



A Psychomotor Intervention Program: The Body Scheme and its Influence on Writing

Francisca Fragoso; João Casal; Luis Picado

Research Center of the Superior Institute of Lisbon and Tejo Valley, Portugal

E-mail: luis.picado@isce.pt

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Abstract

This study highlights the importance of psychomotricity in the writing learning process. For this purpose, a psychomotor intervention program was developed, which was applied to a sample of children in the Municipality of Évora, Portugal. The program aimed to promote the development of the body scheme, eye-hand coordination, specific motor coordination, balance, spatial orientation and laterality. The program was applied in 11 sessions, where 16 specific activities were developed, considering the objectives of the program. The results of the program application showed a remarkable evolution of the children in terms of their psychomotor education, namely in terms of the body scheme.

Keywords: *Psychomotricity; Body Schema; Intervention Program*

Introduction

The number of students with learning difficulties has increased considerably in the last 20 years, estimated to reach close to half of the student population in Portugal (Coelho, 2016; Ministry of Education, 2022). In this case, psychomotricity can play an important role due to its influence on the cognitive formation and organization of the child's body scheme (Lussac, 2008; Potel, 2019). These influences can promote improved spatial, temporal, and sequential orientation, which in turn has significant impacts on a child's ability to learn to read and write more effectively.

The development of writing in children covers different facets, including cognitive, affective-emotional and motor aspects, as pointed out by Fonseca (2015). According to Le Boulch (1988) and Monteiro and Viana (2022), the acquisition of writing is closely linked to language development, familiarization with the written code and initial actions involving drawing. However, it is essential to highlight that these aspects are basically psychomotor conditions that involve coordination, laterality and space-time control. In this way, reading and writing are a natural extension of the child's psychomotor development.

The acquisition of writing is widely recognized as the most important learning at school, as it represents an essential basis for other forms of learning. To evaluate and analyze children's writing, there are several approaches, but it is important to point out that psychomotricity is a crucial element for the development of school skills, especially for the acquisition of writing.

The implementation of early intervention programs has been shown to be effective in solving learning difficulties from the period after birth until the school stage (Mota; Vieira and Nuernberg, 2020). From an educational perspective, learning difficulties are understood as an inability to acquire social, reading, writing and mathematical calculation skills (Correia, 2004; Hyman, Levi & Myers, 2020).

In view of the role of psychomotricity and the learning difficulties at the beginning of the children's school career, the question is: What will be the contributions of the application of a psychomotor intervention program aimed at the development of writing in students of the 1st Cycle of Basic Education?

Therefore, this study intends to evaluate how the implementation of a psychomotor intervention program, focused on the development of writing, can contribute to the improvement of the teaching-learning process. In this way, an attempt was made to promote the development of the body scheme, reinforce eye-hand coordination, develop specific motor coordination, balance and spatial orientation, as well as laterality;

This article, in addition to the introduction, is organized into four more sections. The first concerns the theoretical framework of analysis, the second is dedicated to the methodology and the last two refer to the presentation and discussion of the results and the conclusion.

Theoretical Framework of Analysis

Psychomotricity investigates the relationship between the human being, his body and the surrounding environment and is the object of study in several scientific areas, such as Neurophysiology, Psychiatry, Psychology and Education. According to Andreucci (2013), psychomotricity includes the areas of Education, Re-education and Psychomotor Therapy, which act together to promote the harmonization of human behavior through movement and language, directly influencing the emotional and effective life of the individual.

Psychomotricity promotes the child's interaction with other people and objects through their actions (Mendonça, 2007). Its focus is the study of the body and its manifestations (Heinsius, 2010). In this way, psychomotricity encompasses the construction of the body through the integration of several dimensions, namely: the motor-instrumental (involving the body schema), the emotional-affective (which covers needs, conflicts, prohibitions, symbols and unconscious marks) and the praxis-cognitive (which is related to the knowledge of one's own body in space and time). In this approach, the body and psyche are understood as inseparable elements, resulting in individual formation based on bonds and relationships with other individuals in a given social and historical context (Andreucci, 2013; Hyman, Levi & Myers, 2020).

Pre-reading and pre-writing activities play an essential role in the development of learning processes. The child's ability to read requires the involvement of motor, perceptive, intellectual and affective aspects, as well as the internalization of their body schema (Cró, 2006). In addition to preparing the child for reading, knowledge of the body schema also contributes to their cognitive development and to the integral growth of their personality (Conti, Postalli & Souza, 2021).

The child's personal experience plays a significant role in the process of learning to write and in his cognitive processes, especially in perception. These factors are fundamental for the child to

understand the alphabetic system and acquire symbolic representation skills (Berninger, V. W.; Abbott, Abbott, Graham, Richards, 2002; Muszkat & Rizzutti, 2012; Conti et al., 2021). Therefore, the individual experiences of each child have a direct influence on the way they learn to write and on the development of their perceptive abilities, which are essential for understanding and using the alphabet as a symbolic communication system.

According to Berninger et al. (2002) and Rodrigues and Maluf (2021) writing involves four essential components: the generation of ideas, the mental representation of these ideas in working memory, the transcription that transforms the mental representation into visual text, and, finally, the effective generation of the text, resulting in writing itself. That is, during this process, ideas evolve gradually, turning into words, sentences and, finally, a coherent speech. These authors found, in a hypothesis test, that the process can be subdivided into motor action and spelling. This means that manual language (handwriting) and eye language (visual recognition of words) precede the spelling phase, which, in turn, is directly related to speech through comprehension. Therefore, it is concluded that the ability to write is a complex combination of cognitive and motor processes, where the generation of ideas is converted into text through a series of interdependent steps.

Reading and writing are considered the most elaborate forms of human language. The acquisition of writing is a challenging and gradual process for the child, especially during the beginning of literacy. At this stage, the successful experiences of the child contribute significantly to the construction of oral and written language and play a key role, which is why they should be encouraged by the adult (Cruz, 2014). It is important to value the child's effort and provide him with an encouraging environment where he feels confident exploring and developing his language skills.

The role of psychomotricity in the acquisition of writing is evident. Fonseca (2015) underlines the importance of psychomotricity in the development of reading and writing skills. Studies indicated by Domingues (2014) concluded that psychomotor activities had a positive impact on students' writing performance. Other studies mentioned by Silva and Beltrame (2011) also indicate that between 30% and 50% of children with difficulties in motor development face problems associated with learning to read and write. The results of these studies further reinforce the relevance of psychomotricity in the successful acquisition of writing during the school learning phase.

According to Sacchi and Metzner (2019), investing in psychomotor aspects from the first years of a child's life can bring significant benefits to the development of their school skills. Borges and Rubio (2013) also point out that psychomotricity plays a key role in the learning process. By valuing psychomotor aspects from an early age, we are making a positive contribution to the child's academic success.

The acquisition of writing encompasses intellectual, motor, affective development and specific training. Therefore, it is an integral pedagogical approach, which takes into account the intellectual, social, motor and psychomotor potentials of the child (Oliveira, 2010; Potel, 2019). Thus, the teaching-learning process of writing must be thought of in a comprehensive way, considering and respecting the child's development.

Therefore, it is essential to incorporate psychomotricity in school education, as this approach involves diverse and captivating motor aspects and strategies. In addition, psychomotricity is also concerned with the emotional, psychological and intellectual well-being of the child (Wallon, 1980). That is, by including psychomotricity in the educational context, it is possible to offer enriching approaches that go beyond the physical aspect, also meeting the emotional, psychological and intellectual needs of children (Rezende, Azevedo, Silvério, Pflingstag, Davoglio, Pagnussat, Moraes, Magalhães, Macedo, Souza & Figueiredo, 2022).

Methodology

The methodology used included the development and application of a psychomotor intervention program to a sample of 14 children from the 1st Cycle of Basic Education at a Basic School located in the City of Évora, in Central Alentejo, Portugal. The city is the capital of Central Alentejo and the Alentejo Region and is approximately 140 km from Lisbon.

The approach followed is of a qualitative nature, with an essentially descriptive purpose, allowing the researcher to understand the complexity of the empirical reality (Bryman, 2015). In this case, the collected data make it possible to describe unique aspects of the studied phenomenon (Bogdan & Bilken, 1994). Furthermore, this study can be considered an action-research (Sanches, 2005), where it is intended that the results allow for social change with a positive impact on people's lives.

A case study strategy was followed (Robson, 1993; Yin, 2010), in which the study elements were selected for convenience, as suggested by Casal (2012). In the selection of the sample, the difficulties of the children in terms of the notion of body scheme, laterality and difficulties evidenced in the teaching-learning process of writing were taken into account, having included children from several classes and from several years of the Basic School object of study (Table 1).

Therefore, the study was designed to describe in detail the effect of a psychomotor intervention program on a specific group of students.

Table 1. Characteristics of the study participants

Subject	Age	Year of schooling	Problem/Diagnosis
A.1	6	1°	Moderate intellectual disability and fine motor difficulties
B.1	6	1°	Dwarfism and fine motor difficulties
C.1	6	1°	Attention deficit hyperactivity disorder and fine motor skills
D.1	6	1°	Severe mental impairment and fine motor difficulties
E.2	7	2°	Moderate intellectual disability and fine motor difficulties
F.3	9	3°	Asperger's Syndrome and Fine Motor Difficulties
G.3	9	3°	Moderate to severe mental impairment and fine motor difficulties
H.3	9	3°	Attention deficit and hyperactivity
I.3	9	3°	Moderate intellectual disability and fine motor difficulties
J.3	9	3°	Attention deficit hyperactivity disorder and fine motor skills
L.4	10	4°	Attention deficit and fine motor difficulties
M.4	10	4°	Attention deficit and hyperactivity
N.4	11	4°	Attention deficit hyperactivity disorder and fine motor skills
O.4	13	4°	Severe mental impairment and fine motor difficulties

Source: Elaboration of the authors

Of the 14 children who participated in the study, 4 children are from the 1st year (3 male children and 1 female), 1 male child is from the 2nd year, 5 children are from the 3rd year (4 male children and 1 female child) and 4 children are in the 4th year (2 female children and 2 male children).

The 1st grade children, all 6 years old, face learning difficulties associated with several issues, including mental retardation, difficulties in fine motor skills, as well as a case of dwarfism and another of attention deficit hyperactivity disorder. The 2nd grade child is 7 years old and has moderate mental disability, in addition to difficulties in fine motor skills. Children in the 3rd year, all 9 years old, also face learning difficulties related to mental disability, difficulties in fine motor skills, in addition to cases of attention deficit and hyperactivity. There is also a case of Asperger's Syndrome among these children.

Finally, we have the 4th grade children, whose ages vary between 10 and 13 years old. His main learning difficulties are associated with cases of attention deficit and hyperactivity, difficulties in fine motor skills, and there is also a case of severe mental deficiency.

The application of the program took into account several procedures that are shown in the following figure and described below.

After carrying out the selection and characterization of the children, the Psychomotor Battery adapted from Victor da Fonseca (1975) and the psychomotor intervention program were applied, which took place during 11 sessions and comprised 16 activities. At the end of each session, a self-evaluation was carried out. At the end, the Psychomotor Battery adapted from Victor da Fonseca (1975) was applied again and the results were compared before and after the application of the psychomotor intervention program. In the 11 sessions of the program, specific activities were developed according to the learning difficulties encountered (Table 2).

The application of the program took place during the 2nd and 3rd period of the 2018/2019 academic year, covering the period from March 11 to June 17. All 11 sessions were conducted early in the morning, at 8:30 am, and lasted 60 minutes, except for Session 5, which, due to the nature of the proposed activities, lasted 90 minutes.

The first two sessions and the last two were evaluation sessions, in which it was intended to carry out training and evaluate writing and body schema.

After each session of the psychomotor intervention program, an evaluation form consisting of 13 items was applied, divided into two categories of analysis: construction of knowledge and behavior.

In this evaluation, a 3-level scale was used, with the following measurement options: Never; Occasionally; and Often.

At the end of each session, students also received a self-assessment form containing 4 questions and 3 response levels (Appendix 2). The choice of this assessment scale was based on Catalão (2017) and took into account the different age groups of the children who participated in the study.

Table 2 - Psychomotor intervention program activities

Activities	Objectives	Materials	Procedures
1 – Elaboration of a text	Properly interpret the different positions of the letters in space, develop spatial perception, oculo-manual perception, fine motor skills and laterality	Charcoal pencil and 1 lined sheet	Ask the child to write a short text on the topic he likes the most.
2 – Ask the child to draw a human figure	Identify the body schema	Charcoal pencils, colored pencils, felt-tip pens and paper	Give the child a sheet of paper and ask him to draw a man and a woman.
3 – Painting of the right hand and left hand	Identify in yourself and in the other the right hand and the left hand	2 poster boards, yellow and blue paint, towel, bucket of water and 2 brushes	Paint the right hand with yellow and paint the left hand with blue and trace the hand on the cardboard.
4 – Outline the hands with a felt-tip pen.	Identify the right hand and left hand in the child and in the other and develop fine	1 felt-tip pen and 1 cardboard	Ask the child to identify the right hand on her and the other and outline it with the felt-tip pen.

	motor skills		Ask the child to identify the left hand on it and outline it with a felt-tip pen.
5 – Through drawings of the human figure, recognize right and left in the other	Identify right and left in each other	Sheets with images of the human figure	Show 1 card with the image of a human figure and try to get the child to identify right and left in the image on the card.
6 – Painting of the right foot and left foot	Identify the right foot and the left foot in oneself, through drawings identify the left foot in the other.	Cardstock, bucket of water, paints and brushes	With the teacher's help, paint the child's right foot in yellow and the left foot in blue and trace both feet on cardboard.
7 – Construction of a puzzle with the different parts of the body	Identify body schema and develop fine motor skills	Image of the human figure divided into 16 parts.	Ask the child to put together the 16 pieces of the puzzle and build the complete human figure.
8 – Beat rhythms next, clapping hands, asking the child to repeat	Identify notions of time and visual and auditory memory	The body itself	The teacher performs gestures, which he asks the child to repeat.
9 – Stand on one foot for 2 seconds	Improve overall balance and coordination	The body itself	Ask the child to stand on one foot for 2 seconds.
10 – Stand on tiptoes for 10 seconds	Improve leg strength and balance	The body itself	Ask the child to stand on tiptoe for 10 seconds.
11 – Tracing a child's body on a piece of paper with a pen	Notion of self-image and body scheme, developing spatial orientation, laterality and eye-hand coordination.	The body itself, scenery paper, felt-tip pen	Ask the child to lie down on the scenario sheet of paper and the teacher with the pen outlines the child's body. Ask the child to draw the various parts of the body on the contoured figure
12 - Dribbling a ball	Develop spatial orientation, increase hand-arm control, and develop eye-hand coordination and laterality	The body itself and a ball	Ask the child to dribble the ball with the right hand and with the left hand to the ground
13 – Jump	Increase balance, global coordination and laterality	The body itself	Get the student's attention and have him jump with both feet. Stay by his side and have him jump with you. Repeat the activity until the child can jump unassisted.
14 – Complete the drawing of a face with the missing parts	Develop spatial orientation and recognize the various elements that make up the face (eyes, eyelashes, eyebrows...) and develop fine motor skills	Sheet of paper, images with mouths, eyes, nose, ears, eyebrows and others	Give the child a sheet with the outline of the face and ask him to paste all the missing elements.
15 – Shaving foam on the	Develop spatial orientation, the notion of body scheme	Mirror, shaving foam	The teacher puts some shaving foam on the mirror and lets the

mirror	and laterality		child explore the material and asks him to draw the human figure, name the parts of the body itself and in the drawing and write.
16 - Digital Ink	Develop spatial orientation, the notion of body scheme and laterality	Flour, water, oil, yellow paint and detergent.	The teacher and the student knead the ingredients, spread the preparation on the table and let the child explore the material, draw a man and write words.

Source: Elaboration of the authors

Data analysis is a creative procedure, but subject to the guidelines and assumptions of the adopted methodology (Patton, 1987). It is a process in which previously collected information is organized with the aim of deepening the understanding of a given phenomenon (Bogdan and Bikden, 1994). That is, data analysis requires both creativity and adherence to methodological principles. In this phase, the data collected during the investigation are analyzed in detail, seeking to identify patterns, trends or facts relevant to the understanding of the studied phenomenon. Undoubtedly, the process of processing the data contributes to enriching the results of the investigation and allows for a more in-depth view of the subject in question.

Results and Discussion

The implementation of the psychomotor intervention program, focused on the elaboration of texts in the knowledge construction categories, had, in general, a positive impact on the learning of writing. Initially, reference behaviors in the various categories of knowledge construction were rarely observed. However, after completing the program, the results changed significantly. In general, most children started to occasionally perform the reference behaviors in all knowledge construction categories, and in some cases, some children even started to perform these behaviors frequently. The verified improvements indicate that the program had a beneficial effect on the children's writing development, since they demonstrated greater capacity and involvement in the proposed activities.

As for the behavior categories, the results of the initial and final application of the psychomotor intervention program reveal a positive evolution. An increase in the proportion of children who occasionally or frequently engage in the reference behaviors was observed, while there was a decrease in the proportion of children who never engage in these behaviors. That is, the children showed a notable improvement in the incorporation of the reference behaviors, which indicates a positive response to the psychomotor intervention program.

Writing is one of the most significant human skills. However, its complexity requires specific learning and gradual and coordinated control of movements so that the child can distinguish, memorize and automate the psychomotor pattern of each letter. As the child automates writing, he can direct his attention to the content of the text (Andreucci, 2013). According to Cró (2006), pre-reading and pre-writing activities develop essential behaviors for the progress of learning. Therefore, mastering writing requires a continuous process of psychomotor and cognitive development.

In the initial application of the psychomotor intervention program, it was found that in relation to the drawing of the human figure, in the categories of knowledge production, the children never presented the reference behaviors. However, after the application of the program, there was a substantial decrease in the proportion of children who never adopted the reference behaviors and a considerable increase in the proportion of children who occasionally performed these behaviors. In addition, a proportion of children

who frequently adopt the reference behaviors is already observed. This indicates that the psychomotor intervention program had a positive impact on the development of these skills, with some children demonstrating greater consolidation of desired behaviors.

In the initial application of the program, regarding the categories of behavior related to the drawing of the human figure, children often adopted reference behaviors in only one category. However, after completion of the psychomotor intervention program, there was still a significant proportion of children who never adopted benchmark behaviors in the behavior categories. On the other hand, there was a notable increase in children who frequently and occasionally adopted the reference behaviors.

As observed by researchers, there is a close relationship between the child's cognitive learning ability and their motor skills. This means that psychomotor development can positively influence the cognitive learning process. In this sense, the psychomotor intervention program had a positive impact by providing children with better conditions to incorporate and use the reference behaviors, favoring, in relation to the drawing of the human figure, both motor and cognitive aspects (Rosa NetoI, XavierII, Marília dos Santos, AmaroI, Florêncio & Poeta, 2013)

The writing literacy process comprises a series of cognitive operations, such as the intention to write, formulating ideas, evoking words to consciousness, applying grammatical rules and following the sequence of graphic units (Fonseca, 2015). That is, learning to write involves several mental steps ranging from the desire to communicate to the expression of ideas through words, considering grammatical rules and the composition of the text. This process of achieving writing skills requires a combination of cognitive, linguistic and motor skills.

Figures 2 and 3 show the overall results of the initial application and final application of BPM in relation to body notions.

In the initial application of the BPM, on a scale of 1 to 4, approximately 50% of the children obtained an average total score of "2", while 40% achieved a minimum score of "1". Only 10% of children got a score of "3" and none of them reached the maximum score of "4" in any dimension of body notions.

However, after the final application of BPM, there was a notable improvement in all dimensions of body notions, which was clearly reflected in the total average score. The children showed substantial progress in their abilities related to understanding their own bodies, indicating that the psychomotor intervention program had a positive impact on the development of their body skills.

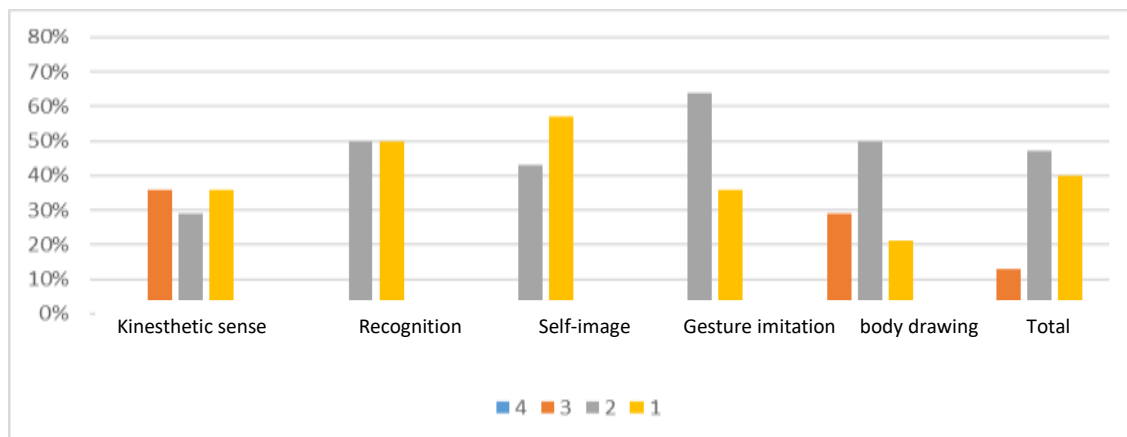


Figure 2. Overall results - initial application of BPM: Body notions
Source: Application of the psychomotor intervention program

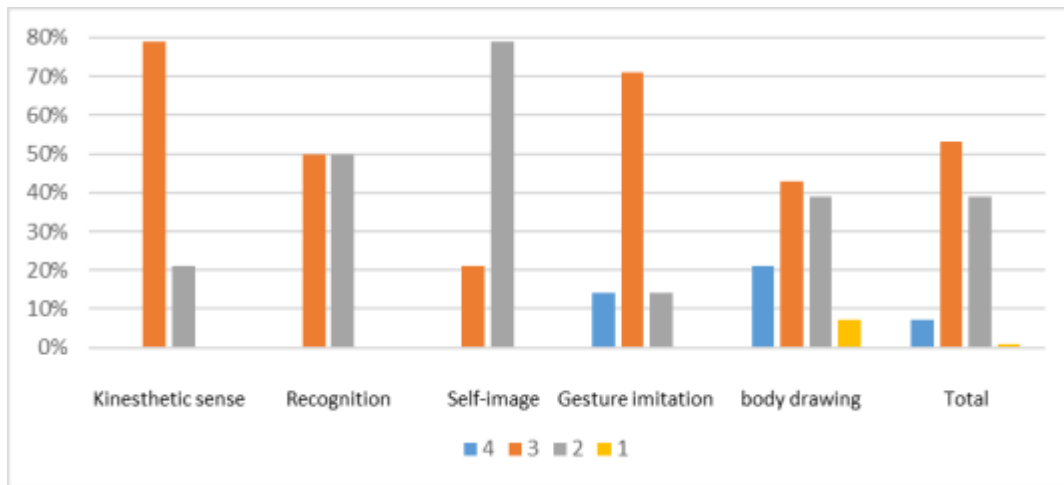


Figure 3. Overall results - final application of BPM: Body notions
Source: Application of the psychomotor intervention program

In general, all dimensions of body notions showed a positive evolution after applying the psychomotor intervention program. However, the areas of kinesthetic sense, recognition and imitation of gestures were the ones that showed the most significant improvements. These results indicate that the program had a beneficial impact on the development of skills related to body awareness, gesture recognition and imitation skills. These advances are fundamental for children's progress in writing and other school learning.

In the initial application of BPM, approximately one third of the children received ratings of "1", "2" and "3" in relation to the kinesthetic sense. However, after the final application of the BPM, it is notable that, in relation to the kinesthetic sense, almost 80% of the children were classified as "3" and a little more than 20% as "2". This demonstrates a clear improvement in children's understanding and perception of their own bodies. The progress achieved is indicative of the positive impact of the psychomotor intervention program on the evolution of the kinesthetic sense of the participating children.

In the recognition, the initial application of the BPM, revealed that half of the children obtained the classification "1" and the other half obtained the classification of "2". After applying the psychomotor intervention program, half of the children reached a "3" classification in recognition and the other half maintained a "2" classification. These results indicate that, although there is an improvement in the recognition of children who went from the classification "1" to "2" after the program, there is still room for improvement in this competence.

Regarding the imitation of gestures dimension, a significant change was observed after the application of the psychomotor intervention program. Initially, nearly two-thirds of children were rated "2" and one-third "1". However, after the intervention, more than 70% of the children were classified as "3" and more than 10% were classified as "4".

A study conducted by Sarmiento, Braga, Martins and Almeida (2008) revealed significant improvements after the psychomotor intervention in the kinesthetic sense and in the recognition of right and left. However, in relation to body design, imitation of gestures and self-image, no changes were observed in the results.

In this context, the results of the psychomotor intervention program allow us to conclude that it was effective in promoting specific improvements, especially in the imitation of gestures and in the spatial organization of the participating children. However, it is important to consider that the different

dimensions of body notions may require specific approaches to achieve a complete and balanced development of children's psychomotricity.

Figure 4 presents the individual results for each child of the initial application and final application of BPM in relation to body notions.

Figure 4. Individual results per child of the initial and final application of BPM: Body notions

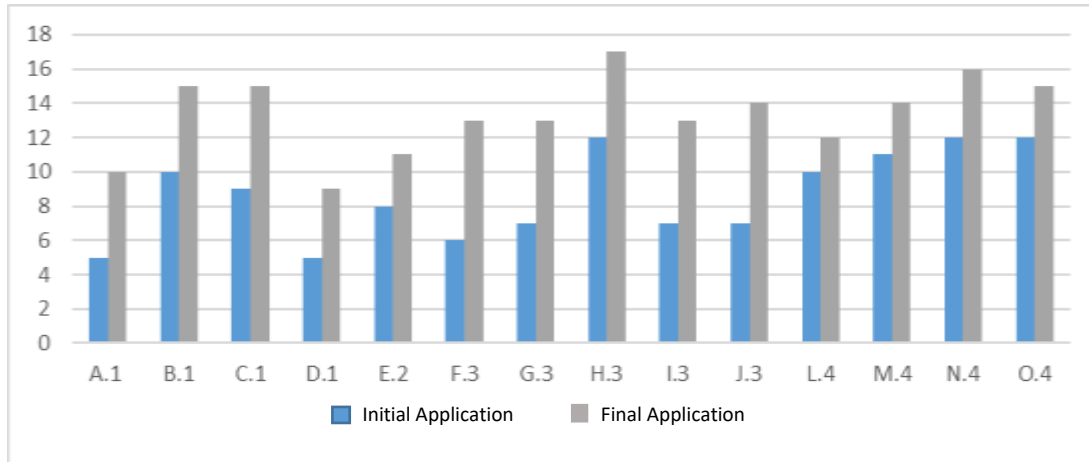


Figure 4. Individual results per child of the initial and final application of BPM: Body notions

Source: Application of the psychomotor intervention program

The individual results show the successful application of the psychomotor intervention program. All children scored higher in the final BPM application, which generally translated into a significant improvement in psychomotor education. For example, children A.1, D1, F3, I3 and J3 experienced a more than double increase in their score compared to the initial application of BPM. These results highlight the positive impact of the program on psychomotor skills and demonstrate the benefits achieved over the intervention period. The psychomotor intervention program proved to be effective in promoting a more advanced development in children, with a significant impact on their psychomotor education.

The body scheme refers to the ability of human beings to symbolize their own body and internalize their image. When the child develops a healthy relationship with his body, he is able to position his body parts and make continuous progress in his discoveries. In this way, psychomotricity plays a crucial role in the construction of the body scheme and in the cognitive development of learning. Many school performance difficulties faced by children stem from inadequate psychomotor education (Andreucci, 2013). Therefore, the proper development of the body scheme is fundamental for the good cognitive and educational progress of children.

Conclusion

In this study, a psychomotor intervention program was developed and applied to a sample of children from a Basic School in the city of Évora, Alentejo, Portugal. The program aimed to promote the development of the body scheme, eye-hand coordination, specific motor coordination, balance, spatial orientation and laterality in children.

The program comprised 11 sessions, during which 16 specific activities were carried out. Its application allowed the children under study to start to adopt reference behaviors in the categories of analysis related to the production of knowledge and behavior. In the first, an improvement was observed

in most categories, although some children still do not adopt the reference behaviors, especially in aspects related to anxiety, nervousness and memorization of contents. However, notable progress is highlighted in relation to children's safety, attention, interest and commitment. Therefore, it is possible to conclude that the psychomotor intervention program allowed the participating children to improve their psychomotor education, mainly in the dimensions associated with the kinesthetic sense, recognition and imitation of gestures.

In addition to the application of the psychomotor intervention program allowing an overall increase in the percentage of children who adopted reference behaviors and who improved their psychomotor education, at an individual level, the results were also good. The individual progress of 5 children is remarkable, who at the end of the program obtained twice the score they had at the beginning of the program, which clearly demonstrates the positive impact and effectiveness of the program in the development of the psychomotor skills of the children involved.

Although the application of the program was successful, some psychomotor dimensions, such as self-image and body design, can still be improved. It is also important to point out that this study was carried out as a case study, and although the results are very positive, they cannot be generalized. In future studies, it will be relevant to investigate in more detail the relationships between psychomotricity and writing, expanding the study to other contexts and involving larger samples, so that it will be possible to perform statistical inference.

References

- Andreucci, L.C. (2013). *Psicomotricidade e resiliência em crianças brasileiras e portuguesas: Um estudo comparativo para a melhoria no ensino-aprendizagem, Tese de Doutorado em Ciências de Educação*, Universidade de Aveiro.
- Berninger, V.W., Abbott, R. D., Abbott, S. P.; Graham, S., Richards, T. (2002). Writing and Reading: Connections Between Language by Hand and Language by Eye, *Journal of Learning Disabilities*, 35, p. 39-56.
- Bogdan, R., Bikden, S. (1994). *Investigação Qualitativa em Educação: uma introdução à teoria e aos métodos*, Porto: Escolar Editora.
- Borges, M. F., Rubio, J. A. S. (2013). A educação psicomotora como instrumento no processo de aprendizagem, *Revista Eletrônica Saberes da Educação*, 4(1), p. 1-12.
- Bryman, A. (2015). *Social Research Methods*, Oxford University Press.
- Casal, J. (2012). *Cooperação entre os Professores do Ensino Regular e Educação Especial, Documento para apreciação em provas públicas com vista à obtenção do Título de Especialista*. Odivelas: Instituto Superior de Ciências Educativas.
- Catalão, I.D.R. (2017). Programa de Intervenção e Prevenção da Discalculia no âmbito do desenvolvimento do Sentido de Número, *Dissertação de Mestrado em Educação Especial - Área de Especialização: Domínio Cognitivo e Motor*, Odivelas: Instituto Superior de Ciências Educativas.
- Coelho, D. (2016). *Dificuldades de aprendizagem específicas: Dislexia, disgrafia, disortografia e discalculia*: Lisboa: Areal Editores.

- Conti, L.; Postalli, L. & Souza, D. (2021) Avaliação Formal e Conhecimento de Professores sobre o Letramento na Educação Infantil, in *Estudos e Pesquisas em Psicologia*. Vol. spe.
- Correia, L. (2004). Problematização das dificuldades de aprendizagem nas necessidades educativas especiais, *Análise Psicológica*, 2(22), p. 369-376.
- Correia, L., Martins, A. (1999). *Dificuldades de Aprendizagem. Que São? Como Entendê-las?* Porto: Porto Editora.
- Cró, M. (2006). *Atividades na Educação Pré-Escolar e Ativação do Desenvolvimento Psicológico*, 2ª Ed., Lisboa: ESEJD-Artes Gráficas, Lda. Editora.
- Domingues, E.P. (2014). *Psicomotricidade e Escrita: Promoção do desenvolvimento da escrita, através do recurso a atividades psicomotoras enquanto estratégia de superação de dificuldades, em jovens com défice cognitivo*, Dissertação de Mestrado em Educação Especial. Coimbra: Escola Superior de Educação de Coimbra.
- Fonseca, M. C. M. (2015). *Avaliação e Correlação entre Psicomotricidade e Escrita*, Dissertação apresentada ao Programa de Pós-Graduação em Educação da Universidade do Vale do Sapucaí como requisito parcial à obtenção do título de Mestre em Educação.
- Garcia, J. N. (1998). *Manual de dificuldades de aprendizagem: Linguagem , leitura, escrita e matemática*, Porto Alegre: Artes Médicas, 1998.
- Hensius, A. M. (2010). *Fundamentos Psicológicos da Psicomotricidade na Área da Saúde*. In: Ferreira, C.; Hensius, A.M. (Org.), *Psicomotricidade na Saúde*, Rio de Janeiro: WAK Editora.
- Hyman, S. L.; Levi, S. E.; Myers S. M. (2020). council on children with disabilities, section on developmental and behavioral pediatrics. *Identification, Evaluation, and Management of Children With Autism Spectrum Disorder*. *Pediatrics*, v.145, n1.
- Le Boulch, J. (1988). *Educação psicomotora: a psicocinética na idade escolar*, 2.ed. Porto Alegre: Artes Médicas.
- Lussac, R. M. P. (2008). *Psicomotricidade: história, desenvolvimento, conceitos, definições e intervenção profissional*, *Revista digital Buenos Aires*, 13(126).
- Mendonça, M.E. (2007). *A psicomotricidade e a educação somática à luz da psicanálise winnicottinana*, Tese de Doutorado em Psicologia Clínica. São Paulo: Pontifícia Universidade Católica de São Paulo.
- Ministry of Education (2022). *OECD Review of Inclusive Education: Country Background Report for Portugal*. Ministry of Education Editor.
- Monteiro, C. & Viana, F. L. (2022). *Falar bem para ler bem: investir no desenvolvimento da linguagem para prevenir o insucesso escolar e a exclusão social*. In V. W. Pereira, A. P. R. Scherer, R. Gabriel & R. Guaresi (Orgs.), *Ensino e aprendizado da leitura e da escrita: Contribuições interdisciplinares* (pp. 133-161). Vitória da Conquista BA: Editora Fonema e Grafema.
- Mota, A. C. W.; Vieira, M. L.; Nuernberg, A. H. (2020). *Programas de intervenções comportamentais e de desenvolvimento intensivos precoces para crianças com TEA: uma revisão de literatura*. *Revista Educação Especial*, v.33.

- Muszkat, M.; Rizzutti, S. (2012). O professor e a Dislexia, São Paulo: Cortez. – (coleção educação & saúde; v.8).
- Oliveira, F et al. (2010). A Prática Pedagógica do Ensino de Ciências nas Escolas Públicas de Santa Cruz – RN, *Holos*, 26(5), p. 218-226.
- Patton, M.Q. (1987). *How to use qualitative methods in evaluation*, Newbury Park: Sage Publications.
- Potel, C. (2019). *Être psychomotricien: un métier du présent, un métier d'avenir*. Toulouse: Érès.
- Rezende, E. DE S. B. ., Azevedo, E. C. ., Silvério, J. Dos S. ., Pflingstag, K. F. F. ., Davoglio, L. ., Pagnussat, L. G. R. ., Moraes, N. L. DE ., Magalhães, R. G. DA S. ., Macedo, R. DE S. B. ., Souza, S. M. DE ., & Figueiredo, M. C. DE A. . (2022). A importância da psicomotricidade na educação infantil. *Revista Ibero-Americana De Humanidades, Ciências E Educação*, 08–60.
- Robson, C. (1993). *Real World Research: A Resource for Social Scientists and Practitioners*, Blackwell.
- Rodrigues, M. L. ., & Maluf, M. R. (2021). Componentes essenciais na aquisição da linguagem escrita: Revisão da literatura no período 2015 a 2020. *Letrônica*, 14(2), e38730.
- Rosa Neto I, Xavier II, Marília dos Santos, Amaro I, Florêncio & Poeta (2013). A lateralidade cruzada e o desempenho da leitura e escrita em escolares, *Rev. CEF AC*, 15(4), p. 864-872.
- Sacchi, A.L., Metzner, A.C. (2019). A percepção do pedagogo sobre o desenvolvimento psicomotor na educação, *Revista Brasileira de Estudos Pedagógicos*, 100(254), p. 96-100.
- Sanches, I. (2005). Compreender, agir, mudar, incluir. Da investigação-ação à educação inclusiva, *Revista Lusófona de Educação*, 5, p. 127-142.
- Sarmiento, R. O. V., Braga, A. O., Martins, A. C., Almeida, M. C. R. (2008). Efeitos da intervenção psicomotora em uma criança com diagnóstico de TDAH (transtorno do déficit de atenção/hiperatividade) em seus aspectos psicomotores, *MOVIMENTUM – Revista Digital de Educação Física*, 3(1).
- Silva, J., Beltrame, T.S. (2011). Desempenho motor e dificuldades de aprendizagem em escolares com idades entre os 7 e os 10 anos, *Motricidade*, 7(2), p. 52-68.
- Wallon, H. (1980). *Psicologia del niño: una comprensión dialéctica del desarrollo infantil*, Madrid : Pablo del Rio.
- Yin, R. (2010). *Estudo de caso: Planejamento e métodos*, Porto Alegre: Artmed Editora.

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