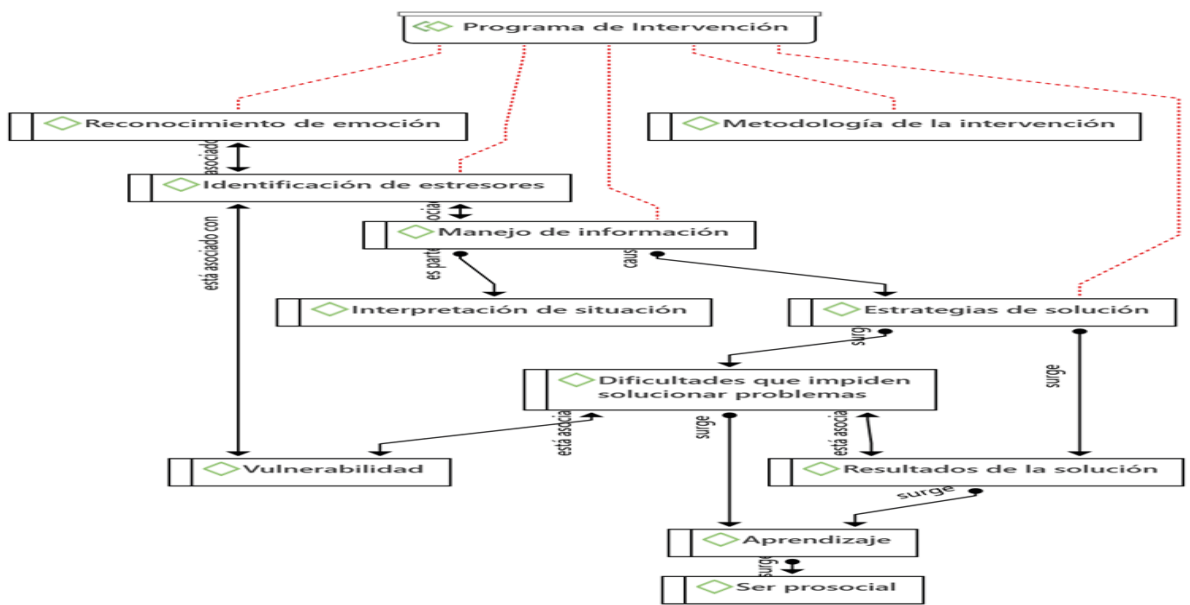


Figure 1. Qualitative results

Note. Own elaboration based on ATLAS.ti 22.2.

However, in the methodological process, sixth grade students would be in the range of 10 to 12 years old, considered “school age”. In addition, the IEM Ciudad de Pasto offers a double day in basic secondary education, although the morning day is preferred by families, due to their work activities. Even so, in the afternoon there is a higher percentage of over-age students, i.e., from 13 to 15 years old (Institución Educativa Municipal Ciudad de Pasto, n.d.).

In terms of gender, the same number of women were identified in both shifts, while there was a slight increase in the number of men in the morning shift. However, access to the shifts is independent of gender, as this is due to the service and the quotas offered. Thus, the institution applies the principle of equality between women and men.

On the other hand, the institution serves population of strata 1 and 2, and located in commune five, characterized by insecurity, social problems, gangs, micro-trafficking, street dwellers, substance abuse and family breakdown (Alcaldía Municipal de Pasto, 2019). Given the latter, the findings on the family composition of the students participating in

the study suggest that most of them live with both parents, followed by those who live alone with their mother and, to a lesser extent, those who live with their grandparents or aunts and uncles. In addition, the afternoon day presents a higher number of cases of single-parent and reconstructed families (Camargo and Pinto, 2023). These findings may have implications for the development of cognitive flexibility and self-regulation in children, because those who live in extended families may have more opportunities to interact with people of different ages and experiences. Not so, children living in single-parent or reconstructed families must adapt to frequent changes in their family environment, which could help them develop better self-regulation skills (Schaffer, 2000).

However, it should be emphasized that the family has a great affinity with the school due to the process of co-responsibility with the student’s educational success. In other words, the school cannot do anything that the family has not done. The family is the children’s first school, and it is responsible for providing them with a supportive and motivating environment for learning. Thus, collaboration between parents

and teachers is a necessity for comprehensive education (Jiménez and Pérez, 2021).

Returning to the issue of cognitive flexibility, this can also help students manage cognitive load. A student with good cognitive flexibility is more able to adapt to unexpected changes in a task, such as with new information or changes in instructions (Caballero, 2021). This is important because it should be considered that the educational institution serves a vulnerable population that lives in neighborhoods with multiple social problems that affect the integral development of students and their families (Obando, 2011; Alcaldía Municipal de Pasto, 2019; Cárdenas and Ariza, 2022).

Thus, the study evaluated the cognitive flexibility of the students before and after implementing the self-regulation program “Caminando ando Soñando”. For this purpose, tests that measure executive function, specifically cognitive flexibility, were applied by using the card sorting test. In this test, the student had to decide which was the correct principle (color, shape or number) to match the response card with the stimulus card, and then feedback could be received from the examiner to know whether the response was correct or incorrect (Matute et al., 2007; Rosselli et al., 2008). In this way, the following aspects were scored:

- Number of trials allowed: there were 54 correct answers when the cards were correctly matched after using the category.
- Number of errors: when the card was not correctly matched with the stimulus card according to the current category.
- Number of categories successfully completed: 10 consecutive correct answers.
- IMO: by recording the number of times an error occurred after five correct answers.

- Perseverative responses: by counting when the child persisted in responding with an incorrect stimulus feature.

For their part, Rubio and Gómez (2020) supported that cognitive flexibility implies the capacity of students to adjust their performance in a task by considering the interpretation and ordering of actions necessary to achieve a goal. This includes neutralizing interference from irrelevant stimuli, correcting errors, incorporating new behaviors, and completing a task. In this sense, improving cognitive flexibility through self-regulation in the student population contributes to controlling emotions, thoughts and behaviors, which facilitates adaptation to changing and complex situations.

In sum, the results of the study showed that there was a significant difference in the experimental group after implementing the self-regulation program “Caminando ando ando Soñando”. This was evidenced by comparing the results of the experimental group with the control group in the posttest, where statistically significant differences were shown in all subscales, except for the IMO

On the other hand, it should be mentioned that the development of executive functions during childhood and adolescence is closely related to the maturation of the frontal lobe and its ability to establish new connections with other brain structures (Berrazueta, 2022). Therefore, it is essential to recognize the importance of environmental stimulation to promote optimal levels of these executive functions in students (Mora, 2021). In this regard, the study by Hendrie and Bastacini (2020) found that students who used self-regulated learning strategies to control their emotions performed better on learning tasks. Thus, this study highlighted the importance of emotional regulation in self-regulated learning and academic performance. Considering the above, it should be noted that the intervention program “Caminando ando ando

Soñando” was designed to strengthen the biological, emotional, cognitive, social and prosocial aspects in students:

- Biological: focused on body awareness, relaxation and muscle contraction to improve tension and distension through structured tasks.
- Emotional: self-observation and analysis of protective and risk factors in situations that generate emotional discomfort were encouraged. Imagined scenarios were recreated so that students could construct a reality in which they could transform situations by analyzing their own actions and those of other relevant people in their environment, such as school, family and neighborhood.
- Cognitive: focused on information processing and flexible thinking, using strategies such as self-regulation to reinforce neuronal connections that benefit the individual and the group in the classroom. Efforts were proposed to form flexible thinking and capacity for change, through strategies such as underlining main ideas and concept mapping.
- Social and prosocial: students were asked to identify verbal and non-verbal aspects of themselves and others that could generate atmospheres that could facilitate or reduce problems in interpersonal relationships. The dramatization process was used to externalize the problems of their immediate context, such as school, neighborhood and family.

After the above, it is worth remembering that emotional well-being is fundamental for learning, since positive emotions affect it. Thus, one learns what one loves, and it requires an interesting stimulus, such as curiosity, which activates brain circuits that anticipate reward or pleasure in the limbic or emotional system (De Lopez, 2020).

Thus, in the category of *emotion recognition*, corresponding to the biological and emotional domain, the students responded that they were pleased by factors such as movement, relaxation, exercise, play and imagination. This allowed concluding that Jacobson’s play, theatrical performance and relaxation produce positive emotions in the development of self-regulation activities to improve cognitive flexibility. However, when negative emotional states such as stress, fear or anger, detected by the amygdala, occur, the amygdala is flooded with neurotransmitters that impede learning and memory formation in the hippocampus, a phenomenon known as amygdala sequestration. This was evidenced in expressions of anger over the dirty classroom space.

Therefore, to favor learning and memory, the educator should incorporate physical activity in the learning process, since the release of neurotransmitters promotes positive moods and reduces stress. It should be remembered that the prefrontal cortex, which is vulnerable to stress, concentrates executive functions and negative emotional states that interfere with students’ learning (Goldin, 2022; Doherty and Forés, 2020).

Thus, it can be affirmed that the “Caminando ando ando Soñando” program allowed participants to identify stressors in different environments (school, family and neighborhood), who highlighted the sale of drugs, *bullying*, disorder and dirt at school; family beatings at home; and theft in the neighborhood. These stressors negatively affect the learning process, so it is crucial to address each situation to generate positive changes through neuroeducation (Mora, 2021).

It should be mentioned that *bullying* is defined as a form of repeated and prolonged aggression that causes psychological victimization, making it a stressor that directly impacts students’ learning and relationships. Thus, the program included activities to promote pea-

ceful coexistence and respect, in order to raise awareness about *bullying* and promote alternative solutions (Arango et al., 2021). From neuroscience, it is explained that *bullying* can be influenced by genetic factors, social learning, traumatic experiences and brain alterations, such as fetal alcohol syndrome (Restrepo, 2018)

Finally, the program also helped to identify stressors related to the risk of psychoactive substance use, such as drug sales, family violence and crime in the neighborhood. It therefore focused on promoting healthy lifestyles through Jacobson's relaxation and strengthening skills such as decision-making and critical thinking. With this, it was sought that students would positively regulate their behaviors, emotions and interpersonal relationships, in order to promote assertive communication and peaceful conflict resolution (Alcalde, 2022). Thus, the program integrated experiential and reflective strategies to empower students in the construction of a healthy life project, in order to prevent risk behaviors, such as the consumption of psychoactive substances. In this sense, the visualization of future goals was a motivational tool for the self-regulation of the present (Cava et al., 2021).

CONCLUSIONS

The "Caminando ando ando Soñando" program is an innovative initiative that uses physical activity with theater to promote self-regulation and cognitive flexibility in students between the ages of 10 and 12. Theater allows students to express their reality, identify problems and propose solutions by developing skills such as memory, attention, listening and teamwork.

Accordingly, the program fosters the development of self-regulation and coping skills in adolescents to manage stressful situations that could lead to the use of psychoactive substances, which is consistent with a preventive approach based on strengthening psychosocial capacities.

Consequently, the results suggest that the self-regulation program is an important tool for addressing student diversity and improving academic performance and social and personal well-being. It also helps to develop resilience and cope with challenges, thus highlighting the importance of positive emotions for learning, activating brain circuits related to reward and pleasure.

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