

The Analysis of Children's Spatial Ability

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Abstract: The aims of this research were to obtain empirical information from experiment on the effect of the method of creative games and art talents to the spatial abilities of children. This research was conducted toward children who study in group B of kindergarten at Blahbatuh, Gianyar, Bali Province, Indonesia. Samples were taken using multistage random sampling technique with 72 children. The empirical findings of this study indicate that there are significant use of creative movement and role play in spatial abilities of children, in addition to the spatial abilities of children who use creative movement higher than using role play. There is significant interaction between method of creative play and dance art talents to the spatial abilities of children. It was also found that the spatial abilities of children who get creative movement and has a high dance art talent gets a higher yield than the spatial abilities of children who get to role play and have a high dance art talent.

Keywords: creative motion, spatial ability of children

I. INTRODUCTION

Early childhood education prioritizes an integrated learning process because children have various potentials that must be maximally developed for various abilities in solving problems in their future lives. Child development achieved is an integration of aspects of understanding religious and moral, physical, cognitive, linguistic, and social-emotional values (Directorate of Early Childhood Education, 2009). Specifically, in the cognitive aspect, it is often the concern of many education observers, so that in its implementation there are several things that are used as the focus of developing children's potential such as general knowledge and science, the concept of color forms and patterns, concepts of numbers, space and letters. Seeing various things that need to be considered in the child's learning process, a teacher must be able to understand every potential that will be developed while making learning activities as attractive as possible for children to do in the learning process.

Through the observation of researchers in several kindergartens in Blahbatuh, Gianyar, Bali Province, Indonesia about developing cognitive aspects of children, there were many children who had not mastered the concept of near-distance, size, direction, boundary and position of space even though these activities have often been given teacher in the learning process. Of course, this happens due to inaccurate use of learning methods and understanding of the material carried out by the teacher.

Acquiring good spatial abilities cannot be separated from the visual perception possessed by children. Visual perception involves sensitivity to the main elements in artistic work, including lines, shapes, volumes, spaces, equilibrium, light and shadow, harmony, patterns, and also colors (Armstrong, 2005: 40), so that spatial abilities will develop along with children's understanding about art. And the development of the potential of art can be formed from a variety of movements performed by children.

Motion in children in the development of various potentials is not what adults do. And of course, the movements used in developing the potential of early childhood are formulated in an educational and creative

game. This structured movement in children's play at the age of kindergarten is known as a creative movement which in its operation requires the freedom of children's expression so as to give children the opportunity to build their own knowledge.

Creative movements designed in accordance with children's development will be able to develop a variety of potential that children have, one of which is spatial ability. Learning with creative movements in particular will habituate children to see the concept of space more dynamically and pleasantly. The spatial ability of children develops along with the children's artistic talents. Related to this, when the spatial abilities of children are developed, other potentials in the form of artistic talent possessed by children must be considered.

Observing the various phenomena and idealistic realities above, it is important to do a research related to these various things. Positivistic ally this study will examine the influence of creative play methods (creative motion and role playing) and artistic talent on the spatial abilities of kindergarten children.

In accordance with the background above, the formulation of the problem in this study is whether there are differences in the spatial abilities of kindergarten children given creative moves and those given role play ?, is there an interaction effect between creative game method variables and artistic talent for spatial abilities kindergarten children ?, for kindergarten children who have high artistic talent, is there a difference in spatial abilities of children who are given creative movement with children who are given role playing ?, for children of kindergarten who have low artistic talent, whether Are there differences in spatial abilities of children who are given creative movement with children who are given role playing?

Children's Spatial Ability

Child's spatial ability can be seen from the cognitive development of the child by assimilating various information from the social environment around the child. The concept of spatial ability is explained by Smith (2009) by stating that the development of spatial abilities requires topological experience that is trained

through the experience of children studying space in various shapes and sizes. The topological concept is composed of various concepts, namely: (1) proximity in the form of the concept of the relationship between children to objects by considering position, direction, and distance; (2) separation which means an object always consists of whole parts, and separate-united; (3) order (order) is an understanding of the concept before-after, and at the beginning; and (4) the limitation (enclosure) is the position of the object which is limited by a point or line with objects that are around it both up and down, right and left side, front and back side.

Seeing the definition and description above, it can be concluded that what is meant by spatial ability is the ability of a person to form a mental model of the world of space that is reflected through the ability of images and visualization of all aspects around them in their minds that are transformed through images or done with how to create it in two dimensions or three dimensions. While the spatial ability of children is the ability to understand and express the concept of space with aspects of closeness, separation, sequence, limitation, and size.

Creative Movement

Creative movement is used as a way of expressing the child freely in accordance with his imagination. By expressing various imagination, children are able to develop various other potentials. According to Dodge and Colker (2000) creative motion contributes greatly to the social-emotional, cognitive, and physical development of children. When a child moves with full freedom, it will provide quality stimulation in the child's social emotional development.

Furthermore, Hawkins (2003) reaffirms the activities that need to be carried out in the implementation of creative movements that are associated with the creative process of feeling (absorbing), living, imagining, manifesting and giving shape. The various components in this creative movement must be well connected by educators so that the totality in displaying this creative movement becomes more perfect and able to express themselves.

Looking at the various opinions above, it can be concluded that creative motion is a motion that is combined to express inner experiences and express one's feelings and is done by giving children the freedom to move according to their imagination by paying attention to time, space and emphasis and having stages of feeling, absorbing, fantasize, manifest and give shape.

Role Play

The concept of role playing itself is rooted in the nature of human beings as individual and social beings. The stages of role playing have several clear procedures which consist of studying the context being discussed, making a list of the material to be discussed, preparing the equipment to be used and arranging the location of the activities, conveying the various topics to be discussed and technical implementation, then practicing all existing preparations, namely topics, tools, and communication techniques in an enjoyable role playing activity, directs children to appreciate their roles and involve emotions in the implementation of activities, inviting children to conclude all activities along with taking on the meaning

of various topics discussed in role playing (Lendrum, 2001).

Looking at the various theories and opinions stated above, it can be concluded that role playing is an activity carried out by the teacher in developing the learning process through playing with conditioning so that children find self-meaning in the social world and solve dilemmas with the help of groups and use the concept of role. The steps used in role playing activities are studying the context in question, making a list of the material to be discussed, preparing the equipment to be used and arranging the location of the activities, conveying the various topics to be discussed and technical implementation, practicing all preparations in a fun role playing activities, directing children to more appreciate the role and involve emotions in the implementation of activities, inviting children to conclude all activities along with taking on the meaning of various topics discussed in role playing.

Art Talent

Art talent is a special talent someone has. Guildford (in Muba, 2010) suggests that there are three dimensions contained in talent, namely perceptual dimensions, psychomotor dimensions, and intellectual dimensions. Along with that, Stinson (1991) who translates the concept of art from Gardner's opinion by asserting that artistic talent is a way of thinking about art and the structure of artistic talent consists of three parts, namely perception (the ability to clearly see the different elements or qualities of an object), production (one's ability to create art products), and reflection (the ability to see oneself by understanding the work of others and being able to choose objects according to one's own interests).

Various explanations of the above theory refer to a conclusion that artistic talent is a feeling expression expressed by the visual appearance and movement of the human body by considering the structure of art such as perception, production, and reflection that is implemented with feelings of pleasure and joy.

II. METHOD

The research method used in this study is the experimental method with Spatial Ability as the main problem which is the dependent variable. While the first independent variable is the Creative Game Method (in this study is Creative Motion activities and Role-Playing activities) and the second independent variable is Art Talent. This research is an experimental study with treatment design by level 2 x 2. Therefore, data analysis using two-way ANAVA, if there is a difference, is followed by a Tukey test to determine which is higher.

Both variables are good Spatial and Talent Ability Art data is taken using performance tests with the rubric model. The criteria used to measure spatial abilities are scores 1, 2 and 3. With category 3 = capable, 2 = moderate, 1 = incapable. Data was collected within 10 months in May 2014 to February 2015 in group B of Q-Ta and Balinese kindergarten Ratna Kumara. The instruments of these variables were tested by validity tests based on the results of the second validity test. this instrument variable is valid. While the reliability of the instrument was tested using Alpha Cronbach and

reliability between rater and based on the results of the analysis of the two instruments classified as reliable for use on subjects that fit the population.

The affordable population in this study was the B kindergarten group in Blahbatuh District which numbered 24 classes in 14 kindergartens. Whereas the population is unreachable, that is, all groups of kindergarten in Gianyar Regency, totaling 220 classes at 125 kindergartens. The population characteristics are relatively homogeneous, in terms of the school environment, the child's family background, and the parents' socio-economic status. Determination of the sample using multistage random sampling technique with a total sample of 72 children with details of each research group of 18 children.

III. RESULTS AND DISCUSSION

Seeing the test results of the analysis requirements as above are fulfilled, then further analysis can be done. Further analysis of this section will explain the hypothesis testing on the research data that has been done. The hypothesis testing on this study used the Anava two-lane statistical formula (ANAVA 2 x 2). When the calculation result shows interaction occurs, it is to know the interaction effect of the treatment variable and the attribute is resumed using the Tuckey test.

Based on the analysis of two-lane variances is a calculation technique that aims to investigate two influences, namely the main effect and interaction effect can be displayed as follows (Table 1).

Table 1
Two-lane ANAVA Calculation Summary

Source Variances	db	JK	RJK	F _{count}	F _{table}
Creative Game Method (A)	1	117,56	117,56	4,612*	3,98
Artistic talent (B)	1	107,56	107,56	4,220*	3,98
Interacts (A x B)	1	760,50	760,50	29,838*	3,98
Confusion	68	1733,17	25,49		
Amount	71	2718,78			

Based on the results of the ANAVA analysis contained in the summary above, it can be explained as follows:

3.1. The child's spatial ability given a creative motion game is higher than the child given a role-playing game.

Analysis result of two-lane variance on differences in spatial ability of child groups given creative motion and role playing as contained in the chart of the test results, indicating that F (count) = 4.612 and F (table) = 3.98 in the equivalent of 0.05 significance, then F (count) > F (table). Thus, H₀ is rejected, so it can be concluded that overall there is a difference in the spatial ability between the child being given creative motion and role-playing.

Based on the results of the data analysis obtained in the first hypothesis of the study showed that overall creative motion has a better influence than role playing against the child's spatial ability. The results of the analysis are in accordance with the theory of theoretical study, that through creative movements that give children the opportunity to move freely while understanding the

space with more maximum. As for the role playing activities children enjoy more role in social life and look for problems in group life even though in the implementation of implementing the concept of a permanent space is given, but the research results This suggests that creative motion is much more effective than playing Role in enhancing the child's spatial ability, especially those subject to the study.

3.2. Influence of interaction between creative game methods and artistic talents to the child's spatial ability

Based on the results of analysis of variance (ANAVA) Two lanes with a signification level $\alpha = 0.05$ obtained the calculation of interaction F_h of 29.838 and F_t of 3.98, then F (count) > F (table). Thus, H₀ rejected, it can be concluded that there is an influence of interaction between creative game methods and artistic talents to the child's spatial ability.

Testing on the second hypothesis through the analysis of two-lane variances shows that there is an interaction between creative games and artistic talent for the child's spatial ability. Thus, it can be stated that the child's spatial ability depends on the given creative game and art talent. Creative motion gives a better impact on the spatial ability of a child with high artistic talent. While the child with low art talent is better given role playing than creative motion.

Because there are interactions between children given creative motion games and role-playing games against the child's spatial ability, the analysis is continued for simple effect testing with test Tuckey.

The result of the calculation is adjusted to the test criteria of the Tuckey testing that accept H₀ if Q_{count} is < Q_{table} and Reject H₀ if Q_{count} > Q_{table} then between A1B1-A2B1 group is found to be q_{count} of 7.61 greater than Q_{table} of 3.74 then The conclusion rejected H₀ while between the A1B2-A2B2 group acquired Q_{count} of 3, 31 smaller than the Q_{table} of 3, 74 then the conclusion H₀ received. A further explanation of the simple effect testing will be described below.

3.3. Differences in child spatial ability which has high artistic talent between given creative motion games and role-playing games.

Based on the results of advanced testing using the Tuckey test, the price of Q_{calculate} is 7.61 greater than Q_{table} at the rate of α significance = 0.05 with n = 18 and Dbmistake = 68 obtainable Q_{table} for 3.74, then Q_{count} > Q_{table} to H₀ Rejected. Thus, it can be concluded that there is a very significant difference that the child's spatial ability has a high artistic talent that is stimulated with creative motion compared to that which is stimulated by role-playing. In addition, it can also be said that the child's spatial capacity is higher in children who are stimulated with creative motion and have a high artistic talent compared to the child's spatial skills that are stimulated by role playing and have high artistic talent.

Related to the third research hypothesis, it can be said that a child's spatial ability has higher artistic talent than a child with low artistic talent. This is in accordance with the theoretical synthesis of theoretical studies, that the child's artistic talents can build a perception of an object's identity. With a high artistic talent and given creative motion certainly the properties of the object will

be recorded well in mind if it has a good response anyway when the visual information is received. If there is an ungood response when receiving spatial information then the attention to the object will be decreased and the spatial information cannot be fully received and not even detail.

3.4. Difference in child spatial ability which has low art talent between given creative motion games and role-playing games.

Based on the results of advanced testing using the Tuckey test, the price of $Q_{calculate}$ is 3.31 smaller than Q_{table} at the rate of α significance = 0.05 with $n = 18$ and $Dbmistake = 68$ obtainable Q_{table} of 3.74, then $Q_{count} < Q_{table}$ so that H_0 Accepted. It can thus be concluded that there is no significant difference in the spatial ability of a child who has a low art talent that is stimulated using creative motion compared to that which is stimulated using role-playing. But another condition, found that the child's spatial ability is lower in children who stimulated creative motion and have a low artistic talent compared to the child's spatial ability which is stimulated by role playing and having low art talent.

In accordance with the fourth hypothesis testing, it was shown that there was no significant difference in the spatial ability of a child with low art talent being stimulated using creative motion compared to that of the stimulatory Using role playing. Seen in social reality, these findings can be very reasoned Associated with the actual community conditions. If it is examined in creative motion along with the stages of its activities, it is obvious that creative movements are easily understood by various children characteristics. So that children who have low art talent is certainly easy to master all the motion done in the process of creative motion stimulation.

The creative movements developed in this study conceptually have the similarities of the characteristics of motion developed in folk dance have several features such as social function, is extracted together, spontaneity, simple form of motion, and Its often-humorous nature. Folk dance such as this is very common to be known by the whole community in Indonesia, especially the area of Bali that is traditionally accustomed to enjoy and present the good folk dance among children and adults. This is what causes creative motion is easy to understand and strengthened by the child with low art talent and certainly effect with the child's spatial ability.

IV. CONCLUSION

Based on the results of the research and discussion described in the previous section, the findings obtained in this study can be summarized as follows. There are differences in spatial abilities between children who get creative games with creative moves with children who get

creative games by playing roles. The spatial ability of children who get creative games with creative motion is higher than the spatial ability of children who get creative games by playing roles.

First, overall there is the influence of the use of creative games with creative movement and role playing on the spatial abilities of children. The spatial ability of children who get creative games with creative motion is higher than the spatial ability of children who get creative games by playing roles. Second, there is the influence of the interaction between creative play and artistic talent on children's spatial abilities, or the influence of creative play on the spatial abilities of children depending on artistic talent. Third, for children who have high artistic talent. The spatial ability of children who get creative games with creative movement and high artistic talent is higher than the spatial ability of children who get creative games by playing roles and having high artistic talent.

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