THE INFLUENCE OF SMART BOARD GAMES ON THE ROUGH MOTOR DEVELOPMENT OF CHILDREN AGE 4 TO 5 YEARS

Kristin Anggraini[1]

Abstract

The aim of this study was to develop children's gross motor development through playing. This research used quantitative research methods with quasi experimental -nonequivalent control group design. In this study, the researcher used four research instruments, namely running, jumping, hopping and throwing. The results of this study indicated positive influences of the Smart Board game on the gross motor development. This was evidenced by the significant difference between the results of the pretest and posttest on children's gross motor skills, especially in terms of running, jumping, hopping and throwing in children aged 4-5 years. When playing, the children gained experience, pleasure and knowledge and through this one form of playing that could increase children's knowledge as well as develop the gross motor aspects of children is the Smart Board game. This study showed that this Smart Board game could be used to develop children's gross motor development well, especially for running, jumping, hopping and throwing in children aged 4-5 years.

Keyword: *Gross motor development, Smart Board Games, Children aged 4-5 years*

1. Background

The first five years of a child is often referred to as the golden period of child growth, because in that period all the skills are experiencing very rapid development. This is influenced by the development of a child's brain that develops very rapidly. The relationship between the brain development and motor development of children is caused by the growth of a part of the brain called the *cerebellum*, a part of the brain located above the brain stem. Dordic, Tubic, & Jaksic (2016) state that the existence of cerebellum development is what influences the development of a child, especially in terms of coordination, balance, development of muscles in shaping body posture and cognitive development of children.

In the process of growth and development, children's motor skill is closely related to the process of growth and development of children's skills in moving. Motor movements can be divided into two, namely gross motor and fine motor. According to Oberer, Gashaj, & Roebers (2017), gross motor is usually done by involving all members of the body, while fine motor refers to the dexterity movements performed by the hands and fingers. This is confirmed by Veldman, et al. (2018) that gross motor skills consist of locomotor movements, control skills and balance movements including jumping, running, kicking, and throwing. It is very often that a child unconsciously performs various motor movements in playing a game. Based on the above description, it is necessary to develop activities that are interesting for children to develop their gross motor aspects. To design a fun activity, the teacher as the facilitator is very influential in helping the children express their creative ideas.

[1] *Lecturer of Early Childhood Education Program Widya Mandala Surabaya Catholic University*

Furthermore, the creative idea is used to design a learning media that can stimulate the children in such a way that the gross motor aspect of the children can develop more optimally.

The learning media used should also be adjusted to the level of child development, made of simple materials and may attract the attention of children. This is in accordance with the opinion of Asyhar (2012) that learning media is anything that can be used to send information from a source to the recipient in accordance with the plan, so that learning activities can be carried out with optimal and effective results. Thus, the learning media used to develop aspects of children's developments can be in the form of interesting games. Playing is a very exciting situation for children. Children always want to play whenever they want, this can be used by educators to provide a game that can stimulate aspects of child development. According to Triharso (2013: 1) "playing is an activity carried out by children so that children get knowledge, information, and satisfaction can develop their imagination".

One form of play that can be used to develop aspects of gross motor development of children is the Smart Board game. The Smart Board game was inspired by Galton's marble board or often called the Galton's Board which was invented by Sir Francis Galton in 1878, and the Smart Board game was also designed according to the level of child development. This Smart Board game consists of a board made of rectangular wood with a size of 100 cm x 58 cm, this board is deliberately made tilted with a height of 50 cm and is given a colorful and trajectories and numbers. In addition, the Smart Board game is also equipped with pegs embedded in boards and colored and numbered ping pong balls as well as beads. This game can develop the development of a child's gross motor activity in running toward the Smart Board, hopping like a frog into a bead and rolling the ball on the track correctly. Thus, the Smart Board game can be used as a means to develop children's physical abilities through running, jumping, hopping and throwing balls as this involves all children to actively participate.

Based on these descriptions, the researcher wants to conduct research on the effect of Smart Board games on the gross motor development of children age 4-5 years. This research attempts to answer the following problem: "What is the influence of the Smart Board game on the gross motor development of children age 4-5 years?"

2. Research Methods

This research used quantitative research approach, especially quasi experimental - nonequivalent control group design. The research sample selection used random sampling technique. This technique was conducted to determine the sample by drawing; the draw was conducted on 30 kindergarteners included in the population. The same share of possibility to be selected is equal for every child in Kindergarten X, as a research participant in this study. In determining the sample of the population to be studied, the researcher rests on the standard mentioned in Arikunto (2010) that if the subject or population to be studied in a study is less than one hundred then it should all be used so that the research is a population study, if the research subjects number is more than one hundred then the suggested sample is between 10 and 15% or 20 and 25% or more. In this study, the research subjects were 30 children, the location of the study was at a kindergarten X in Sidoarjo city, Indonesia.

In this study, the data collection technique used by the researcher was in the form of observation and documentation. The research instrument used was an observation sheet of gross motor development of children, about doing the movement of jumping, hopping and running in a coordinated manner and throwing things in a particular direction. To test the reliability of the instrument, the Cronbach's Alpha formula with the help of the

SPSS 21 program for Windows evaluation version is used; if the alpha value is more than 0.60, then the data is considered to be good and reliable.

The homogeneity test and normality test are used to identify whether the data is homogeneous and normally distributed. To test the hypothesis of the influence of the Smart Board game on gross motor development, the One Way ANOVA analysis technique was used with the following conditions:

If $F_{count} < F_{table,}$ then H_0 is accepted and H_a is rejected

If $F_{count} > F_{table}$ then H_0 is rejected and H_a is accepted

Hypothesis testing is conducted to determine the effect of the Smart board game in the experimental class and the control class after each class is given a different treatment, as seen from the results of the pre-test and post-test difference values of the two classes. Hypothesis testing in this study was conducted with the significance level equals to 0.05.

3. Results and Discussion

Early developments of gross motor children in running, jumping, hopping and throwing were analyzed in two sessions, namely pretest and posttest. The average value of children's gross motor development is shown in Table 3.1.

Table 3.1. Observation Data of Rough Motor Children Development before Treatment

No	Name	Indicator						Amount
		Run	Jump with your left foot	Jump with your right foot	Hop	Roll the ping pong ball using one hand (left hand) on the right trajectory	Roll the ping pong ball using one hand (right hand) on the right trajectory	
1	Ais	3	3	3	2	2	2	15
2	Nrs	3	3	2	2	2	3	15
3	Zv	3	3	2	2	2	2	14
4	All	1	1	1	1	1	1	6
5	Amr	2	2	2	1	2	2	11
6	Bm	3	3	3	3	2	3	17
7	Frh	3	2	3	3	2	2	15
8	Aqs	3	3	3	2	2	2	15
9	Nvl	3	2	3	2	2	2	14
10	Dms	2	2	2	2	2	3	13
11	Vlt	3	3	2	2	2	2	14
12	Adi	1	1	1	1	1	1	6
13	Ss	2	2	1	1	1	1	8
14	Valn	2	2	1	1	1	1	8

No	Name	Indicator						Amount
		Run	Jump with your left foot	Jump with your right foot	Hop	Roll the ping pong ball using one hand (left hand) on the right trajectory	Roll the ping pong ball using one hand (right hand) on the right trajectory	
15	Adr	2	2	2	1	2	2	11
16	Blg	1	1	2	1	1	2	8
17	Dnd	1	1	2	2	2	2	10
18	Nr	1	1	2	2	2	2	10
19	Nbl	3	2	3	2	2	3	15
20	Ard	2	2	3	2	2	3	14
21	Aml	1	1	2	2	2	2	10
22	Nl	2	2	2	2	2	2	12
23	Tio	1	1	1	1	1	1	6
24	Rtn	1	1	1	1	1	1	6
25	Svnd	3	3	2	2	1	2	13
26	Rf	3	3	3	2	2	3	16
27	Nvl	2	2	3	2	2	2	13
28	Snt	2	2	3	2	2	2	13
29	Eka	1	1	2	1	1	2	8
30	Mg	1	1	2	1	1	2	8
Amount		61	58	64	51	50	60	344
Average		2.03	1.93	2.13	1.7	1.66	2	11.46

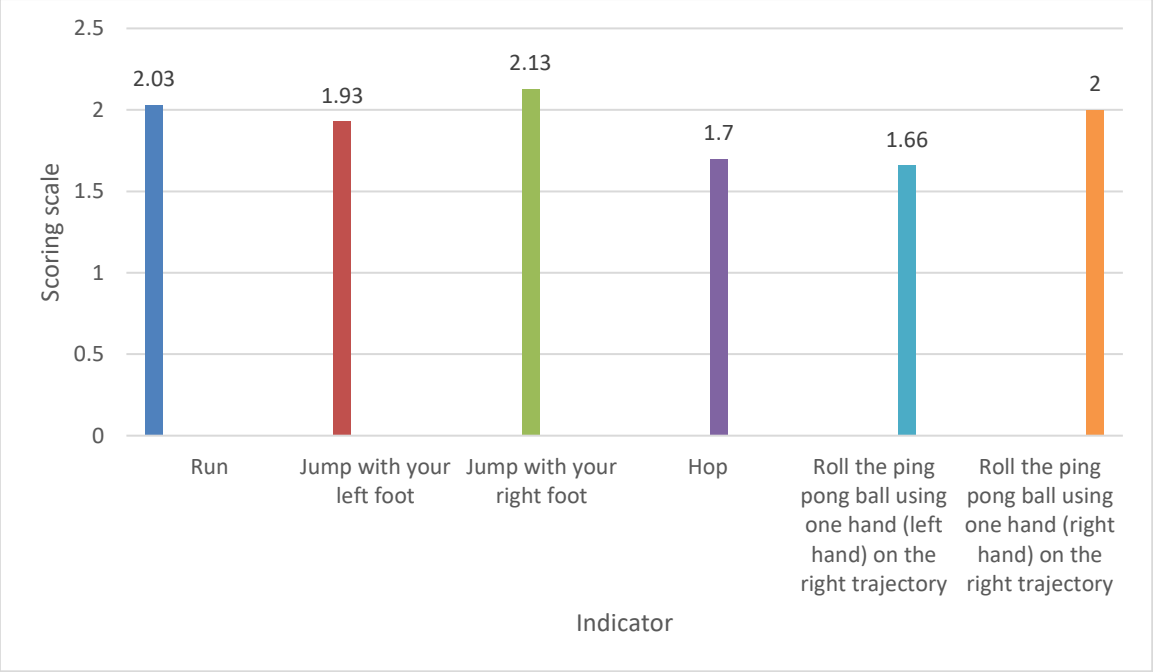

Figure 3.1 Histogram Data of Rough Motor Child Development before Treatment

The table shows the data states that the gross motor development of children before being treated is obtained the highest score of 17 and the lowest of 6. The average, highest and lowest values of gross motor development of children after treatment are shown in Table 3.2.

Table 3.2. Observation Data of Rough Motor Child Development after Treatment

No	Name	Indicator						Amount
		Run	Jump with your left foot	Jump with your right foot	Jump	Roll the ping pong ball using one hand (left hand) on the right trajectory	Roll the ping pong ball using one hand (right hand) on the right trajectory	
1	Ais	4	3	4	3	3	4	21
2	Nrs	3	3	3	3	3	3	18
3	Zv	3	3	2	2	2	2	14
4	All	3	2	3	2	2	3	15
5	Amr	4	3	3	3	2	4	19
6	Bm	4	3	3	3	2	4	19
7	Frh	3	2	3	3	2	3	16
8	Aqs	3	3	3	3	2	3	17
9	Nvl	4	3	4	4	3	4	22
10	Dms	4	4	4	4	3	4	23

No	Name	Indicator						Amount
		Run	Jump with your left foot	Jump with your right foot	Jump	Roll the ping pong ball using one hand (left hand) on the right trajectory	Roll the ping pong ball using one hand (right hand) on the right trajectory	
11	Vlt	3	3	2	3	2	3	16
12	Adi	3	2	3	3	2	3	16
13	Ss	3	2	2	2	2	3	14
14	Valn	4	2	2	3	2	3	16
15	Adr	2	2	2	2	2	2	12
16	Blg	2	1	2	2	1	2	10
17	Dnd	2	1	2	2	2	2	11
18	Nr	2	2	2	2	2	2	12
19	Nbl	3	2	3	3	2	3	16
20	Ard	3	2	3	3	2	3	16
21	Aml	2	2	2	2	2	2	12
22	Nl	3	2	2	2	2	2	13
23	Tio	2	1	1	1	2	2	9
24	Rtn	2	2	2	2	2	2	12
25	Svnd	3	3	2	2	2	2	14
26	Rf	3	3	3	3	2	3	17
27	Nvl	3	2	3	3	3	3	17
28	Snt	3	2	3	2	2	2	14
29	Eka	3	3	2	3	2	2	15
30	Mg	2	2	2	2	2	2	12
Amount		88	70	77	77	64	82	458
Average		2.93	2.33	2.56	2.56	2.13	2.73	15.26

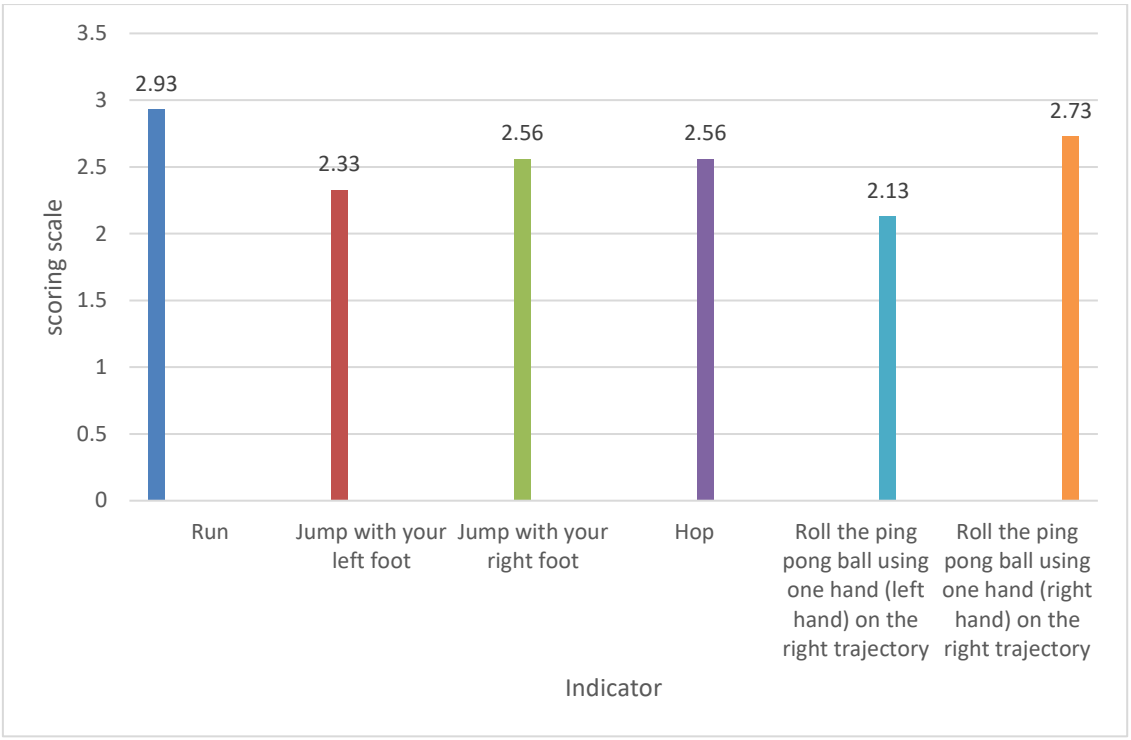

Figure 4.2. Histogram Data of Rough Motor Child Development after Treatment

The results of observations of gross motor development data show that the average final observation score is 15.26 (mean = 15.26) while the average initial observation score is 11.46 (mean = 11.46).

In this study, the normality testing was carried out using SPSS 22.0 for Windows Evaluation Version, using the Kolmogorov-Smirnov formula with the following criteria:

If sig ≥ 0.05 the data is normally distributed

If sig ≤ 0.05 the data is not normally distributed

Table 3.3 Motor Pretest Data Normality Test

Tests of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pretest.	Experiment	,172	48	,001	,885	48	,000
Motoric	Control	,268	40	,000	,796	40	,000

a. Lilliefors Significance Correction

Based on the results of normality testing using Kolmogorov-Smirnov and Shapiro-Wilk in table 3.3 above it can be seen that the motor development pretest data in the experimental and control groups, has a significance value or p value of 0,000 <0.05 so that the motor pretest data is not have a normal distribution.

Table 3.4 Motor Posttest Data Normality Test

Tests of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Posttest. Motoric	Experiment	,198	48	,000	,902	48	,001
	Control	,233	40	,000	,887	40	,001

a. Lilliefors Significance Correction

Based on the results of normality testing using Kolmogorov-Smirnov and Shapiro-Wilk in table 3.4 above, it appears that the posttest data on motor development in both the experimental and control groups, has a significance value or p value of 0.001 <0.05 so that the motor posttest data is not a normal distribution.

Table 3.5 Homogeneity Test of Motor Pretest Data

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Pretest. Motoric	Based on Mean	.320	1	86	.573
	Based on Median	.213	1	86	.646
	Based on Median and with adjusted df	.213	1	72.791	.646
	Based on trimmed mean	.221	1	86	.640

Based on the results of homogeneity testing of variants in table 3.5 above, it can be seen that the significance value or p value of 0.573 > 0.05 so that the variant of homogeneous data, and the assumption of homogeneity is met.

Nevertheless, the assumption of normality is not met even though the assumption of homogeneity is met, so that the average difference test of the Independent Sample T-test is replaced with the Mann Whitney Difference Test.

Table 3.6 Motor Pretest Difference Test

Test Statistics[a]

	Pretest.Motoric
Mann-Whitney U	836,000
Wilcoxon W	1656,000
Z	-1,060
Asymp. Sig. (2-tailed)	,289

a. Grouping Variable: Kelompok

Based on the Mann-Whitney U test results in table 3.6 above, it can be seen that the significance value or p value is 0.289 < 0.05 so it can be concluded that there is no significant difference in the average pretest motor between the experimental and control groups.

Table 3.7 Homogeneity Test of Posttest Motor data

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Posttest. Motoric	Based on Mean	2.236	1	86	.139
	Based on Median	2.937	1	86	.090
	Based on Median and with adjusted df	2.937	1	84.707	.090
	Based on trimmed mean	2.508	1	86	.117

Based on the results of the homogeneity of the variants in table 3.7 above, it can be seen that the significance value or p value of 0.139> 0.05 so that the variant of homogeneous data, the homogeneity assumption is fulfilled. The assumption of normality is not met even though the assumption of homogeneity is met, so that the average difference test of the Independent Sample T-test is replaced with the Mann Whitney Difference Test.

Table 3.8 Motor Posttest Difference Test

Test Statistics[a]

	Posttest.Motorik
Mann-Whitney U	162,500
Wilcoxon W	982,500
Z	-6,764
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: Kelompok

Based on the Mann-Whitney U test results in table 3.8 above it can be seen that the significance value or p value of 0,000 < 0.05 so that it can be concluded that there is a significant difference in the average posttest motor between the experimental and control groups.

The following are the results of the hypothesis test:

Table 3.9 Description of Hypothesis Test Results

ANOVA

Posttest.Motoric

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	167.509	1	167.509	96.454	.000
Within Groups	149.354	86	1.737		
Total	316.864	87			

Based on the One Way Anova test results in table 3.9 above, it can be seen that the F_{count} value is 96.454 and the significance value or p value is 0.000 < 0.05. H_o refused H_a accepted, so it can be concluded that the Smart Board game affects the gross motor development of kindergarten X in the city of Sidoarjo.

The purpose of this study was to examine the effect of the Smart Board game on the gross motor development of children aged 4-5 years in the ability to run, jump, jump and throw. As hypothesized that the Smart Board game has a major influence on the development of gross motor skills of children aged 4-5 years, especially in terms of running, jumping, hopping and throwing, these findings indicate that young children who have played Smart Board games can have better moving skills

According to Elofsson, Gustafson, Samuelsson, & Traff (2016) state that games and activities carried out by children, can support the development of children's abilities to become more developed. This is in line with the opinion of Arsyad (2015) state that actually a person gets knowledge from experience by directly involved in an activity.

4. Conclusion

This research provides support for our hypothesis that children who play Smart Board games will have an advantage in moving skills especially in terms of running, jumping, hopping and throwing. This finding provides evidence for a very specific effect of the Smart Board game. All children showed increased ability to run, jump, jump and throw after participating in this game. At the beginning of observation, it was found that the gross motor abilities of children in terms of running, jumping, hopping and throwing this is relatively low this is due to the lack of stimulation received by the child. Thus, researchers who are interested in exploring children's gross motor skills must also consider differences in children's experiences.

References

Arikunto, Suharsimi. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*, Jakarta: PT. Rineka Cipta

Arsyad, Azhar. (2015). *Media Pembelajaran*. Jakarta: RajawaliPers

Asyhar, Rayandra. (2012). *Kreatif Mengembangkan Media Pembelajaran*, Jakarta: Referensi Jakarta

Dordic, V., Tubic, T., Jaksic, D. (2016). *The Relationship between Physical, Motor, and Intellectual Development of Preschool Children*. ProcediaSocial and Behavioral Sciences 233 (2016) 3-7.

Eloffson, J., Gustafson, S., Samuelson, J., Traff, U. (2016). *Playing Number Board Games Support 5-Years-Old Children's Early Mathematical Development*. Journal of Mathematical Behavior 43(2016) 134-147.

Oberer N., Gashaj V., Roebers C.M. (2017). *Motor Skills in Kindergarten: Internal Structure, Cognitive Correlates and Relationship to Background Variables*. Human Movement Science 52 (2017) 170-180

Triharso, Agung. (2013). *Permainan Kreatif dan Edukatif untuk Anak Usia Dini: 30 Permainan Matematika dan Sains*, Jogjakarta: ANDI

Veldman, S.L.C., Jones, R.A., Santos, R., Sousa-Sa, E., Pereira, J.R., Zhang, Z., Okely, A.D., (2018). *Association Between Gross Motor Skills and Physical Activity in Australian Toddler*. Journal of Science and Medicine in Sport 21 (8), 817-821