Original article

The treatment of fine motor skills in children from five to six years of age based on interdimensional relationships

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ABSTRACT

The objective of the article is to present the results of the application of a methodology for the treatment of fine motor skills in children from five to six years of age in the educational process of the motor skills education and development dimension. The study is based on a pre-experimental design, the data collection techniques used were observation of the programmed activities and a pedagogical test was applied as a measuring instrument. The results of the experiment show the development of the control of the movements of the small facial muscles, hands, feet and fingers.

Keywords: Methodology, Fine motor skills, Interdimensional relations, Preschool, Muscular control.

Introduction

Currently, the Early Childhood educational process (Díaz, Ríos, Silverio, Burke, & Gallo, 2017) structurally organizes the curriculum content by dimensions of education and development: Social-personal, Communication, Relations with the environment, Aesthetics and Motricity. The latter is an important educational and teaching activity,

previously called Physical Education; it favors initiative and the performance of movements with greater coordination and fluidity, which allows a better interrelation with the remaining dimensions.

The educational process of the dimension education and development of motor skills for children aged five to six years (Valdés, Sampayo, Cárdenas, Pérez, Luz, García, Díaz, Uralde, Marzo, Vega, Moreno, Pentón, Amaro, Veja, Fernández, Herrera, Cáceres, Aragonés, Duarte, Menéndez, Pupo, Quintero, Hernández, Cabreja, Guerra, Rojas and Hernández, 2019); is aimed at achieving general objectives: To manifest predominance of a positive physical-emotional state of health by manifesting precision and control in the movements in which the small muscles are involved, with security and confidence in their possibilities during the execution of movements typical of their age.

The development of motor skills is essential in the integral formation of children (Agrelo and Becquer, 2015); it is through movement that they discover the infinite possibilities of action of their body, establish greater relationships with their environment, and also satisfy their needs for communication, expression and the development of the different systems of the organism.

The motricity (Díaz, Ríos, Silverio, Burke and Gallo, 2017) is a form of human activity, which includes motor development in intimate relationship with the cultural, social, symbolic, volitional, affective and intellectual, allowing the child to initially come into contact with the adult, objects, with himself and with the surrounding environment, favors the realization of movements with greater coordination and fluidity and a better interrelation with the remaining dimensions of development.

In the educational process of the dimension of education and development of motor skills, children are oriented towards the realization of movements (Agrelo and Becquer, 2015), which favors physical development, communication and their integral development through the systematization of knowledge, skills and moral qualities that favor, from their incidence in fine motor skills, the control and precision of movements manifested in the skills of the other dimensions and daily life.

This aspiration is achieved from interdimensionality which, for the authors of this research, refers to complex relationships between the content of the dimensions of the early childhood educational process, which generate syntheses and complex systems, sharing common theoretical and methodological frameworks that allow reaching levels of synthesis as a result of a strategy of cooperation and interrelation between them.

Studies of educational programs for children from five to six years of age have shown that there are insufficiencies in the conception of integrative activities of the educational process from the dimension of education and development of motor skills, manifested in the limited articulation of ways and procedures in the educational process, by not valuing the adequate interrelation that should exist between this dimension and the other dimensions.

Similarly, it was observed that the conception of the activities of the dimension of education and development of motor skills does not favor the interrelation of the content of fine motor skills with that of the other dimensions of the curriculum, showing limitations for the treatment of the content of this dimension in the educational process, i.e., knowledge is treated in a fragmented manner,

Therefore, the research sought to provide a solution to the inadequacies in the treatment of fine motor skills content, related to the precision and control of movements involving small muscles, by designing a methodology based on interdimensional relationships, from the dimension of education and development of motor skills with the other dimensions, which integrates a system of didactic and methodological actions, from the interdimensional approach, which takes the inter-object as a means of articulation, through playful motor actions.

For this reason, this article presents the results obtained in the application of a methodology for the treatment of fine motor skills to achieve the improvement of muscular control, manifested in the precision and control of movements involving the small facial muscles, hands, feet and fingers, with security and confidence in their possibilities during the execution of movements typical of their age.

Development

1. Theoretical framework

The educational dimension and development of motor skills, as a form of human activity, includes motor development in close relation to the cultural, social, symbolic,

volitional, affective and intellectual, allowing the child to initially come into contact with the adult, objects, with himself and with the surrounding environment of life allows to continue consolidating the maturation processes in the child's organism.

Educational influences received by the child from five to six years (Valdés et. al., 2019); systematically contribute to the performance of motor actions with a higher level of complexity, with independence, in a varied and combined way in relation to other years. The increase in the development of motor skills, makes them show interest in the results of their actions and a marked desire to perform them showing mastery of the basic movements used in different situations, this makes the motor activity more efficient and through it solve tasks and problems of everyday life.

At the end of pre-school childhood, the following are consolidated: balance, spatial orientation, coordination, rhythm, movement regulation, adaptation and motor changes, anticipation, differentiation and agility as an integrator of all of the aforementioned, and mastery of laterality, present in all activities.

The fundamental objective of the dimension of education and development of motor skills in children from five to six years of life (Valdés et. al., 2019), is to achieve that, in the performance of activities, where the small facial muscles, hands, feet and fingers are involved, they show precision and control of movements, demonstrating the development achieved in motor skills and showing the development of coordination abilities, with creativity and complexity appropriate to their age.

The integrative approach of treatment of the content of the dimension of education and development of motor skills with the content of the dimensions of the curriculum is explained as the general strategy to structure the educational process, taking as a method of: planning, construction and systematization of the content to the approach of playful motor actions, which are conceived from the inter-object of interdimensional articulation and which require the appropriation and interrelated application of the content of the dimension of education and development of motor skills with the content of the other dimensions of the curriculum of the sixth year of life.

The interrelation of the content of the dimension education and development of motor skills with the content of the other dimensions of the curriculum of the sixth year of life is understood, explained and interpreted by the authors of this research as the interdimensional function that allows the interaction or articulation between the

different components of the content system (knowledge, skills and moral qualities), determines the meeting points, articulation or linkage of the different dimensions within the educational process of the sixth year of life, sharing theoretical and methodological frameworks and that allows reaching levels of synthesis as a result of a strategy of cooperation between them.

The categories proposed by the authors, which characterize the interrelation of the content of the dimension of education and development of motor skills with the other dimensions in the sixth year of life are: the inter-object of interdimensional articulation is the Treatment of fine motor skills of children from five to six years of age, delimiting playful motor actions, the integrating nucleus of the educational process is The programmed activity with an integrating approach, the integrating activity is the Activity of the dimension education and development of motor skills and the integrating axis is the content (fine motor skills), from playful motor actions.

The treatment of fine motor skills in the educational activities of children from five to six years of age, based on interdimensional relations, is understood as the didactic and methodological process of carrying out playful motor actions in the dimension of education and development of interrelated motor skills, on the basis of the inter-object, which allows connecting them, taking as a center the needs of the integral development of the child in the social context.

2. Methodology

2.1. Research approach

The study required, from the instrumental point of view, an experimental design of prospective, transectional, observational, descriptive and explanatory type, from a quantitative-qualitative approach (Hernández & Mendoza, 2018), developed from a pre-experimental design, with pre-test and post-test with three approaches of intensive character.

A first approach, studying the initial state of fine motor skills reached by the children (verification experiment); a second approach, applying in the educational process of the

dimension of education and development of motor skills the methodology for its treatment (formative experiment); and a third approach, studying the final state of fine motor skills reached by the children (control experiment).

2.2. Population and sample

The population under study consisted of children between five and six years of age in the municipality of Bartolomé Masó, Granma province, and the teachers of the sixth year of life. The sample selected intentionally is constituted by 44 children of the two groups of the sixth year of life, as well as the four teachers of the Kindergarten Circle Granma.

2.3. Data collection techniques

As a data collection technique, observation of programmed activities of the education and development of motor skills dimension was used; as a measurement instrument, a pedagogical fine motor skills test for hands was applied Construction of a dice tower, adapted by Pentón (2017), whose objective was to ascertain the development of fine motor skills.

The hypothesis was submitted to empirical verification: **the application of a methodology for the development of the educational process of the educational dimension and development of motor skills, based on the treatment of fine motor skills in children from five to six years of age from interdimensional relations, which solves the contradiction between the dimensional treatment of the content, and the integrative approach of the content, which takes the interdimensional articulation of the inter-object, through playful motor actions, favors the precision and control of the children's movements.**

I. For the study of the precision and control of the movements of children from five to six years old, where the small facial muscles, hands, feet and fingers are involved, the development reached by the children in the dimensions was

considered:

II. Accuracy and control of facial movements.

Indicators:

1. Grimacing, blowing kisses, puffing and blowing cheeks.
2. Stick out the tongue, move it in different directions.
3. Closing and opening eyes, looking in different directions, blinking.
4. Opening and closing the mouth, stretching the lips (to the sides, to the front), squeezing them.
5. Join and raise eyebrows.
6. Move chin, forehead, eyebrows, nose.
7. Show moods (happy, angry, astonished).

III. Accuracy and control of hand and finger movements.

1.1 Visuomotor Coordination

Indicators:

1. Drawing lines with precision

2. Continuity in the line

3. Adjustment to line limits

4. Trimming, tearing, coloring and tracing

Indicators:

- Regularity
- Accuracy
- Continuity
- Limits

II. Precision and control of foot and toe movements.

Indicators:

1. Join the soles and toes together.

2. Flexion and extension of the toes.
3. Roll cylindrical objects with the toes (balls, sticks, among others).
4. Grasping objects with the toes and alternating them.
5. Imaginary drawing with the toes.
6. Touching feet and hands alternately, front and back.
7. Finger touch: knee, leg, shoulder, or other body part.

The indicators were evaluated using an ordinal rating scale using the categories

5. Performs the action very similar to the given guidance with confidence and assurance.

4. Performs the action similar to the given guidance with assurance and confidence.

3. Performs the action without concretizing the given orientation with security and confidence

2. Performs the action without concretizing the given orientation with uncertainty and confidence

1. Performs the action without concretizing the given orientation without confidence

1.2. Data processing techniques

The information processing was developed through the descriptive, quantitative and inferential analysis of the data from the pedagogical tests applied to the children (Hernández and Mendoza, 2018), which were ordered, coded and classified in frequency distribution tables and interpreted according to the established indicators and categories. As a technique for processing the information, the nonparametric statistical test of the ranks with Wilcoxon sign was used, with 95% reliability (= 0.05), for the calculation the SPSS 24 statistical package for Windows was used.

2. Results and discussion

The results obtained in the study were organized in two parts that respond to the results of the verification experiment and of the control experiment, deepening the quantitative and qualitative analysis of the established indicators.

2.1. Result of the precision and control of the facial movements, hands, feet and fingers of the children, before applying the methodology.

The experimental variant begins with the verification or diagnostic stage (verification experiment), the objective of which was to verify the initial state of control of the children's facial, hand, foot and finger movements.

Table 1 shows the results of the pre-test, obtained in fine motor skills before applying the methodology, according to the indicators and categories.

Table 1. Frequency distribution of children's control of facial, hand, foot and finger movements before applying the methodology, according to indicators and categories.

INDICADORES	CATEGORÍAS									
	5	%	4	%	3	%	2	%	1	%
1. Realización de movimientos faciales	38	86,3	6	13,6	0	0	0	0	0	0
2. Realización de movimientos de las manos y los dedos										
2.1. Coordinación visomotora	22	50	16	36,3	6	13,6	0	0	0	0
2.2. Recorte, rasgado, coloreado y trazado	22	50	14	31,8	8	18,1	0	0	0	0
SUBTOTAL	22	50	15	34	7	15,9	0	0	0	0
3. Realización de movimientos de los pies y los dedos	34	77,2	4	9	6	13,6	0	0	0	0
TOTAL	31	70,4	8	18,1	5	11,4	0	0	0	0

Source: authors' self elaboration (pedagogical test).

In the results obtained from the pre-test it was found that the initial state of precision and control achieved by the children in fine motor skills, from the facial movements, hands, feet and fingers of the children, before applying the methodology, according to the indicators and categories, present evident limitations since in a general way a total

of four children, representing 9%, reach the category of 5, those who perform the action very similar to the orientation given with security and confidence, 11 children, representing 25.0%, reach the category of 4, manifested in the limitations to perform the action, but similar to the orientation given with security and confidence, 17 children, representing 38.6%, reach the category of 3, manifested in the limitations to perform the action, without concretizing the orientation given with security and confidence; nine children, representing 20.4%, reach the category of 2, manifested in the limitations to perform the action without concretizing the orientation given with little security and three children, representing 6.8%, reach the category of 1, those who perform the action without concretizing the orientation given without security.

Results that are statistically corroborated through the application of the nonparametric test of the Wilcoxon signed ranks, where there is sufficient evidence to state with 99% reliability that the proportion of children with categories of 5 and 1 differs significantly from the categories: 4, 3 and 2.

2.2. Results of the precision and control of the children's facial, hand, foot and finger movements after applying the methodology.

The application of the experimental variant concludes with the realization of the final verification stage (control experiment), the purpose of which was to verify the final state of fine motor skills, manifested in the precision and control achieved by the children in the control of facial movements, hands, feet and fingers.

Table 2 shows the results of the post-test, obtained in the control of facial, hand, foot and finger movements.

Table 2. Distribution of frequencies of control of facial, hand, foot and finger movements after applying the methodology, according to indicators and categories.

INDICADORES	CATEGORÍAS									
	5	%	4	%	3	%	2	%	1	%
1. Realización de movimientos faciales	38	86,3	6	13,6	0	0	0	0	0	0
2. Realización de movimientos de las manos y los dedos										
2.1. Coordinación visomotora	22	50	16	36,3	6	13,6	0	0	0	0
2.2. Recorte, rasgado, coloreado y trazado	22	50	14	31,8	8	18,1	0	0	0	0
SUBTOTAL	22	50	15	34	7	15,9	0	0	0	0
3. Realización de movimientos de los pies y los dedos	34	77,2	4	9	6	13,6	0	0	0	0
TOTAL	31	70,4	8	18,1	5	11,4	0	0	0	0

Source: authors' self elaboration (pedagogical test).

In the control of facial movements, hands, feet and fingers of the children, after applying the methodology, according to the indicators and categories, favorable results are obtained since in a general way a total of 31 children, representing 70.4%, reach the category of 5, those who perform the action very similar to the orientation given with security and confidence; eight children, representing 18.1%, reach the category of 4, which means that they perform the action, but similar to the orientation given with security and confidence; five children, representing 11.4%, reach the category of 3, which means that they perform the action, but without specifying the orientation given with security and confidence; and no child reaches the categories of 2 and 1.

These results are statistically corroborated through the application of the nonparametric test of ranges with Wilcoxon sign, where there is sufficient evidence to state with 99% reliability that the proportion of children with categories 5 and 4 differs significantly from the categories 3, 2 and 1.

When comparing the data obtained in the pre-test and post-test before and after applying the methodology, these are statistically corroborated through the application of the non-parametric test of the ranges with Wilcoxon sign, in which results of statistical significance are obtained, that is to say, there is sufficient evidence to propose, with 99% reliability, that the proportion of children with categories 5 and 4 differs significantly from the categories 3, 2 and 1, there is sufficient evidence to state, with

99% reliability, that there are significant differences in the results obtained in the fine motor skills achieved by the children in the control of facial movements, hands, feet and fingers in favor of the post-test and categories 5 and 4.

Although the concept and development of motor skills has been studied from numerous disciplines such as Biology, Developmental Psychology and Pedagogy, there are not many references in the scientific literature on the application of methodologies for the treatment of fine motor skills in children from five to six years old, from the dimension of education and development of motor skills based on interdimensional relationships, from the interdimensional approach of content treatment, taking as a method: Of projection, of construction and interrelated systematization of the content to the design and execution of playful motor actions, formulated from the inter-object of interdimensional articulation, required by children from five to six years old in the control of facial movements, hands, feet and fingers.

In this sense, Ginarte (2015), achieves the appropriation of knowledge, the formation of skills and moral qualities through the integration of content from the areas of development, from the design of the curriculum at the micro level in Preschool Education, results that agree with the results and interpretations made in this research; but does not take into consideration the integration from the Dimension education and development of motor skills with the other dimensions at this level.

The bibliographic analysis made to the educational process of the dimension education and development of motor skills in Early Childhood recognizes that it has been studied by several researchers among which Agrelo (2012) and Hernández (2019) stand out, those who have provided information regarding the motor characterization of children from 0 to 6 years old, the capacities, the definition of contents, However, their contributions do not take into consideration the ways of establishing relationships between elements for the treatment of fine motor skills in children from five to six years of age, which limits the use of the possibilities offered by these activities.

Particularly in relation to fine motor skills, different scholars have made incursions such as: Agrelo, Bécquer, Martínez, Hernández, Hernández, Amaro, and Hernández (2013), Pentón (2017), Mazó (2019), who have provided definitions, stages and a series of exercises where the small facial muscles, hands, feet and their fingers intervene, proposed for it in the Improvement of the Cuban Kindergarten Curriculum, These results differ from those obtained in this research because they do not delimit ways of

establishing interdimensional relationships by relating the content with other dimensions from the motor activity itself.

In addition, Díaz, Ríos, Silverio, Burke, and Gallo (2017) provide educational strategies that allow the integration of contents of the dimensions education and development of communication and education and aesthetic development for children of fifth and sixth years of life; and they recognize the unity of the cognitive and the affective, aspects that agree with the results and interpretations obtained in this research; but they do not take into consideration the possibilities offered by the dimension of education and development of motor skills to establish the interrelation with the content of the rest of the dimensions and to deal with the theoretical, didactic and methodological aspects for the improvement of fine motor skills.

Therefore, the results obtained through the experimental variant applied show that the partial application of the methodology in the educational practice favors the treatment of fine motor skills in children from five to six years of age, based on interdimensional relationships between the contents of the dimension of education and development of motor skills with the contents of the other dimensions and, therefore, achieving precision and control of movements, as shown in:

- The appropriation of knowledge and the improvement of fine motor skills interrelated with the content of the Education and Development of Motor Skills dimension, with the content of the other dimensions in children from five to six years of preschool childhood, manifested in the control of movements in the solution of educational and newspaper situations.

The generalization and transfer of knowledge and skills in the solution of educational and newspaper situations that require interrelating the content of the Education and Development of Motor skills dimension, with that of the other dimensions in the sixth year of life of preschool children, in correspondence with the depth and essence required for the contextualized application of movements with different levels of complexity and variability, manifested in the control of movements.

Conclusions

The analysis of the historical background of the conception of university Physical Education for university students with medical certificate, which conditions them for these practices, shows that the attention to the diversity of the class group has not always been taken into account in the therapeutic area of physical culture and the requirements of the documents with normative legal basis at this educational level.

The theoretical construct of therapeutic area of university physical education shows in its structure the operative relations between the categories therapeutic area, Physical Education in Higher Education and the use of the potentialities shown by this discipline, concretizing in a representation of the new object sustaining the teaching-learning process according to the requirements of the documents with normative legal basis of Higher Education.