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Playful activities in the learning of geometric notions in children of initial, Callao

Carla Marilia Ayala Valladares[a], Juana María Cruz Montero[a,*], Angel Saldarriaga Melgar[a]

[a]Universidad Cesar Vallejo, Lima, Peru
*jcruzmo@ucv.edu.pe

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Resumen

La investigación tuvo como propósito principal determinar los efectos del programa de Actividades Lúdicas para el aprendizaje de la geometría en niños de cinco años en todas sus dimensiones orientación y localización, formas geométricas y medida, a través de sus componentes: ubicación en el espacio, identificar localizaciones y posiciones de los objetos, identificar y caracterizar figuras geométricas y comunicar las cualidades de estas, así mismo identificar, clasificar magnitudes y utilizar diversos instrumentos de medida. El tipo de investigación fue aplicado, con un diseño cuasi experimental, la población estuvo constituida por 103 niños, y se utilizó un muestreo no probabilístico por conveniencia con una muestra de 51 niños, divididos en dos grupos control y experimental. Se utilizó el instrumento de geometría para recoger información. Se determinó el efecto favorable del programa de actividades lúdicas en el aprendizaje de nociones geométricas en niños de inicial - Callao, 2018.

Palabras clave: Lúdica, nociones, geometría, aprendizaje.

Abstract

The main purpose of the research was to determine the effects of the program of ludic activities for the learning of geometry in children of five years in all their dimensions orientation and location, geometric shapes and measurement, through its components: location in space, identify locations and positions of objects, identify and characterize geometric figures and communicate the qualities of these, likewise identify, classify magnitudes and use various measuring instruments. The type of research was applied, with a quasi-experimental design, the population was constituted by 103 children, and a non-probabilistic sample was used for convenience with a sample of 51 children, divided into two control and experimental groups. The geometry instrument was used to collect information. The favorable effect of the program of playful activities in the learning of geometric notions in children of initial - Callao, 2018 was determined.

Keywords: Playful, notions, geometry, learning

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1. Introduction

The Ministry of Education in Peru in order to improve learning in mathematics the results of the International Student Assessment. "Peru is at level one of the six performance levels evaluated. In the country, 66.1% of the students do not reach this level, but it is also classified as one of the last places in these tests ". (MINEDU, 2017, p.69).

The playful is an important resource in the initial classrooms that students enjoy in the moment of experiential and motivating learning. Barrera and Reyes (2018) described the theory of play situations is based on addictive situations which are presented in a playful context and is not related to the intention of teaching, the teacher does not respond to students what will be learned, Through the reflections of the students, as well as learn the mathematical concepts that arise from the processes and actions carried out by students for a construction of more complex and structured meanings. On the other hand, Van and Broadheadh (2016) state that play activities directed by the teacher can play when the space is confirmed, encourages student autonomy and fulfills its role as counselor, in this way the autonomy of the student is recognized. In the study of, Figueroa (2016) a study was made on the mathematical games like strategy to develop apprentices of geometric figures of identification, where 69.82% of the children are in the level, similar condition in the study of, Panduro (2015) who applied educational games, arriving that the children that conform the experimental group obtained favorable learnings.

The geometry notion in the child is reflected in the exploration of objects, to be able to construct their concepts about the forms, positions and relationships between them, likewise to use the geometric notions to be able to understand and understand the position of the objects that surround them. NCTM (2015) support that geometry and measurement seeks that children begin to develop the capacity to structure the space and the objects of their context mentally, allowing the development of mathematical reasoning as well as the development of the Thinking skills and critical thinking in solving problems.

With respect to orientation and location refers to the set of knowledge and skills so that the subject can be organized in space. Castro and Castro (2016) add that geometry is immersed in the capacity of orientation and spatial localization, geometric shapes and measurement. The first capacity is based on the capacity that the person has in relation to the construction of mental maps. The development of this orientation and location will be beneficial according to the organization of the space that the mother or the teacher will adapt. They also support that the learning of this ability occurs from 3 years where the child is able to establish the location of objects from the relationship with their own body. After 4 years the child begins to develop more accurately the notions of proximity and distance, also recognizing geometric shapes but can not represent them from 4 years the child already begins to have a geometric awareness and begins to draw a square taking into account its sides and can explain and classify different geometric shapes.

Regarding the contributions of Castro and Castro (2016), the teaching role is to help students to construct new definitions and procedures about their previous learning and to reflect on the acquired learning. However Gonzales and Weistein (2016) base that the work In the school for the student is to expand, organize and systematize the spatial and geometric knowledge in the relationship with its environment and objects. In addition, students must be prepared to face and adapt to the different changes that occur in reality, build their own ideas and opinions, and thus

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be part of a culture where understanding, critical analysis and reflection have relevance. Castro and Castro (2016) expressed that teachers must be able to take into account the child's experiences and take advantage of them, as well as to know the child in all its aspects since the external factors (space, materials, time) could influence learning.

The theory of playful situations of Brousseau, is based on the production of mathematical knowledge, he explained that mathematical knowledge is built from recognizing, addressing and solving problems, where students will build their learning freely and spontaneously, within the 4 phases: situation of action, formulation situation, validation situation, institutionalization. Regarding Barrera and Reyes (2018) explain these four phases: In the first the teacher proposes the rules of play and exemplifies then asks students to play in pairs, in the second the students realize that it is necessary to discuss and discuss the possible strategies, in the third the teacher invites to express the resolved conjectures and write them down on the blackboard, if the conjecture is accepted it remains on the blackboard otherwise it is deleted and finally the teacher must clarify what was the purpose of the task the terms or mathematical concepts were developed and defined.

The game is the field where the child develops his personality, his learning and skills for his future life. Brinnitzer et al. (2015) define that the game is a resource when it has a specific objective that is linked to a content in the learning sessions. The game is a manifestation of the cognitive level of children, is built through interaction with the environment, assimilation and accommodation. It involves meta cognitive processes and the ways of thinking of the child, promoting new schemes.
The game allows the child to develop different abilities and abilities in terms of the physical, cognitive and social. When we talk about physics, we refer to the fact that it will allow us to develop gross motor coordination such as reaching, crawling, running, jumping, throwing, grabbing, balancing, etc. And the fine motor coordination since through the manipulation of the objects and the exploration of these they will use their hands and fingers. When we talk about the cognitive we refer to that through the game will allow the solution of problems, knowledge of objects and the world around them, as well as language.

2. Material and methods

The research presents a quantitative approach, since the study responds to a previously developed scheme that goes from the approach of the problem to the conclusions, going through the theoretical foundations, the hypothesis and the methodical aspects. Hernández, Fernández and Baptista (2014), The type of research responds to the applied since it is a material for application directed to the teacher who works with children of 5 years in relation to the teaching-learning of geometry and playful activities, because He used as a main element of data analysis the statistics applied to educational research, solving a problem. In this regard Hernández, et. al (2014) stated that the exploratory studies aim to check trends, identify environment, areas and the environment in research situation, relations between variables and contribute to subsequent ones, under the hypothetical deductive method and a specific quasi-experimental design, formed by 53 children of five years of Educational Institution No. 84 "Niña María", consisting of 2 intact groups, to whom the instrument of geometry composed of 27 items and 3 dimensions, the first of orientation and location were applied composed of 9 items, the second of geometric shapes having 9 items and the third measuring 9 items, put to reliability using the Cronbach's Alpha test whose result was 0.953. We can say then that this instrument

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has an acceptable degree of reliability Hernández et al. (2014), and then be processed in the SPSS v24 under the scales and the corresponding categories.

3. Results

The data analysis was performed by the nonparametric statistic for independent samples of U Mann Whitney, and the results were represented in boxes and whiskers diagrams to identify the difference between the medians of each group.

Regarding the descriptive analysis of Figure 1, it can be seen that the Control Group (CG) obtained 23.1%, at the beginning level and 76.9% at the process level, while the Experimental Group (EG) obtained a 20%. % at the beginning level and 80% at the process level, demonstrating that they are in the process of developing the geometry variable.

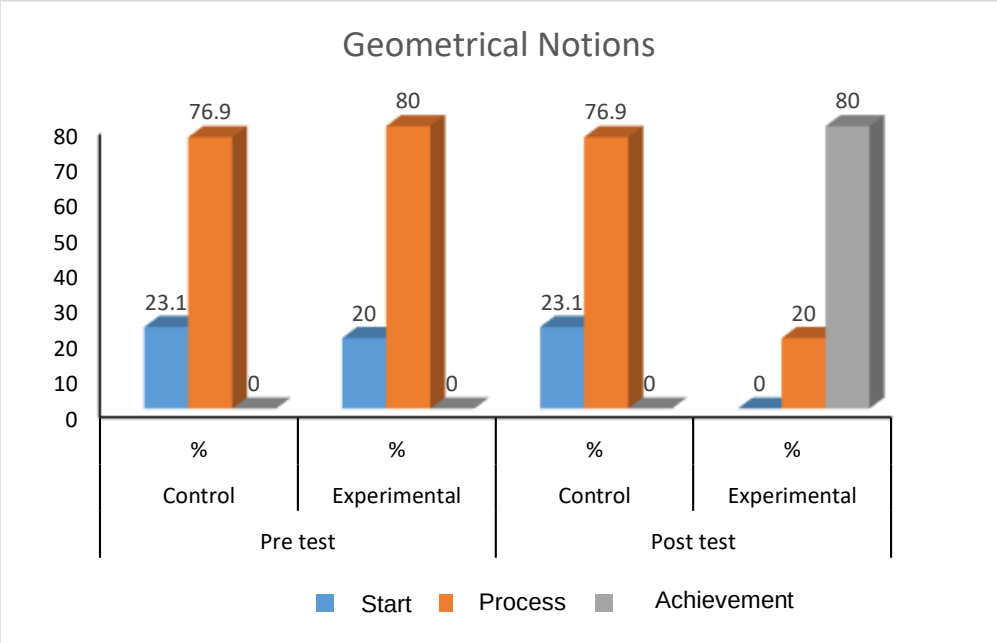

Figure 1 Percentages in pre-test and post-test measurements of the control and experimental groups of the notion of geometric concepts of 5-year-old students.

However, in the Post test measurement in the variable geometry table 1, it can be seen that the CG obtained 23.1% in the beginning level and 76.9% in the process, while after applying the program it can be seen that the EG obtained a 20% in process level and an 80% in level achieved, which present a development in the notion of geometric concepts.
To compare the initial and final results of both groups CG and EG in the learning of geometric notions, the non-parametric "U Mann Whitney" test was applied to independent samples, showing that there are no significant differences, at the level of CG and EG, such and as shown by the medians reached, 48.08 and 47.96 respectively, both groups are in similar conditions. (Table 1).

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Table 1. Estimation of the contrast statistic to determine the level of bilateral significance of the notion of geometry, before and after the application of the program, using the Mann Whitney U coefficient

Statistics	Groups	
	Control (n=25)	Experimental (n=25)
	Pre Test	
Median	48,08	47,96
Desv. típ	5,614	6,208
	Post Test	
Median	49,35	69,32
Desv. típ	6,474	5,023
U de Mann Whitney test	0,970	0,000

However, after the application of the program of recreational activities the final results in the notion of Geometry for both groups are different, that is, finding very distant results. The CG obtained a median of 49.35, and the GE a median of 69.32; with this it was evidenced that the experimental group improved notably in the variable Geometry, as a consequence of the effectiveness of the program. On the other hand, it was observed that there are no significant differences in the CG, in the before and after as the medians remained similar at both moments 48.08, and 49.35. Finally, it was observed that the EG in its initial evaluation obtained a median of 47.96, after the application of the program, this value reached 69.32, observing significant differences in both moments product of the effectiveness of the program.

That is why the findings of the general hypothesis analysis are accepted: The effect of the program of playful activities favors the learning of geometry in children of five years, so it responds to the general objective: Determine the effect of the program of playful activities in the Learning of geometric notions in children of five years.

These results agree with what was supported by Casas, et al (2017) in their research "Kindergarteners' Achievement on Geometry and Measurement Units That Incorporate to Gifted Education Approach" obtaining as a result that 95.6% obtained a level achieved. Evidence that the highest percentage of responses is at the same level of process of both investigations, so that there are coincidences between the results corresponding to the geometry variable. These results are similar to the present investigation, since in these investigations they have applied a program that gives effective results in the learning of geometric notions developing competences in the students.

Castro and Castro (2016) argue that in order to achieve an adequate learning of geometric notions it is important that the teacher helps the students to build new definitions and procedures about their previous learning and to reflect on the acquired learning.

In the dimension of orientation and location, the results were obtained in the post-test measurement, it is evident that the control group reached 76.9% in the process level and an absence in the achieved level and the experimental group obtained 84% in level achieved, from

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this reason it is verified that the program of Playful Activities influenced significantly in the learning of orientation and location.

When comparing the averages of the measurement made in the experimental group before and after the application of the program of ludic activities, using the U Mann Whitney test for the variable, highly significant differences are observed (p <0.00); since the value of the mean of the pretest (16.00) was lower than that of the posttest (22.48). In the same way, the test shows that there were significant differences between the posttest of the experimental and control group; the value of the mean of the post test of the control group reached one (16.69) and the experimental group obtained one (22.48), since it is demonstrated that the results of the post test of the experimental group were superior to those of the posttest of the control group; that is why the findings of the analysis of the specific hypothesis are approved: The effect of the program of playful activities favors the learning of orientation and location in children of five years, reason why it responds to one of the specific objectives. To determine the effect of the program of playful activities in the learning of orientation and localization in children of five years.

It is relevant to consider the results of Panduro (2015) obtained in the research "Application of a program of educational games to improve learning achievements in mathematics in children of 4 years of the IEI" San Francisco de Asís "-Iquitos, 2014" having as results 82.35% in favorable level and 17.65% in unfavorable level. Evidence that the highest percentage of responses is at the same level of process of both investigations, so there are coincidences between the results corresponding to the dimension of orientation and location.

These results are based on what was stated by Castro and Castro (2016) who point out that spatial orientation and location refers to the person's ability to know their reality and the relation that space has with objects, facilitating the construction of mental maps and for this to be achieved should be used the playful as an instrument in the learning process.

Also, this agrees with what was raised by Brinnitzer, et. al (2015) who points out that games develop cognitive skills, logical thinking, reasoning habits and critical thinking development, thus mime favors divergent thinking.

In the dimension of Geometric Forms, the results were obtained in the post-test measurement, it is evident that the control group reached 76.9% in the process level and 3.8% in the achieved level and the experimental group obtained a 96% in level achieved, this reason shows that the program of ludic activities significantly influenced the learning of geometric shapes.

When comparing the averages of the measurement made in the experimental group before and after the application of the program of ludic activities, using the U Mann Whitney test for the variable, highly significant differences are observed (p <0.00); since the value of the mean of the pretest (17,36) was lower than that of the posttest (25,84). In the same way, the test shows that there were significant differences between the posttest of the experimental and control group; the value of the mean of the post test of the control group reached one (17,12) and the experimental group obtained one (25,84), since it is demonstrated that the results of the post test of the experimental group were superior to those of the posttest of the control group.

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That is why we accept the findings of the analysis of the specific hypothesis: The effect of the program of playful activities favors the learning of geometric shapes in children of five years, so it responds to one of the specific objectives. Determine the effect of the program of playful activities in the learning of geometric shapes in children of five years

These results are not similar to what was stated by Figueroa (2016) in his research "Thematic games as a strategy to develop learning of geometric figures in boys and girls of 3 years of IEI N° 094 of Moyobamba-Chinchao, 2015" having as results obtained that 69.82% of the students evaluated is at the achieved level; since the application of the thematic games in the learning sessions of geometric figures although they had a significant influence on the students, there is no achievement as the results of the present investigation, this may be due to different factors such as motivation before of the learning sessions, the moment in which the program was applied, and the way how the post test was evaluated.

In the same way, they are based on what was proposed by Castro and Castro (2016), who points out that children from 3 years old are able to recognize geometric shapes but can not yet represent them after 4 years, the child begins to have a geometric consciousness and begins to draw a square taking into account that it has four sides and can explain and classify different geometric shapes from the age of 5 the children already start making more complex representations taking into account the different characteristics and properties in a two-dimensional and three-dimensional way.

In the Measurement dimension, the results obtained in the post-test measurement show that the control group reached 73.1% in the process level and an absence in the achieved level and the experimental group obtained a 48% in process level and a 52 % of the achieved level of this reason, it is verified that the Leisure Activities program significantly influenced the learning of measurement. When comparing the averages of the measurement made in the experimental group before and after the application of the program of ludic activities, using the U Mann Whitney test for the variable, highly significant differences are observed ($p < 0.00$); since the value of the mean of the pretest (14.60) was lower than that of the posttest (21.00). Similarly, the U Mann Whitney test shows that there were significant differences between the posttest of the experimental and control group; the value of the mean of the post test of the control group reached one (15.54) and the experimental group obtained one (21.00), since it is demonstrated that the results of the post test of the experimental group were superior to those of the posttest of the control group.

In this way the findings of the analysis of the specific hypothesis are evidenced: The effect of the program of playful activities favors measurement learning in children of five years, so it responds to one of the specific objectives. Determine the effect of the recreational activities program on measurement learning in five-year-old children.

These results are based on the statement made by Castro and Castro (2016) who points out that the presence of magnitudes in people's lives makes the measure considered as a means to organize the environment and the world that surrounds us. that the study of these magnitudes be carried out, however, many of the measurement competences are not possible to achieve in early childhood education, but it is possible that an initiation to this is given.

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4. Conclusions

- The results have revealed the positive effects of the applied program coinciding in the same way with other studies carried out. It is concluded that the program of playful activities contributes significantly in the learning of geometric notions, in this way the program is pertinent to apply at the initial level.
- In the same way, an approach based on didactic situations allows students to develop different capacities, such as problem solving, creativity and imagination, autonomy, representation of ideas. In future research, in order to meet the needs of all students, the adaptation of said program is assertive as it will allow to address the diversity of students.
- Finally, future researchers can expand the research by separating the dimensions and investigate each one of them since their study is a very broad topic, in this way a better learning in geometry will be generated. Also investigate the variable of recreational activities, since this program is subject to improvements and new implementation ideas.

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