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Submission date: 28-Feb-2024 12:54PM (UTC+0530)
Submission ID: 2306792509
File name: REVISI_TOMMY_1.docx (566.1K)
Word count: 5595
Character count: 29219

International Journal of
Disabilities Sports and Health Sciences
e-ISSN: 2645-9094

RESEARCH ARTICLE

Implementation of Manipulative Basic Movement Learning Model Development for Students aged 5-6 years

Endang Pratiwi[1*], Hernawan[2], Fahmy Fachrezzy[3], Norma Anggara[4], Widiastuti[5], Sri Ayatina Hayati[6], Ainun Heriyah[7], Y. Touvan Juni Samodra[8], Tommy Rizki Prasetyo[9], Eka Fitri Novita Sari[10]

1,2,3,5, Department of Sport Education, Jakarta State University, Indonesia

*1*Kalimantan Islamic University Muhammad Arsyad Al Banjari Banjarmasin, Indonesia 4Lambung Mangkurat State University, Indonesia, 8IKIP PGRI Pontianak, Universitas Primagraha, Indonesia9*

**Corresponding author. Email:*
EndangPratiwi_9904921013@mhs.unj.ac.id1,pratiwi.endang@uniska-bjm.ac.id1,Hernawan@unj.ac.id2,fahmyfachrezzy@unj.ac.id3,normaanggara@ulm.ac.id4,widiastuti@unj.ac.id5,bio.sriayatina@gmail.com6,ainunheiriyah@gmail.com7,tovan@fkip.untan.ac.id8, tommyrizkiprasetyo_9904919002@mahasiswa.unj.ac.id9, ekanovita@unj.ac.id10

Abstract

This research aims to determine the implementation of the manipulative basic movement learning model in students aged 5-6 years. This type of research was quantitative with an experimental method that included a pre-test and post-test as well as test results for manipulative basic movement skills. The population of this study was all students aged 5-6 years spread across two provinces in Indonesia, namely the subjects used for large-scale testing were 40 people with 22 models for students aged 5-6 years at Al Amin Kindergarden Martapura, South Kalimantan, where the results showed that 71% of the entire model could be used. Meanwhile, the effectiveness test involved 60 student subjects consisting of 30 experimental groups and 30 control groups at the AHA Kindergarten, South Kalmantan Province. The results of the data normality test using the Kolmogorov-Smirnov test showed significant value of the experimental group that was .155 > 0.05 and the control group that was .104 > 0.05, indicating that the data were normally distributed. Furthermore, the effectiveness test with N-Gain Percent in the experimental group was 76.89 with an effective interpretation, while the control group showed a result of 31.88 with a less effective interpretation. Based on the data processed, it is known that the value, Sig (2-tailed), is 0.000 < 0.05 with tcount score = 12.55 with df = 58. and t table = 1.98, so the increase in gross motor skills of the experimental group was higher than the increase in gross motor skills of the control group. Thus, it can be concluded that the inplementation of learning model with manipulative basic movement model is effective in improving the gross motor skills of children aged 5-6 years.

Keywords
Learning Models, Manipulative Basic Movements, Early Childhood

INTRODUCTION

There are three stages of movement, namely"Cognitive, Associative and Autonomous." Cognitive stage is the stage where every movement is the result of previous thoughts and experiences. The associative stage is the stage where all movements are coordinated so that they become a complete movement. Meanwhile, autonomous movements are movements that are formed and produced according to external stimuli. According to Fitts and Posner in (Tarreh, 2020). Students in the automatic stage of motor skill learning do not have to concentrate on movement. These students can focus their energy on other areas, such as offensive and defensive situations in sports, targets in activities such as golf and archery, or the aesthetic feeling of movement in dance (Erazo-Damian, 2018). Basic movement skills are basic movement patterns that begin to develop at the same time that a child is able to walk independently and move

Received: ; **Accepted:** …….. ; **Published:**
[1]**ORCID:** ……, [2]**ORCID**, [3]**ORCID:** ……. , [4]**ORCID:** ……

freely through his environment. Fundamental movement skills (FMS) are basic skills used in everyday life, and thus mastery of these skills among children and adolescents is an important contributor to future participation in sports and physical activity (McGrane, 2017). Fundamental movement skills are gross motor movements that are the basis for the development of more complex and specialized skills and include skills related to stability (e.g., stopping, turning, pushing), locomotion (e.g., jumping, running), and object control. (e.g., catching, kicking)(Gursel, 2014).

Achieving the advanced stage is greatly influenced by opportunities for practice, encouragement, and instruction in an environment that encourages learning(Goodway, 2019). For normal and special needs children, the fundamental stage is about learning all the basic movement skills. It is about learning to run and jump and leap and catch and throw and kick and it is also about learning to use a prosthetic arm or leg, or to become mobile using a wheelchair or walker. It is about learning all the skills that can be used in sports and physical activities later in life (Tóth-Király, 2020). These basic movement skills help participants engage confidently in a variety of sports (Byl, 2014). Basic movement skills are one of the important things in a person's movement development phase (Pangkey, 2020).

With good basic movement skills, a person can perform various sports skills. Foundational skills, sometimes called basic movement or functional skills, are the skills a child needs to function effectively in the environment (Stanton, 2016). Basic skills are basic human movements that are usually identified by a single verb, such as walking, turning, running, jumping, or stretching. Basic movement skills are “a set of specific skills that involve different parts of the body such as the legs, feet, body, head, arms and hands”.(Kezić, 2018). Basic movement skills form the building blocks of everyday activities such as running for the bus, jumping over puddles, and stretching to stop a cup from tipping over (Wang, 2013). The unification method is a method and training to introduce and understand the basic movements of Running ABC which are good, efficient, and harmonious. Unification analysis can describe basic movement errors that are often made during training (Hernawan, 2020). Children's motor repertoires expand rapidly during the second year of life (Eime, 2013).

Basic movement skills support overall development of children, especially their coordination and physical dexterity.” (Cresham, 2021). The observable movements can be grouped into three functional categories according to the purpose and the entire phase of motor development: stability movement tasks, locomotor movement tasks, and manipulative movements, or a combination of the three (Goodway, Motor development in young children. , 2013). In brief, if movement functions as a trigger for the process of motor development, then one way to study this process is through the sequential development of motor skills across the life span. There are three fundamental phases that must be passed, namely the proficient stage, emerging elementary stages, and initial stage. Although children become mature and learn at different rates, almost all children learn their fundamental movement skills in the same order and through the same phases (Pommier, 2020). Stability is the ability to maintain body position against the force of gravity, which can include other circumstances that increase the difficulty of the task (Ozmun, 2012). Maintaining stability is essential for not only most sports-related motor skills, but also many functional skills (Foster, 2019). Nonlocomotor skills are performed without significant movement from one place to another (Aaron, 2022).

Manipulative skills are a person's skills in manipulating objects. “Manipulative skills (also referred to as object control skills) generally involve a combination of at least two movements and are performed in conjunction with other types of movement” (Foster, Constraints Model for Improving Motor Skills in Children with CHARGE Syndrome., 2019). Additionally, manipulative skills involve the use of some types of tool, often with the hands but also with the feet or other parts of the body. Manipulative activities develop hand-eye and foot-eye coordination and dexterity (Pangrazi, 2019). By using equipment such as balloons, hoops, magic wands, bean bags, balls, tug-of-war ropes, Lummi sticks, Frisbees, and spoons, students can develop manipulative skills in a variety of situations (Li, 2013). Object control skills require the children to control objects using body parts or using tools (Bucher-Koenen, 2018). Manipulative skills involve moving and controlling objects. The body is used to apply force to an object and to absorb force when receiving or controlling an object. Manipulative skills allow children to give

or receive force to and from objects to achieve certain results (Jenkins, 2022). Manipulative skills are a person's ability to manipulate objects around them to achieve certain goals (KARISMAN, 2021). Manipulative skills involve the use of some types of tool, often with the hands but also with the feet or other parts of the body (Stanton NA, 2019).

Quality physical education offers a variety of physical and fitness activities that are developmentally appropriate and enjoyable for students; use meaningful and appropriate teaching practices to provide students with maximum learning experiences; and ensure students to spend 50% of class time in MVPA (Heidorn, 2013). Students are people who have basic potential, namely cognitive, affective and psychomotor, who try to develop their own potential through the learning process in educational pathways, both formal and non-formal education, at certain levels of education and types of education (Suwartini, 2017). Movements can be grouped into three functional categories according to their purpose namely: stabilizing movement tasks, locomotor movement tasks, and manipulative movement tasks, or a combination of the three (Darmawan, 2018). The age period of 2-7 years is a fundamental movement phase (basic movement stage) and in the age period of 7-10 years, 11-13 years, 14 years is the specialized movement phase (special movement stage). The process of forming movements does not occur automatically, but is an accumulation of learning and practice processes, namely by understanding movements and carrying out movements repeatedly accompanied by awareness of whether the movements being carried out are correct or not. Therefore, the growth and development of students can have good basic movement skills with the presence of professional teachers. The potential of students generally consists of three categories, namely cognitive, affective and psychomotor in assessing their learning of movement skills, especially manipulative basic movements which have been programmed through RPPH indicators and visitation assessment instruments in schools.

MATERIALS AND METHODS

This research used quantitative type with experimental method containing pre-test and post-test as well as test results for manipulative basic movement learning skills. The population of this study was all students aged 5-6 years spread across the provinces of South Kalimantan and North Sumatra. The treatment given was in the form of a manipulative basic movement learning model through the development model of throwing, catching, bouncing, hitting and kicking (Asmawati, 2015). The large-scale test (Pre Test) consisted of 40 students who were given 22 models that met the criteria, showing 71% of the expected criteria at AL Amin Martapura Kindergarten. Meanwhile, the effectiveness test (Post Test) involved 60 students who were divided into 2 groups, including an experimental group and a control group at the AHA Asahan Kindergarten, North Sumatra Province, using 22 models that were suitable for use for age 5-6 years. This activity was given for 30 days. The research instrument used was experimental method (Judanto, 2020). The following is a narrative of research activities for the manipulative basic movements learning model aged 5-6 years using the experimental method through pre-test and post-test:

1. Pre Test of Manipulative Basic Movements Aged 5-6 Years

After the results of the development of manipulative basic movement learning products using simple tools in the form of games for students aged 5-6 years had been tested on a small scale and had been revised, the next stage was to conduct a large group trial (field group try out). Based on the results of limited trials (small group trials) which had been evaluated by experts, the researchers then revised the product and obtained22 models used in large group trials (field group try out). Based on the results of large group trials carried out on 22 learning models using simple tools in the form of games by experts, a maximum score of 95 was obtained or with an average percentage of results using the model of 74.3%. Therefore, the use of the entire model in this development can be categorized as valid and suitable for use in developing manipulative basic movement learning models using simple tools in the form of games for students aged 5-6 years. The next step after the model underwent phase II revision from experts was to continue by testing the product on a large group (field group try out) using research subjects of 40 students aged 5-6 years at AL Amin Kindergarten, Banjar Regency. Assessment data from 40 respondents/students regarding the effectiveness of the basic manipulative movement learning model using simple tools in the form of games is shown in table 1 below:

RESULTS AND DISCUSSION

Table 1. Stage II Assessment Results of Manipulative Basic Movement Learning Model Using Simple Tools in the Form of a Game

Subject	Indicator					Score	Information	Category
	Throw	Catch	Dribble	Kick	Bounce			
A	19	18	11	15	14	77	Used	Good
B	14	14	12	17	14	71	Used	Good
C	14	15	9	16	18	72	Used	Good
D	15	16	11	15	18	75	Used	Good
E	17	17	12	12	14	72	Used	Good
F	17	16	10	13	14	70	Used	Good
G	18	15	11	15	12	71	Used	Good
H	14	18	14	18	17	81	Used	Good
I	15	14	12	14	18	73	Used	Good
J	14	14	12	16	14	70	Used	Good
K	14	16	10	18	13	71	Used	Good
L	16	18	13	17	11	75	Used	Good
m	18	12	12	18	18	78	Used	Good
N	17	18	10	12	18	75	Used	Good
O	15	15	13	12	15	70	Used	Good
P	15	16	12	15	16	74	Used	Good
Q	18	17	14	18	18	85	Used	Good
R	16	17	10	16	14	73	Used	Good
S	18	16	12	18	16	80	Used	Good
Q	14	15	14	14	18	75	Used	Good
U	15	14	12	16	17	74	Used	Good
V	15	16	9	18	15	73	Used	Good
W	12	18	13	17	15	75	Used	Good
X	14	14	12	16	15	71	Used	Good
Y	16	16	14	16	16	78	Used	Good
Z	18	18	9	18	18	81	Used	Good
AA	17	17	9	14	18	75	Used	Good
AB	15	18	10	11	17	71	Used	Good
AC	18	17	12	12	14	73	Used	Good
AD	16	15	14	13	14	72	Used	Good
A.E	16	18	10	18	18	80	Used	Good
AF	18	12	9	17	17	73	Used	Good
AG	17	11	11	15	18	72	Used	Good
AH	15	15	11	18	17	76	Used	Good
AI	15	16	13	16	15	75	Used	Good
AJ	18	17	8	16	18	77	Used	Good
AK	16	17	8	18	12	71	Used	Good
AL	18	16	9	17	11	71	Used	Good
AM	14	15	14	15	15	73	Used	Good
AN	15	14	13	15	16	73	Used	Good

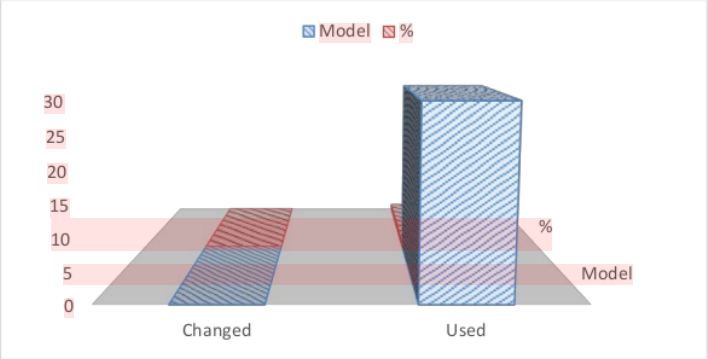

Figure 1. Results of the percentage of small group tests (Field try groups) that have been made

To calculate the average effectiveness of the large group trial learning model, the average effectiveness of this approach was calculated using the ideal score.

Ideal score: 5 x 1 x 30 x 40 = 6000

Information:

5 : The five highest answer scores

1 : One assessment indicator item (an attitude of courage, an attitude of concentration (focus) and an attitude of enthusiasm)

30 : Thirty stages of movement

40 : Forty respondents

Based on table 1.2, the amount of data obtained = 4290. Thus, the overall effectiveness of the new learning model is 4290: 6000 = 0.715 or 71% of the expected criteria.

Table 2. Level of Effectiveness of the Manipulative Basic Movement Learning Model

Score	Category	Meaning	Total
≥ 80	Excellent	Used	4
60-79	Good	Used	36
40-59	Fair	Not used	0
30-39	Poor	Not used	0
< 29	Very Poor	Not used	0

Based on the psychomotor score table above, it was found that 4 students scored ≥ 80 in the Excellent category and 36 students scored 60-79 (good), and all of them were in the good category. Thus, it can be concluded that the learning material for manipulative basic movements for students aged 5-6 years has been successful and can be used for students.

According to the results of small group trials, then product revisions, and large group trials, it can be concluded that the development of manipulative basic movement learning model is effective for students aged 5-6 years. From the results of the recapitulation of large group trials (n= 40) above, it can be concluded that the entire manipulative learning model for children aged 5-6 years can be applied because they can all carry it out but are still given instructions by the teacher. Based on the results of the field test, it shows that this learning model has been tested and has not been revised further, all aspects highly feasible for use.

2. Post Test of Manipulative Basic Movements Aged 5-6 Years

Based on small group and large group trial activities that have gone through product revisions, it is recommended that effectiveness tests be carried out at

Kindergarten Asmaul Husna Kab. Asahan North Sumatra consisted of 60 students consisting of 30 students (Experimental Group) and 30 students (Control Group) to determine the effectiveness of the manipulative basic movement learning model product and compare it with the control group. The implementation process was carried out using a Pre-Experimental research design in the form of a "pretest - posttest with control group". The steps taken were as follows: (1) determining the research subject group: (2) carrying out a pre-test, (3) trying out a gross motor learning model with a manipulative basic movement model, (4) carrying out a post-test (5) looking for the average score of the pretest and posttest results, then compared it with the control group, (6) looking for the difference between the two averages through statistical methods (t-test) repeated observations to find out whether there was a significant influence from the use of this model on learning outcomes gross motor skills with manipulative basic movement models. The assessment results of the effectiveness of the manipulative basic jumping model for children aged 5-6 years are as follows:

Table 3. Results of the manipulative gross motor skills test
Pretest and Posttest at Kindergarten Asmaul Husna Kab. Asahan, North Sumatra

Group			Group		
Testee	Experiment		Testee	Control	
	Pretest	Posttest		Pretest	Posttest
1	50	78	1	55	73
2	52	74	2	63	72
3	59	72	3	64	76
4	61	75	4	63	65
5	55	72	5	64	76
6	62	77	6	56	75
7	62	76	7	57	67
8	67	82	8	63	71
9	60	84	9	65	70
10	63	83	10	55	73
11	58	71	11	63	73
12	55	75	12	64	72
13	59	78	13	63	74
14	54	75	14	64	73
15	63	70	15	56	70
16	65	74	16	57	68
17	68	85	17	63	77
18	58	73	18	65	70
19	61	80	19	55	65
20	51	75	20	63	71
21	50	74	21	64	70
22	56	73	22	63	70
23	52	75	23	64	73
24	62	71	24	55	67
25	67	78	25	63	74
26	60	81	26	64	78
27	55	75	27	63	77
28	59	71	28	64	77
29	57	73	29	56	63

30	68	72	30	57	65
31	68	80	31	63	65
32	66	73	32	65	70
33	62	72	33	63	70
34	64	76	34	55	67
35	65	75	35	63	70
36	67	77	36	64	70
37	65	82	37	63	73
38	63	80	38	64	60
39	64	73	39	56	60
40	56	73	40	57	69
41	57	82	41	63	65
42	52	82	42	65	65
43	53	87	43	63	70
44	60	80	44	55	70
45	60	78	45	63	67
46	61	75	46	64	72
47	69	76	47	55	71
48	55	75	48	63	74
49	63	84	49	64	76
50	64	83	50	63	76
51	63	80	51	64	76
52	64	76	52	55	68
53	56	75	53	63	75
54	57	77	54	64	77
55	63	71	55	63	75
56	65	71	56	64	73
57	63	73	57	56	73
58	64	73	58	57	78
59	56	78	59	63	76
60	57	80	60	65	70
∑	**3611**	**4589**	**∑**	**3676**	**4266**
X	**60.18**	**76.48**	**X**	**61.27**	**71.10**
SD	**5.02**	**4.16**	**SD**	**3.66**	**4.36**

The table above shows the average of pretest and posttest scores. The average posttest score is greater than the average posttest score. This shows that the average gross motor skills of students increased after using the learning model created. After the researchers knew the average of the pretest and posttest results, the next step was determining the effectiveness of gross motor skills increasing after using the manipulative basic movement learning model. An N-Gain Percent test and a T-test were carried out using the independent sample T-test. The results of the N-Gain Percent test are as follows:

Table 4. N-Gain Percent Test Results

No	Class	N-Gain Percent	Interpretation
1	Experiment	76.89	Effective
2	Control	31.88	Ineffective

Based on the N-gain Percent results, it shows that the average N-gain percent value for the experimental class (manipulative learning model for children aged 5-6 years) is 76.89%, which is in the "effective" category. The minimum N-gain percent value is 37.50% and the maximum N-gain percent value is 100%. Meanwhile, the average N-gain percent for the control class was 31.88%, which was included in the "Ineffective" category. The minimum N-gain percent value is 10.00% and the maximum N-gain percent value is 66.67%. Therefore, it can be concluded that the use of the manipulative learning model for children aged 5-6 years is effective in improving the gross motor skills of students in the unit/institution. Meanwhile, the results of learning gross motor skills without using a learning model are not effective. Based on the results of the effectiveness test, according to Nieveen's opinion quoted by (Lovisia, 2018) that the model is said to be good if it meets the criteria, one of which is logical theoretical rational validity. A good learning model, one of which is characterized by a logical theoretical rationale and the learning objectives to be achieved.(Munawaroh, 2012). From the test results above, it shows that there was a significant improvement after being taught gross motor skills using the manipulative learning model, so that it can be used and applied for students aged 5-6 years.

Next, to find out whether the differences in the averages were significant, an independent sample T-test was carried out. Before carrying out this test, the data must be tested for analysis requirements first, namely the normality test. Homogeneity test used IBM SPSS 27. The normality test results are as follows:

Table 5. Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistics	df	Sig.	Statistics	df	Sig.
N-Gain Percent	Experiment	.130	60	.055	.943	60	.029
	Control	.120	60	.104	.936	60	.015

Based on the table above, it shows that the N-Gain percent for the experimental class has a significant value of 0.055 > 0.05 and 0.104 > 0.05 for the control class, so the hypothesis is accepted. This shows that the N-Gain of gross motor skills in the experimental and control classes is normally distributed. Next, the researchers carried out a mean difference test. This test uses the independent sample T-test with a significance level of 0.05. The results of the average gross motor N-Gain difference test are as follows:

Table 6. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
								95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

NGain_Press en	Equal variances assumed	.059	.809	12.5558	.000	45.00	3.58533	37.884	152.13431
	Equal variances not assumed			12.5558	.000	45.00	3.58533	37.883	852.13456

Based on the table above, it is known that the value, Sig (2-tailed), is 0.000 < 0.05 and the score of tcount = 12.55 with df = 58 obtained ttable = 1.98729, then the increase in gross motor skills in the experimental group is higher than the increase in gross motor skills in the control group. Therefore, it can be concluded that the use of learning models with a manipulative learning model is effective for increasing the results of gross motor skills of children aged 5-6 years.

CONCLUSION

Referring to the results of implementing the manipulative basic movement learning model development, it is an effort to help students aged 5-6 years for participating in gross motor skills learning actively, creatively, effectively, and in encouraging and fun ways. The manipulative basic movement learning model has a principle that requires teachers to assess the learning needs of children aged 5-6 years, so that children do learning in addition to having fun and improving the quality of their multilateral movements, such as walking, running, jumping and skipping. In principle, the manipulative basic movement learning model is an effort to change the learning paradigm which is currently indoor-oriented only and the indicators in the early childhood accreditation assessment instrument items.

Conflict of Interest

The author declares that this article has no conflict of interest.

Ethics Committee

This research was approved and supervised by the research committee department, Institute for Research and Community Service, Muhammad Arsyad Al Banjari Islamic University of Kalimantan Banjarmasin, Indonesia (Reg No 38/UNISKA-LP2M/II/2024

Author Contributions

Thank you to the educators and students as well as the Principal and Teachers of An Nur Banjarbaru Kindergarten, Al Islah Martapura Kindergarten, Al Amin Martapura Kindergarten, South Kalimantan Province and the Principal and Teachers at AHA Asahan Kindergarten, North Sumatra who were involved in the research and who gave permission to collect data on educators and students. Special thanks to the lecturers at Jakarta State University who always sincerely provide me with motivation, knowledge and thoughts so that this research can be completed well. Thank you to the Kalimantan Islamic University Muhammad Arsyad Al Banjari Banjarmasin and UPT Publication and Journal Management UNISKA MAB.

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