Physical Education in the Early Childhood: A Perspective of Investigation in Education from the Neuroscience

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ABSTRACT

In this study the main purpose has been to evidence the importance of Physical Education in Early Childhood Learning as a source of research in education from the perspective of neuroscience. Students, when initiating the process of education and learning, are in a constant training and building of knowledge. In this way, Physical Education contributes to the process of research in education: as evidence of social and ethical personal development, and addressing the holistic education of children in physical, cognitive, emotional and social aspects. With this approach, Physical Education is related directly to the perspective of neuroscience, by means of recreational activities and actions of daily movements that are based on the basic concepts necessary for living.

Key words: Physical Education, Early Childhood Education, Neuroscience.

1. INTRODUCTION

When we talk of education we refer to the idea of forming people capable of living in the society to which they belong. That can be reduced to different fields of life; in this case at school level. Educating another person is not a simple task, and as a result there have always been those tasked with training others for the role defined as teacher, educator and professor amongst others. It is they who are responsible for contributing to the growth of knowledge that comes with life. In order to teach, a certain level of training is needed, as well as knowing the students and understanding their development and what can be done to drive the process along.

Early childhood is a special period in human development, where the building of knowledge prevails along with the development of memory and learning, and the command of cognitive and motor skills. There are several stages in schooling, the first being the initial, known as pre-school which is very recent in Colombia and has taken off since the end of the 20th Century. At first, orphanages were created which were populated by children between 0 and 7 years of age who were not raised at home and there was little semblance of the notion of education; a child was simply raised. However, midway through the 20th century private school centers were born, and in 1962 institutions appeared designed to attend to the needs of early childhood, giving as a result in 1976 (by means of Article 4 of the Decree 088), the stipulation of school education with the aim to stimulate the physical, affective, spiritual and social development of children, in joint action with parents and the community [1].

In 1994 obligatory preschool education was declared through Law 115 Articles 15 to 18, promoting holistic education in children under 6 years of age. In this way education in early childhood has had the aim of improving the development of both boys and girls in accordance with his or her characteristics, capacities and skills. At the same time, it has sought to immerse the students in their cultures and societies, complementing the education received in the home. On the other hand, “the holistic education in the framework of early childhood means to recognize girls and boys in the exercise of his or her rights, knowing his or her attributes, interests, tastes and needs, and to attend to them” [1]. For this reason, activities for children under 6 years of age must consider the stage of development and the intentionality that should exist within each stage, thus improving a holistic and harmonic education. In this stage of life educators must observe and listen to students so that they can create pedagogical guidelines born of the interests and tastes of children, allowing actions and intentional spaces in order to improve the activities that guide early childhood.

Thus these guiding activities in early childhood have been adopted by the Ministry of National Education. Examples are: games, art, literature and the exploration of the child’s environment, all of which aim to provide an adequate development for children, grounded in their holistic formation. Within this sphere we can relate games and the exploration of the environment to a corporal dimension. Currently, a holistic development of people is being sought but a special emphasis has been placed on promoting physical care and other related work, challenging people to change their lifestyles and to participate more in physical activity with the result being the benefits that this brings about in each person.

The WHO [2] defines physical activity as any corporal movement produced by the skeletal muscles with the consequent consumption of energy, which includes activities realized when working, playing and travelling, along with domestic tasks and recreational activities. Along with the gains that this has, the WHO [2] mentions that it improves the cardio-respiratory state and osseous health, the muscular state and it prevents illnesses such as hypertension. These advantages can provide a longer life taking into account that it improves in varying ways depending on age; particularly in the stages of childhood and youth it improves growth and good health. Boosting physical activity in the aforementioned ages is of key importance and those responsible for it are schools and families; however, there is little information on how to promote it in children under 5 years of age.

The corporal dimension is being fostered at school level via Physical Education, which, in accordance with that stipulated at national level in preschool grade, must be obligatory and taught by the teacher who teaches all subjects; at baccalaureate there now must be a Physical Education teacher. Preschool education in most schools, especially public schools, covers all areas including Physical Education, and in many cases this education does not have a foundation or an implication in the life of the students, because of the lack of knowledge on the part of the teachers who are not able to adapt education towards physical activity, especially in early childhood.

This shortage of knowledge on the part of teachers to tackle the theme reduces the importance placed on this activity and it in turn becomes monotonous, not giving the children the opportunity to explore the maximum potential of their bodies. Children do not make the same advances as they do in other subjects that are considered as the basis for their lives. Therefore, Physical Education becomes part of the holistic formation of children: a constant process of adaptation, interaction and construction of images, diagrams and corporal expression. Through Physical Education, children can express themselves with their bodies,. The body allows children to learn and explore the world, to establish relations with others and their environment. This experience of the body, according to Baecker [4] opens the door for children to learn about concepts and actions, to develop their independence, self-consciousness and the individuality and cognitive maturity of perception and artistic configuration. The WHO [5] mentions that 19% of children in the world receive sufficient Physical Education in schools.

With this preamble, it is important to mention neuroscience within educational and academic activity as an element that relates emergent capabilities to the plasticity of the brain in the different stages of life. In this sense and for this work, it is considered that the measure in which children participate in activities designed for Physical Education provides a learning experience that effects change in the physical structure of the brain, allowing it to organize and reorganize itself. Likewise, it is possible to think that a child's learning stages are different despite having the same age, whereby their brains begin to mold themselves according to each and every experience that reinforces their development.

Folino [6] has proposed that the brain expresses in a model that integrates the neocortex (right and left hemispheres) with the limbic system and it groups capacities in quadrants, which permit a study on how the brain functions in the development of creativity and learning. *Table 1* below presents the capacities of each one of the lobules in the learning process in people.

Table 1. Capacities differentiated for each lobule of the brain according to its location.

Cognitive appearance	Visceral appearance
Upper left lobule (Quadrant A) Logical, qualitative, critical, mathematical and analytic thinking	**Upper right lobule (Quadrant D)** Style of conceptual thought, holistic, integrative, global, synthetic, creative, artistic, visual and metaphorical approach
Inferior left lobule (Quadrant B) Style of sequential, organized, planned, detailed and controlled thought	**Inferior right lobule (Quadrant C)** Style of emotional, sensitive, humanistic, interpersonal, musical, symbolic and spiritual thought

According to De Souza Martins and Posada-Bernal [7], and Sanvito [8], learning occurs through cognitive memory. Via the process of perception and cognition, the brain translates external and internal stimuli, and manipulates the symbols expressed by pictures or representations. Taking a child's knowledge of several experiences in an integrated manner at the same time stimulates perception and facilitates their understanding within the learning process.

In this sense, and in the process of learning, perception and memory, according to Sanvito[8], consists of three steps:

- *First Step* – occurs the register or reception of the information registered by means of the senses.
- *Second Step* – produces the maintenance or the consolidation of information, the storage of information in a more notable way, in the long term memory.
- *Third Step* – occurs the recovery of contained information, stored in the memory through perception.

In this sense, for De Souza Martins and Posada-Bernal [7], the development of holistic formation in children through Physical Education related recreational activities in Preschool Learning consists of a pedagogical cognitive model that contains history, curiosity, origins and the gains from the activity according to the stages in neuroscience learning.

- Step 1: *perception and apprehension* – the teacher presents a summary of the game or activity that will be performed and the useful information that can generate one or more questions on the subject.
- Step 2: *comprehension and explanation* – after the interaction of the game or activity, the teacher tries to formulate a question guide for the children, and obtaining a response, develops a model to interpret the solution and make use of other daily activities.
- Step 3: *signification and modeling* – after the children's experience in the practice of the activity, it seeks to build a model, an association of ideas and meaning to what has been learned. The teacher gathers the children together for a conversation in order to determine whether the learning was effective.

2. METHODOLOGY

A study was elaborated on art with diverse bibliographic sources and antecedents presented in databases, within which stand out authors such as Carter [9]; Ratey[10]; Kovácks[11], Folino[6] and Sanvito[8]; those who guide the development of their concepts on learning with an approach directed towards neuroscience. This review is oriented towards the perspective of current Physical Education and its evolution from the theory of the neuroscience. Data on academic investigations was reviewed identifying and recognizing recent studies on similar subjects related to this investigation. Once the theoretical information on the relation of Physical Education in early childhood together with neuroscience was found, an activity was carried out with children ranging from 4 to 5 years of age, teaching them a series of "Nursery Rhymes", to which for this analysis the three steps posed by Sanvito were observed [8].

An example of application: "Nursery Rhymes"
How to play? In this traditional musical game, the children form a circle whilst holding hands and singing popular melodies. All the participants should join hands with their classmates and form a big wheel; in addition to singing the song and walking in circles, the children can perform gestures with their bodies, with their hands and feet, sitting down, jumping and embracing each other.

What are the gains? This activity allows the children to develop geometrical concepts (circles) working within a physical (socialization, affectivity and coordination) and health orientated education (aerobic resistance).

What is its history? It is a big traditional expression and its origins trace back to the emergence of human civilization. It registers drawings of circles from the Stone Age, as also practiced in rituals in Asia, Africa, Europe and America. At present, they are still exercised by some ethnic groups that conserve their ancestral culture with simple melodies and different rhythms, which favors an immediate assimilation between children.

How to teach it?

Stage 1: Perception and Apprehension

A - The teacher shows the children the activity "Nursery Rhymes", using as an example popular music, and forming a circle in group together with the children.

Figure 1– "Nursery Rhymes" [12]

B - In the circle, the teacher walks together with the children to the right or to the left, and starts to sing simple songs so that the children follow the words and the rhythm.

C – Before starting the activity, the teacher together with the children performs some bodily exercises that are used in this activity (affectivity, socialization and coordination). These exercises serve as a warm up for carrying out the activity.

Stage 2: Comprehensión and Explanation

The teacher asks the children the following: What geometric shapes are you making? What sizes of the geometrical shapes can you make? Are there other geometric shapes that you can make in this activity?

After explaining all the rules of the activity, it begins with some music and in the group the children perform all the bodily movements in the activity. In the second stage, the children are encouraged to perform by themselves, allowing them to create their own movements and songs.

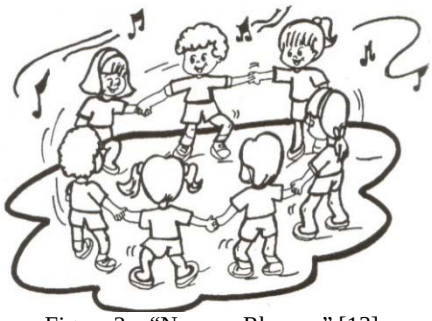

Figure 2 – "Nursery Rhymes" [13]

Stage 3: Signification and Modeling

The teacher asks the children: What geometrical shapes did you make in the activity? Which did you like the most? Which bodily movements did you like the most?
At this stage, the teacher has to verbally remind the children of the numerical mathematical concepts. The teacher orients the children towards making a drawing of the activity. Let's draw about our musical activity!

3. RESULTS

In the activity "Nursery Rhymes", the children developed the geometrical concepts of a circle as the union of all the children hand in hand allowed them to obtain the idea of circumference. The activity also exercised affectivity, socialization and coordination, promoting aerobic resistance, benefiting the health of the children. The drawing in *figure 3* was elaborated by a three year old boy, that in *figure 4* by a four year old boy and that in *figure 5* by a five year old girl.

Figure 3

Figure 4

Figure 5

Drawing is a form of representation and an expression of language, explaining how children perceive their environment and also how they express their imagination and ideas. Thus, drawing is integral to this holistic activity, relating to the perception of how children see, think and build their world.

From the drawings it is possible to identify that the children represent their perceptions from different angles, given that one looked from above, another from below and another from the side; they present their ideas and representations of the experience from differing spatial orientations. For Gardner [14], through creating and re-creating expressive forms, and integrating perception, the imagination showed reflection and appropriate sensitivity by means of a lived experience by the child. Carter [9], Ratey[10], Kovácks[11], Folino[6] and Sanvito[8] highlight that independent of the stimulating situation, in a process of learning there always will occur a cognitive structuring by means of the senses. In this way there exists an understanding from the perceptions gained during an experience, increasingly expanding learning and knowledge.

The theory of neuroscience has been demonstrated as an alternative for holistic formation in children in Physical Education in early childhood, understanding that knowledge builds itself from a child's perceptions and actions mediated by the mental structures already built in other areas of knowledge. At the same time, Physical Education in the 21st Century is oriented towards the development of social, human, technological, constructivist and cognitive dimensions.

4. CONCLUSION

From new tendencies in Physical Education arise the need to reconsider the principle of the Physical Education teacher with respect to the analysis and reflection of experiences oriented towards key learning in children.

To give continuity to this investigation, the suggestion is to promote strategies that will contribute to the restructuring of the pedagogic and curricular plans in early childhood Physical Education.

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