REVISTA CÁTEDRA

Lenguajes artísticos y destrezas motoras en el nivel preparatoria de educación básica

Artistic languages and motor skills in the preparatory level of basic education

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(Received on: 27/07/2021; Accepted on: 30/07/2021; Final version received on: 25/08/2021)

Suggested citation: Bahamonde-Sola, J., Cando-Vaca, E., Panchi-Culqui, E. (2021). Artistic languages and motor skills in the preparatory level of basic education., *Revista Cátedra, 4*(3), 16-34.

Resumen

En el proceso de prácticas preprofesionales realizadas en los centros educativos de nivel preparatoria de la educación general básica ecuatoriana, se han evidenciado dificultades en el desarrollo de habilidades motrices básicas necesarias para el aprendizaje de la lecto-escritura. El artículo es el resultado de un estudio cuasi-experimental con grupo control que propone implementar experiencias lúdicas con diferentes lenguajes artísticos para el desarrollo de destrezas motoras en los niños y niñas entre 5 y 6 años, de seis centros educativos ubicados en diferentes sectores urbanos y periurbanos de la ciudad de Quito. Se basa en la evaluación con la prueba de funciones básicas antes y después de la aplicación de experiencias lúdicas de aprendizaje que fusionan artes escénicas, musicales y plásticas-visuales, adecuadas al objetivo de aprendizaje en los grupos de experimentación y control de cada institución, para determinar las diferencias en cada grupo y en su contraste. El

diagnóstico inicial demuestra una prevalencia superior al 50% de estudiantes con déficit en las destrezas motoras. Luego del proceso aplicado y la evaluación postest, se observa una reducción de las áreas deficitarias y un mejor desarrollo en las destrezas de dominancia lateral, ritmo y coordinación visomotora en el grupo experimental frente al control. Se concluye que la propuesta que conjuga el arte y la lúdica favorece el desarrollo de la motricidad gruesa y fina, necesarias para el proceso de lecto-escritura, observándose, además, que este proceso promueve la expresión libre y espontánea de los infantes para su mejor desarrollo personal y social.

Palabras clave

Lenguajes artísticos, destrezas motoras, experiencias lúdico-artísticas, funciones básicas, educación básica preparatoria

Abstract

In the process of pre-professional practices carried out in Ecuadorian general basic education high schools, difficulties have been evidenced in the development of basic motor skills necessary for learning to read and write. The article is the result of a quasi-experimental study with a control group that proposes to implement playful experiences with different artistic languages for the development of motor skills in children between 5 and 6 years old, from six educational centers located in different urban and peri-urban sectors of the city of Quito. It is based on the evaluation with the basic functions test before and after the application of playful learning experiences that merge scenic, musical and plastic-visual arts, adequate to the learning objective in the experimentation and control groups of each institution, to determine the differences in each group and in their contrast. The initial diagnosis shows a prevalence of more than 50% of students with deficits in motor skills. After the applied process and the post-test evaluation, a reduction of the deficit areas and a better development in the skills of lateral dominance, rhythm and visual-motor coordination were observed in the experimental group compared to the control group. It is concluded that the proposal that combines art and games favors the development of gross and fine motor skills, necessary for the reading-writing process, also observing that this process promotes the free and spontaneous expression of infants for their better personal and social development.

Keywords

Artistic languages, motor skills, artistic playful experiences, basic functions, preparatory basic education.

1. Introduction

The general framework of the study refers to the curricular model of the Ecuadorian national education system, which defines three educational levels: Initial, Basic and High School. The General Basic Education (EGB) level is organized into four sub-levels that respond to epistemological, pedagogical and didactic criteria, conformed by reference age groups: Preparatory (around 5 years old), Elementary Basic (preferably from 6 to 8 years old), Middle Basic (9 to 11 years old) and Higher Basic (12 to 14 years old) (Ministry of Education, 2019, pp. 21-22).

One of the recurring problems in the first years of basic education has to do with difficulties in the acquisition of skills necessary for reading and writing, which has repercussions both

in the learning processes in the school environment and in the interaction with the cultural and social environment.

Taking into account the objective of the curricular block of expressive-communicative body practices of the preparatory sub-level, the Ministry of Education (2019) proposes "to safely perform body practices (playful and expressive-communicative) that favor the development of basic motor skills and, specifically, gross and fine motor skills, according to their needs and those of the community" (p. 162). In this sense, the study is focused on the application of ludic strategies with the use of artistic languages to promote the development of motor skills of boys and girls in the preparatory sub-level of EGB, whose ages range between 5 and 6 years old, in which it corresponds to strengthen and enhance cognitive, motor and psychosocial skills and abilities. In this sense, teachers should continuously observe and evaluate the integral development of their students in order to design playful strategies, so that their start in compulsory schooling is pleasant and motivating.

According to the model of the integrative curriculum of the EGB Preparatory sub-level proposed by the Ministry of Education (2019), it is necessary to take into account all aspects related to the being, that is, the biological, physical, emotional, psychological and social, knowing that the human being is holistic; therefore, the learning of children is produced from the integral, from self-knowledge and interaction among peers, with adults and the social, natural and cultural environment (p. 48).

According to the above, the research problem revolves around the question: why do children in high school have a deficient development of motor skills? This question arises from the observation made by pre-professional practice tutors in child development centers. The recommendation they offer, from their expertise in the area of arts and culture, is the application of playful experiences with different artistic languages as an alternative strategy to enable motor skills based on epistemological, neuropsychological and pedagogical foundations.

In order to put this recommendation into practice, a quasi-experimental study with a control group was carried out, whose main objective was to demonstrate, methodologically, if the application of artistic languages, based on playful experiences, would allow the development of the motor area in the infants of the study population. The research consisted of testing, in the classroom, a proposal with didactic resources, elaborated with concrete material for the areas of scenic, music and visual plastic.

After a first application of the basic functions test, the methodological proposal was executed in several sessions with the experimental group, based on a planning and development of the didactic process with performance activities, shadow puppets, black light theater and plastic arts. In order to incorporate several criteria for the analysis of this process, classroom observation was carried out during the execution of the playful experiences and the educators and directors of the children's centers were interviewed. The research was carried out with the required permissions and informed consents; however, there were some limitations in terms of educational infrastructure and the time necessary for an adequate application of the programmed didactic activities.

Both the process and the results of the research are a current and pertinent proposal, since they orient towards new analyses, whose bases revolve around educational experiences that link the arts with playfulness to improve the development of motor skills for learning at early ages. The proposal is unprecedented and can be put into pedagogical practice in the first years of basic education, and can be improved with the use of alternative resources that

incorporate new playful experiences combined with different artistic techniques and languages.

This article is structured as follows: in section 2, a review of the literature and theoretical foundation related to artistic languages, play and motor skills is presented; in section 3, the methodological design and materials used in the quasi-experimental process are described; in section 4, the findings, descriptive analyses and the contrast of statistical hypotheses are detailed to demonstrate whether the differences in the enabled areas of the motor skills are statistically significant; Section 4 details the findings, descriptive analyses and the contrast of statistical hypotheses to demonstrate whether the differences in the enabled areas of motor skills between the control group and the experimental group are statistically significant; Section 5 includes the discussion of results; and Section 6 describes the conclusions derived from the research process..

2. Literature Review

This research is based on conceptual and theoretical elements from specialized sources related to motor skills and artistic languages which, in the case of infants, are communicative expressions that are developed through their oral and body language in a playful way.

2.1 Artistic languages

Artistic languages are an active part of children's daily lives and constitute a mechanism for creating, expressing and communicating feelings and emotions through artistic codes.

For Montaño (2020), "Artistic language refers to the communicative codes that an artist uses to convey his or her message. Part of that message is aesthetic, but it should also provoke feelings, reflection and other interpretations considered by the author" (p. 1).

In this sense, artistic language refers to a series of aesthetic codes, whose purpose is to transmit the oral and corporal message developed by the child in the different artistic manifestations supported by visual, gestural and sound signs, thus providing a space for free expression through art.

Regarding the natural expression of art in human beings, Azagra Solano & Giménez Chornet (2018) indicate that, "Among these expressions are contemplated drawing, painting, engraving and sculpture, and other more contemporary ones such as photography, video and digital media" (p. 73). In other words, visual and plastic expressions become a language of children's thoughts that are developed in appropriate learning environments of space and time, as a fundamental component that combines resources of dramatic expression, musical expression and scenic expression to favor the development of expression, appreciation and representation of ideas, spaces, emotions, sensations and, above all, of aesthetic sensibility.

Estévez and Rojas state that artistic languages are already present in the students' culture. It is shown, for example, that this is found in the memory of their communities, where the emotional and spiritual is lived in everyday life. This, in turn, allows them to develop creative behaviors according to their cultural and social diversity, which enables them to embrace nature, society and thought in three major spheres: knowledge, activity and education. Educating children with the arts from the earliest levels of training facilitates the psychophysical development that stands as a relevant condition of their future personality (Estévez and Rojas, 2017, p. 115).

Reading Acurio et al, play is considered as a basic element in the life of an infant, since it is the first element of communication through their own body; due to the fact that, body language is expressed through movement that favors the development of psychomotor skills. In addition, infants need to be active to grow and develop their abilities through play and it allows them to relate and interact with others for their integral formation. (Acurio et al., 2016, p. 13).

2.2 Play

Play is a recreational activity for the development of learning, as it allows children to improve interpersonal relationships through enjoyment, capable of releasing the expressive, creative and affective force. Bonilla mentions that playfulness should be properly conceived as a dimension of human development, that is, it has the same value or representation as any other area of development, since it is a need that all people have, to feel pleasant emotions that are performed with spontaneity and optimism, which emerge in daily personal interactions. Infants constantly need to use actions that are related to them, things that motivate them and awaken their emotions. By executing playful activities, they seek interaction with other children, bringing into play cognitive, affective and social functions in a constant exchange of learning and knowledge from an early age. (Bonilla, 1999, p. 47).

In this way, we see how playful activity generates an important influence on learning in students, since it constitutes one of the most effective tools in students at the preparatory level. For Domínguez (2015), this activity allows "to test and learn new skills, abilities, experiences and concepts, so it is convenient the application of programs aimed at a compensatory education, which provide emotional balance to the evolutionary development of childhood" (p. 15).

The application of artistic languages in a playful way consolidates learning at an early age and facilitates the protagonism of children in the construction of their own knowledge. For this reason, it is necessary the accompaniment of early childhood educators to provide an optimal environment in which the different activities of artistic expressions are carried out. These actions should awaken the interest and curiosity of the students and, in turn, should provide them with various learning experiences that contribute to the development of their skills. All this should be done as an act of recreation that contributes to the realization of actions in a free and spontaneous way, for their personal and social development.

Gómez Roldán (2005) states: "playfulness encourages the personality; it influences the culture of decision making; it develops a conciliatory, negotiating and strategic spirit in the face of conflictive situations; it articulates socialization, as well as teamwork" (p. 114). Through playful activities, logical thinking and collaborative work are developed, allowing for problem solving, reaffirming the values of their culture and participating in decision making from an early age.

2.3 Motor skills

Motor skill is defined by Guthrie (1998) as "the ability, acquired by learning, to produce intended results with the maximum of certainty and often with the minimum expenditure of time, energy, or both" (p. 189). (p. 189). Therefore, skill transcends movement as a simple action, which is oriented to the achievement of a goal that implies a direction and orientation of motor actions with a determined sense and intention.

With respect to motor skills, Serrano and Correa mention that the study on the validation of the Bruininks Oseretsky-BOT2- motor skills test in children from 4 to 7 years of age states that the development of the human being progresses as an integral whole and is composed

of mutually dependent areas, so that gross motor skills influence the child's ability to move actively. In the early years, the child acquires the maturation of basic postural and locomotor patterns and motor execution plans are developed that favor the improvement of movement (Serrano and Correa, 2014, p. 634).

Ruiz Pérez refers to basic motor skills, encompassing all possible actions in three sections or specific areas:

> Locomotor. Their main characteristic is locomotion. Among them we have: walking, running, jumping, galloping, sliding, rolling, climbing, etc.
> Non-locomotive. Their main characteristic is the management and control of the body in space. Examples of these skills are balancing, turning, backing up, hanging, etc.
> Projection/perception. Characterized by the projection, manipulation and reception of mobiles and objects. They are present in tasks such as throwing, catching, batting, catching, etc. (Ruíz Pérez, 1987, p. 1).

The concept of basic functions or neurofunctions is used to designate, operationally, certain aspects that children must have acquired before entering a school system in order to adequately face any learning process. Espinosa (2010) proposes 17 areas of neurofunctions, of which 8 areas are related to motor skills. Motor skills are the capacities of human beings to achieve the coordination of the movements of the limbs or body segments, which allows, in the case of students at the initial level, to achieve a motor objective. It is worth mentioning that, this is mostly achieved during development in the infant stage. (p. 3). On the other hand, researchers consider that a motor area is enabled in a child when speed and precision at the level of gross and fine motor skills have been developed; while the disabled motor area is considered to be the difficulty in the development of speed and precision at the level of gross and fine motor skills.

From another perspective, Almeida (2009) affirms that:

> Basic motor skills are those that allow us to change and develop the motor behavior of the human being through practice. It is necessary to reinforce the development and growth of gross motor skills for a better displacement of the body and in the future a better development of fine motor skills will be obtained (p. 1).

Taking into account that the research aims to demonstrate that the application of playful experiences with different artistic languages favors the development of motor skills, eight areas were selected from Espinosa's (2010) test of basic functions. In this regard, the Ministry of Education of Ecuador (2010) establishes the following conceptual definitions of the basic functions related to motor skills:

> Body schema: perform multiple actions while maintaining their body structure as a unit.
> Temporal orientation: location of the subject in time (hour, day, week, month and year).
> Spatial orientation: ability to recognize right and left sides with respect to the body axis.
> Dynamic coordination: wide movements with the gross parts of the body and harmonic and uniform movements of the hand.

> Manual expressive: the ability to couple body movements based on perceived auditory stimuli.
> Visual-auditory-motor coordination (rhythm): harmonic motor response to a visual or auditory pattern.
> Manual development: coordination of movements, directionality, sense of rotation, precision, continuity, prehension of the instrument.
> Visual-motor coordination: coordination between movement, space and time (pp. 4-6).

In this context, the playful-artistic experiences for the development of motor skills in the first years of life are important, because they allow children to be managers of their own adventure, to explore the things around them, to live intensely a state of curiosity, alertness, interest and amazement, conjugating through sounds, movements, smells, flavors that act on them as stimuli and source of constant concerns for their learning.

3. Methods and materials

The research design with a quantitative approach is quasi-experimental with a non-equivalent control group and pretest-posttest measures. The application of ludic experiences with different artistic languages to favor the development of motor skills in intact non-randomized groups, already formed in the six educational institutions, was studied through the analysis and contrast of hypotheses verified with the data observed through the non-parametric tests of Wilcoxon, Mann-Whitney and McNemar ranges for the before-after differences between the experimental and control groups and between these groups.

The independent variable is defined as artistic languages with the dimensions of appreciation and expression; four playful learning experiences were structured that fuse scenic, musical and visual-visual arts, adapted to the subjects and objectives of the study. The dependent variable corresponds to motor skills with two dimensions: gross motor skills (body schema and general coordination) and fine motor skills (digital skills and hand-eye coordination), which are classified into the eight basic functions defined in section 2.3.

After formalizing the informed consent, the study was carried out in a total population of three hundred and twenty-four infants, between five and six years of age, from six educational institutions located in different urban and peri-urban sectors of the city of Quito, within the framework of the theoretical and methodological assumptions appropriate to the objective.

The study population detailed in Table 1 was determined by the research team under considerations of feasibility and research objective. The collection units are intact groups, already conformed and non-equivalent, randomly selected, an experimental parallel and a control parallel for each educational institution.

EDUCATIONAL INSTITUTION	RESEARCH GROUP		TOTAL
	EXPERIMENTAL	CONTROL	
1	31	29	60
2	33	27	60
3	20	25	45
4	17	19	36
5	30	28	58
6	31	34	65
	162	**162**	**324**

Table 1. Study population

The first analysis was based on the application of the basic functions test adopted by the Ministry of Education of Ecuador to diagnose in children the situational state of the seventeen perceptual-motor areas that determine the learning of reading and writing, namely: body schema, lateral dominance, temporal and spatial orientation, dynamic coordination, visual and auditory receptive, auditory association, manual expressive, auditory-vocal closure, pronunciation, auditory sequence memory, visual-auditory-motor coordination (rhythm), visual memory, auditory discrimination, visuomotor coordination, manual development, attention and fatigue. (Ministry of Education, 2010, pp. 4-6). This process made it possible to identify eight specific areas related to motor skills and to recognize whether or not they are enabled.

Each measurement phase, before-after (*pretest-posttest*) of the playful experiences with artistic languages, consists of the application of the basic functions test in the students of the control and experimental groups of the six educational institutions.

According to the design proposed in Table 2, in order to test the central statistical hypothesis of the study, it is proposed that there is a significant difference in the enabled areas of motor skills between the experimental and control groups, with a confidence level of 95%. Thus, the following analyses were proposed:

DESIGN	GROUPS CONFORMED	PRETEST	EXPERIMENT	POSTEST
CUASI EXPERIMENTAL	EXPERIMENTAL	Measurement E1	Playful experience	Measurement E2
	CONTROL	Measurement C1	No intervention	Measurement C2

Cuadro 2. Diseño cuasi-experimental del método con lenguajes artísticos en los grupos de estudio

In the pretest phase, a first dichotomous distribution was determined, constituted by the results of each of the areas of basic functions evaluated -whether enabled (+) or disabled (-)-, and another distribution of the total of enabled and disabled areas that corresponds to the sum of the negative and positive areas with numerical values between 1 and 8, according to the total number of areas of the motor skills evaluated. To establish the baseline of the study, a descriptive analysis of frequencies was performed, determining the prevalence of enabled and disabled motor skills, both in the experimental and control groups of the six institutions.

According to the dichotomous distribution of the eight areas related to motor skills, to determine if there is a significant difference between the pretest and posttest measurement

in each experimental and control group of each institution, McNemar's test with 5% significance was applied to test this hypothesis.

To select the statistical model for testing the hypotheses, whether parametric or non-parametric, and to carry out the comparative analysis of the pretest and posttest phases of each group independently, and between groups, in the analysis of the variables of total areas enabled and of the posttest-pretest differences of the total areas enabled, the Kolmogorov-Smirnov (K-S) normality test was applied and was complemented with the analysis of homogeneity of variance of the distributions of these three variables with the Levene test to determine homoscedasticity (Badii, et al. , 2012, p. 139). Both tests with 95% confidence.

For hypothesis testing of the non-dichotomous distributions corresponding to the pretest and posttest totals of enabled areas, as well as the posttest-pretest differences of the experimental and control groups, based on the study of normality and homoscedasticity, the Wilcoxon and Mann Whitney Ranks tests were applied (Badii, et al., 2012, pp. 144-152).

To complement the criteria for the analysis of the data collected, a structured observation was carried out during the application of the play experiences in the classroom and after this process was completed, a survey was administered to the participating teachers and authorities of each institution. These instruments were previously validated by experts from other universities in the country.

4. Results

Based on the collection of data through the application of the basic functions test of the students who make up the experimental and control groups of the six educational institutions, the study focuses on the enabled areas related to motor skills (gross and fine motor skills).

The statistical analysis of the data was carried out in two stages: the first analysis to identify the prevalence of children who have enabled or disabled basic function areas related to the eight motor skills, before and after the play experiences with artistic languages. The second analysis of hypothesis contrast to check if there is a statistically significant difference between the posttest and pretest phases of each group by motor skills area, as well as the contrast of the posttest-pretest differences of the experimental group with respect to the differences of the control group.

Tables 3 and 4 summarize the data from the pre- and post-test application of the basic functions test, as well as their differences with respect to the areas enabled in the experimental and control groups in the eight motor skill areas.

MOTOR SKILLS AREAS	PRETEST				POSTEST				DIF-HABILIT.	
	DESHAB.	%	HABIL.	%	DESHAB.	%	HABIL.	%	POST-PRE	%
BODY SCHEMA	9	6	153	94	4	2	158	98	5	3
LATERAL DOMINANCE	143	88	19	12	119	73	43	2%	24	15
ORIENTATION	6	4	156	96	7	4	155	96	-1	-1
DYNAMIC COORDINATION	40	25	122	75	33	20	129	80	7	4
EXPRESSIVE-MANUAL	7	4	155	96	2	1	160	99	5	3
RHYTHM	144	89	18	11	114	70	48	30	30	19
VISUAL-MOTOR COORDINATION	112	69	50	31	79	49	83	51	33	20
MANUAL DEVELOPMENT	60	37	102	63	54	33	108	67	6	4

Table 3. Frequencies of enabled areas, disabled areas and posttest-pretest difference of the experimental group.

With respect to the areas of motor development that are disabled in the students of the experimental group (Table 3), the highest prevalence is presented in lateral dominance (88%), dynamic coordination (25%), rhythm (89%), visual-motor coordination (69%) and manual development (37%). With respect to the difference between posttest and pretest of habilitated areas, improvement is evidenced in all areas of the experimental group, except in orientation (-1%); but a greater increase is shown in the number of infants who have achieved habilitation in the areas of lateral dominance (15%), rhythm (19%) and visuomotor coordination (20%).

AREA-MOTOR SKILLS	PRETEST				POSTEST				DIF-HABILIT.	
	DESHAB.	%	HABIL.	%	DESHAB.	%	HABIL.	%	POST-PRE	%
BODY SCHEMA	5	3	157	97	2	1	160	99	3	2
LATERAL DOMINANCE	140	86	22	14	119	73	43	27	21	13
ORIENTATION	7	4	155	96	4	2	158	98	3	2
DYNAMIC COORDINATION	55	34	107	66	36	22	126	78	19	12
EXPRESSIVE-MANUAL	10	6	152	94	3	2	159	98	7	4
RHYTHM	135	83	27	17	122	75	40	25	13	8
VISUAL-MOTOR COORDINATION	107	66	55	34	104	64	58	36	3	2
MANUAL DEVELOPMENT	69	43	93	57	57	35	105	65	12	7

Table 4. Frequencies of enabled areas, disabled areas and post-test-pre-test difference of the control group.

In the control group (Table 4), the areas of disabled motor skills with the highest prevalence of students in the pretest coincided with those of the experimental group: lateral dominance (86%), dynamic coordination (34%), rhythm (83%), visual-motor coordination (66%) and manual development (43%). From the analysis of the difference between posttest-pretest of areas enabled in the control group, positive proportions are recorded in all areas of motor

skills, with an increase in the prevalence of students who have managed to enable the areas of lateral dominance (13%) and dynamic coordination (12%). These increases are lower than those achieved by the experimental group in lateral dominance, rhythm and visual-motor coordination, but not in dynamic coordination, where the control group presents a higher prevalence.

As can be seen, both the control and experimental groups of the six institutions analyzed present deficiencies in the same areas evaluated. This suggests that, being non-random groups, the conditions of development of the basic functions are comparable among these groups. It is important to note that the basic functions test allowed the identification of other critical areas that show negative levels of development, which are not directly related to motor skills, but still require study.

Prior to the selection of the statistical tests to demonstrate whether the differences before and after in the experimental and control groups are significant, normality (Kolmogorov-Smirnov K-S) and homoscedasticity (Levene) tests were applied to the distributions of the three variables: pretest total of skilled areas, posttest total of skilled areas and the posttest-pretest difference of the total of areas. According to the asymptotic significance values of these distributions, it is concluded that all the distributions of these variables differ from normal, according to the K-S test. On the other hand, the distributions of the variables pretest total of enabled areas and the *posttest-pretest* difference of total enabled areas, have asymptotic significance values higher than 0.05 with Levene's test (0.663 and 0.912 respectively), which proves homogeneity of their variances.

As a consequence of the previous analysis, nonparametric statistics were applied to check if the differences are significant between pretest total enabled areas, posttest total enabled areas and the posttest-pretest difference of the total enabled areas of the experimental and control groups. According to McNemar's asymptotic significance values (Badii, et al., 2012, p. 143). seen in Table 5, the posttest-pretest differences of the experimental group are significant at 5% in the areas of lateral dominance, rhythm and visuomotor coordination. In the other areas analyzed, although positive differences are observed, they are not statistically significant.

POSTEST-PRETEST	Cases	Chi-square	Sig. Asymptotic	Exact significance (bilateral)	Exact significance (unilateral)
BODY SCHEMA	162			,267[c,1d2]	,133[c]
LATERAL DOMINANCE	162	11,021	0,001	,001[c]	,000[c]
ORIENTATION	162			1,000[c,d]	,500[c]
DYNAMIC COORDINATION	162	0,8	0,371	,371[c]	,186[c]
EXPRESSIVE-MANUAL	162			,180[c,d]	,090[c]
RHYTHM	162	18,283	0	,000[c]	,000[c]
VISUAL-MOTOR COORDINATION	162	18,618	0	,000[c]	,000[c]
MANUAL DEVELOPMENT	162	0,357	0,55	,550[c]	,275[c]

Table 5. McNemar hypothesis test for posttest differences for each area related to motor skills in group experimental

[1] c= Binomial distribution used.
[2] d= Continuity corrected.

The McNemar hypothesis test with the control group, summarized in Table 6, shows that the pretest-posttest differences of the control group are significant in the areas of lateral dominance and dynamic coordination with 95% confidence. In the other areas, the differences are not statistically significant.

POSTEST-PRETEST	N	Chi-square[e3]	Asymptotic Sig.	Exact significance (bilateral)	Exact significance (unilateral)
BODY SCHEMA	162			,453[c,4d5]	,227[c]
LATERAL DOMINANCE	162	8,511	0,004	,003[c]	,002[c]
ORIENTATION	162			,508[c,d]	,254[c]
DYNAMIC COORDINATION	162	6,113	0,013	,013[c]	,006[c]
EXPRESSIVE-MANUAL	162			,092[c,d]	,046[c]
RHYTHM	162	2,717	0,099	,098[c]	,049[c]
VISUAL-MOTOR COORDINATION	162	0,056	0,812	,813[c]	,406[c]
MANUAL DEVELOPMENT	162	1,833	0,176	,175[c]	,088[c]

Table 6. McNemar hypothesis test for posttest-pretest differences for each area related to motor skills in the control group.

When comparing the post-test differences of the experimental group with the differences of the control group, positive percentage values are found that correspond to a significant increase in the proportion of students in the experimental group that have achieved the areas of visual-motor coordination (18.5%) and rhythm (10.5%), to a lesser degree, lateral dominance (1.9%) and body schema (1.2%), surpassing the control group. The negative differences indicate the areas in which the control group outperforms the experimental group, but values of lesser magnitude are evident, the most relevant increase being (7.4%) in dynamic coordination.

In accordance with the previous analysis, to determine the difference between the pretest and posttest related groups in the total of enabled areas, the Wilcoxon rank test at 5% significance was used.

	POSTTEST TOTAL QUALIFIED AREAS - PRESTEST TOTAL QUALIFIED AREAS
Z	-5,628[c6]
Asymptotic sign (bilateral)	,000

[3] e= Continuity corrected
[4] c= Exact results are provided for this test instead of Monte Carlo
[5] d= Binomial distribution used
[6] c= It is based on negative range

Table 7. Wilcoxon hypothesis test for the differences of the total enabled areas of the posttest and pretest of the experimental group

According to the results of Table 7, the asymptotic significance with the Wilcoxon rank test shows that there is a significant difference between the posttest and pretest of the total areas enabled. Since the total positive differences (53.64%) are higher than the negative ones (40%), it can be affirmed with 95% confidence that, in the experimental group, the areas of motor skills enabled in the posttest exceed the pretest by 13.64%.

	POSTEST TOTAL AREAS HABILITADAS - PRESTEST TOTAL AREAS HABILITADAS
Z	-4,341[c7]
Sig. asintótica (bilateral)	,000

Table 8. Wilcoxon hypothesis test for the differences of total enabled areas of the posttest and pretest of the control group.

The asymptotic significance of less than 0.05 shown in Table 8 with the Wilcoxon signed-rank test demonstrates that there is a significant difference between the posttest and pretest of the total enabled areas. Therefore, the total positive differences are higher (59.24%) compared to the negative ones (50.21%) and it can be affirmed that in the control group, the areas of motor skills enabled in the posttest exceed the pretest with a confidence level of 95%.

From the general analysis carried out with the data of the 324 students of the six institutions studied and according to the differences found, it is shown that the students of the experimental group achieve an increase of 13.64% in the total areas enabled with the applied ludic experiences, surpassing the control group that achieves 9.03% with the conventional method.

The Mann-Whitney test was applied to contrast the post-test differences between the experimental and control groups with 95% confidence.

The asymptotic significance of 0.359 obtained with the Mann-Whitney test (Table 9), confirms that there is no statistically significant difference in the differences in the total areas enabled between the experimental and control groups, with 5% significance.

	cPOST-PRE-TEST DIFFERENCE ENABLED
cMann-Whitney U	12373,000
cW de Wilcoxon	25576,000
Z	-,916
Asymptotic sig. (bilateral)	,359

Table 9. Mann-Whitney U hypothesis test for the difference of the control and experimental groups posttest-pretest corresponding to the enabled areas.

[7] c= It is based on negative ranges

When compared with the result of the Wilcoxon rank test (Table 8), which showed an overall increase of 13.64% in the areas of motor skills enabled with the experimental method, which surpassed the control group that achieved 9.03%, this small difference of 4.61% in the total scores of the experimental and control groups is not significant, according to the results obtained with the Mann-Whitney test (Table 9).

Finally, with the analysis of the data obtained from the survey applied to the teachers who participated in the study, they state that they do not know the theory that supports the applied process and do not have the practical experience to carry out activities with artistic languages in playful environments. In some cases, they carry out activities only as a practice of art for art's sake.

Among the factors that may have influenced the results achieved, we can point out the lack of adequate spaces for the application of the artistic playful experiences, the number of children in each class, the participation of the teachers of the groups studied, as well as the preparation of the pre-professional practice students who supported the execution of the research in the different children's centers.

5. Discussion of results

The data obtained allowed the identification of the level of development of motor skills in the following areas in the population studied: lateral dominance, dynamic coordination, visual-motor coordination, visual-auditory-motor coordination (rhythm) and manual development. The prevalence of these deficit areas fluctuates between 25% and 89% of the study population. The starting point was the evaluation of the levels of development of the basic functions and specifically of the motor skills necessary for pre-writing and reading of the students. In this regard, Quiles-Ros (2013) states that the results of the motor skills tests as a function of academic performance confirm the hypothesis that students with high academic performance score in all motor tests above 4.40, while students with low academic performance at most reach 3.75 out of 10 points. These data indicate that there could be a relationship between motor skills and learning (p.12).

Da Fonseca (1996), in his study explains the basis of motor development and the neuropsychological explanation of movement. He states that the relationship between motor skills and movement and their quality reflects the maturity of the central nervous system, concluding that, if movements stimulate the maturation of the central nervous system, children who do not have adequate or good quality motor skills will therefore have an immature central nervous system, which will undoubtedly interfere in their learning process. In turn, this will lead to poor academic performance (p.12). In this sense, the study of artistic languages promotes movement and rhythm by stimulating the nervous system in order to develop in children the motor skills necessary for reading and writing, aesthetic sensitivity and creative thinking.

The study by Díaz and Vargas (2009) suggests that participating in a motor intervention program, structured with a pedagogical style that stimulates physical activity, benefits gross motor development, both in the locomotion component and in the manipulation component. Although this does not have a significant effect on academic performance and creative thinking in preschool children (p.13). In this regard, the development of artistic experiences through play allowed not only motor development, but also stimulated creative thinking with the manipulation of concrete material for a staging.

The teachers of the different educational institutions that took part in the study stated that, during the process, different activities were carried out that combined playfulness with

artistic languages, which allowed them to merge the different activities with movement, that is, with free body expression -or performance-, through rhythm and song melodies. Also through the development of plastic activities, shadow theater activities and black light theater, where children expressed their creativity playfully. All this results in fun and, therefore, a more dynamic and harmonious motor development, which allows children to approach aesthetic sensitivity and creative thinking.

The didactic programming of the proposal was based on the conjugation of artistic playful experiences with an art for all approach, oriented to the development of the motor skills that make up the basic functions necessary for the learning of reading and writing. These experiences aroused the interest of the participating teachers to put them into practice with their students, taking into account that micro-curricular planning, the design and elaboration of resources and didactic materials in a participatory way, as well as the plastic, musical and scenic expression of children, are key and catalyzing elements in the remedial sub-level of basic general education.

6. Conclusions

The initial finding has to do with the diagnosis of the level of development of the basic functions essential for learning to read and write, and refers that more than 50% of students are not enabled in the areas of auditory discrimination, visual memory, visual-motor coordination and pronunciation. In addition, visual-auditory-motor coordination (rhythm), lateral dominance and auditory sequence memory exceed 80% of students aged around 5 years, which prove to be disabled. These results suggest analyzing the particularities of the urban and peri-urban children's centers studied, as well as the development of learning in the initial sub-level, which precedes the preparatory level.

Considering that the diagnostic test or pretest was applied in the middle of the school cycle, it is inferred that, at least during the first trimester, the high school teachers developed the teaching and learning process with conventional methods, which allowed them to reach a certain degree of development of the basic functions of their students, according to the figures of the initial diagnosis.

The basic functions associated with the development of motor skills that the students, both in the experimental and control groups before the research process, did not have in the greatest proportion, were lateral dominance, dynamic coordination, visual-motor coordination, visual-auditory-motor coordination (rhythm) and manual development. The prevalence of these deficit areas fluctuates between 25% and 89% of the study population.

When considering the total scores of the basic function areas that are enabled (positive) and disabled (negative), the statistical distributions of the experimental and control groups are asymmetric or skewed, and do not meet the characteristics of a normal distribution, according to the Kolmogorov-Smirnov normality test and Levene homoscedasticity; therefore, this allowed defining the application of non-parametric models for the hypothesis testing of the study.

It was demonstrated that the differences between posttest and pretest of the control group are significant in the areas of lateral dominance and dynamic coordination. In the experimental group, the differences were found to be significant in the areas of lateral dominance, rhythm and visuomotor coordination, with McNemar's test at 5% significance.

From the general analysis carried out with the 324 high school students from the six institutions studied and according to the post-test differences found, an increase of 13. 6%

in the prevalence of students in the experimental group that have the areas of motor skills enabled compared to the control group that achieves 9%, showing that the play activities with artistic languages favor the development of gross and fine motor skills, necessary for the reading-writing process, also observing that this process promotes the free and spontaneous expression of the children for their better personal and social development.

The general difference of 4.6% found between the experimental and control groups of the six educational institutions, according to the analysis performed with the Mann-Whitney test, is not statistically significant with 95% confidence, however, there is evidence of a variation in the differences between institutions, which suggests an analysis of other associated factors.

In general, it was statistically proven that, with the application of playful experiences with artistic languages in the experimental groups, a better development of motor skills is achieved in the areas of lateral dominance, visual-auditory-motor coordination (rhythm) and visual-motor coordination, compared to the control groups in the high schools.

Acknowledgments

It is important to highlight the collaboration of six practicum students from the Early Childhood Education program at UCE, who helped in the preparation of the didactic resources and execution of the experimental process of the study.

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