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## The Effect of Manipulative Games to Improve Fundamental Motor Skills in Elementary School Students

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### Abstract

This study aims to improve fundamental motor skill skills by using manipulative games. The method used in this study was experimental using a one-group pretest-posttest design. The research was conducted by applying manipulative games in physical education learning. To measure and find out the results of the data obtained by researchers using the statistical package for the social sciences (SPSS) software. The sample in this study was elementary school students with a total of 30 students. Random sampling with random sampling technique. The data collection technique in this study used a gross motor skill-second edition test which was analyzed using quantitative descriptions and different tests. The research results showed an increase in the fundamental motor skills of elementary school students through manipulative games; this was because manipulative games were able to stimulate students to be active in carrying out fundamental motor skills and fun activities for students. The conclusion in this study is that there is a significant effect of manipulative games on the fundamental motor skill of elementary school students.

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### Introduction

Physical Education, Sports, and Health is one of the subjects carried out at the elementary, secondary, and even higher education levels. Physical education aims to develop aspects of physical fitness, movement skills, critical thinking skills, social skills, reasoning, emotional stability, moral action, and a healthy lifestyle (Depdiknas, 2006). The National Education Standards Agency (BSNP), in the 2006 Elementary School Physical Education Subject Syllabus Model, stated that sports and health physical education taught in schools have an important role, namely: providing opportunities for students to see firsthand in various learning experiences through physical activities, that sports and health which are carried out systematically provide a learning experience to foster better physical growth and psychological development, as well as forming a healthy and fit lifestyle throughout life (Depdiknas, 2006).

One category of movements that are often done in elementary school is fundamental motor skills. Fundamental motor skills are a necessity that must be learned during elementary school age, considering that they will be

needed to support the development of body posture in adolescence and adulthood. Fundamental motor skills include locomotor, non-locomotor, and manipulative. These three fundamental motor skills are in the curriculum of elementary school children in lower grades. It means that at this time, children are required to carry out physical activities that are related to play activities.

Nowadays, we often see children's play activities shifting from manual games to digital equipment games (Adipat et al., 2021; Rahimi, Shute, & Zhang, 2021; Syafii, Kusnawan, & Syukroni, 2020). Children no longer play marbles or play traditional games in the afternoon. They prefer to access entertainment and relax their minds and bodies by watching television, playing various Playstation games, browsing cyberspace, and playing on cell phones. At home, they are always served with a remote control or playing games via a smartphone. This comment is in line with what was stated by Elliott et al. (2006) that most children go to school by car, watch too much TV, play in front of the computer, and do not have many opportunities to play outside, causing children to have little physical activity.

Nowadays, most student activities are sitting and making interaction with their smartphones because of the covid-19 pandemic. They are required to learn how to use smartphones online. This situation makes the student get much information from the internet due to the students focusing on smartphones. In the break time after learning, most elementary school students fill their time by playing online games on smartphones. In addition, the use of smartphones is also one of the shortcuts taken by parents to gather at home. Parents think that smartphone playing will be safer for students and easier to supervise (Maria & Novianti, 2020). Smartphone usage has positive and negative impacts. The positive impact is to make students creative and intelligent. On the other hand, the negative impact make students inactive (Nugraha, 2017).

### **Changes Physical Activities Through Games with Games Activities in Smartphones**

Changes in physical activity through game applications on smartphones make parents worried. Based on a survey of elementary school students, they know every game application on smartphones. This result decreases student physical activity. Student physical activity is rarely found today. PE teachers and parents should pay attention to this problem if this is playtime and socialization for elementary school students.

In essence, development at the age of 6 to 12 is a period for fun activities by playing (Harahap & Seprina, 2019). This thing is the responsibility of the PE teacher to drive, stimulate, and become active. Children should be educated at an early age to improve their physical activity skills (Wilczyńska et al., 2021), which pushes the student to think positively. Children at the age of 6 to 12 years are not the time to get to know smartphones. They are easy to get all information (Maria & Novianti, 2020).

Physical education teachers and parents must balance the development of the digital era with the learning needs of physical education. This situation is a fundamental problem for students' fundamental motor skills in playing. Physical activity in play is a vehicle to drive and motivate to encourage and stimulate learning problems; by learning, physical activity drives students to think and know why and how. Play is an important role in the

development and knowledge, and development of children's observations. Students tend to be inactive. Inactive students make little movement or too much silence; this phenomenon causes metabolic disorders of the body that cause a decrease in physical fitness, health, overweight (Hoorweg, 2019). Cause delay in social, cognitive, and emotional development (Gustiana, 2011). Students who have low emotional intelligence have bad behavior, and students who have high emotional intelligence can face life's challenges and can control emotions better (Gustiana, 2011).

### **The Importance of Games for Elementary Students**

School-age is a time when students have to play more than stay silent (Gustiana, 2011). Games are one type of sports activity very popular with children (Gustiana, 2011). Game is one of the activities that can make the heart happy, not only that game is also an important part of human life, especially elementary school students because the game has become an inherent characteristic of students so that game is the main activity carried out students. Games, in general, have a positive impact on students learning physical activity such as being able to develop various aspects, including physical, fine, and gross motoric aspects, strengthening social skills, increasing emotional intelligence, personality, skills, and achievements to be proud of (Burstiando, 2015; Nani et al., 2019). In addition, playing can be used to improve physical health because students become more active in carrying out movement activities and make students skilled in communication (Supriadi, 2019). The motor development of elementary school students focuses on fundamental motor skills (Lubans et al., 2010).

Syahrial (2015) divides games into four main categories, namely:

- (1) Agon is a competitive game, the resistance of both parties with the same opportunity to achieve victory so that a hard physical struggle is needed.
- (2) Alea is a game that relies on luck, or the law of chance such as dice, cards, roulette. That athletic ability is not required.
- (3) Mimicry is a fantasy game that requires freedom.
- (4) The games include reflection for movement, adventure, and dynamics, such as exercising outdoors and climbing mountains.

From the opinions above, it can be concluded that games that are used as a way to convey learning have many benefits, including; the game is a fun thing so that it can attract students' interest in learning, allows the active participation of students, games are flexible, one of which is easy to apply in various subjects by changing the content and learning media, games make it easy to apply concepts. Students will more easily understand a concept that is practiced directly.

### **Mastery of Fundamental Movement Skills**

Mastery of fundamental movement skills is important in achieving movement skills in sports, games, and rhythmic activities. In addition, the mastery of fundamental motor skills encourages students to move effectively and efficiently and explore their environment (Tandon et al., 2016). Fundamental motor skill is a movement

pattern that is the basis for achieving more complex movement skills (Imani et al., 2020). The fundamental motion itself is divided into three components, namely, locomotor, non-locomotor, and manipulative motion. A movement involving controlling an object, especially with the hands and feet, is called manipulative motion.

Qualification skills of manipulative movements are receptive and propulsive. Puspitowati et al. (2013) suggest that using these large muscles for early childhood is classified as a fundamental motor skill ability to improve the quality of life. Manipulative movements are usually described as movements that play with certain objects as a medium or skills that involve a person's ability in parts of his body to manipulate objects outside himself. Syahrial (2015) suggests that this skill needs to involve eye-hand coordination and speed, agility, eye, and foot coordination, for example, catching, throwing, kicking, hitting with a racket, stick, or bat.

The development of manipulative motion is a skill to manipulate objects while moving (Rahmah et al., 2019). It is suggested that manipulative motion is a movement that requires coordination with space and objects around it (Lemos et al., 2012). Movement or manipulative skills involve the act of controlling an object, especially with the hands and feet. Some of the manipulative movements include rolling the ball or the like, throwing and catching, holding or trapping, bouncing or dribbling, hitting, and the like (Rahmah et al., 2019).

In this regard, it is certainly a challenge for education, especially physical education in improving motor quality. One of the factors that influence the success of achieving physical education goals is the teacher because the teacher is one of the spearheads in implementing student education in elementary schools. Furthermore, skilled teachers who have many innovations in the selection of learning methods and can motivate students in participating in the learning process will be able to improve the quality of learning and be able to prepare students to have high-quality skills (Putro et al., 2013).

In addition, the problems faced by elementary school students are that many display movements that are less than optimal and lack good coordination, the movements that are carried out still seem stiff and not optimal such as unbalanced hand and foot coordination, and when doing sports movements such as throwing, and throwing. The capture looks not optimal. Along with that, we need an effort and learning method that can motivate and generate interest so that problems can be overcome, one of which is a fun and effective learning approach or model to develop elementary school students' fundamental motor skills through manipulative games.

Various research studies have shown a significant effect of the application of manipulative games in developing the fundamental motor skill of elementary school students, including the application of manipulative games that have benefits that can build students' abilities and character (Maria & Novianti, 2020) and improve fundamental motor skill (Abdullah et al., 2013). Manipulative games are young to play because manipulative games have the concept of throwing and catching games that focus on a set target. Manipulative movement ability also has an element of play (Rahmah et al., 2019).

From these results, it is necessary to research to improve the fundamental motor skill by using manipulative games. The research carried out is adjusted to the characteristics of students and environmental conditions so that the research carried out has benefits for students. The target in this research is elementary school (SD)

students because the development has experienced extraordinary physical and mental development.

## Method

The method used in this research is to use an experimental method with a one-group pretest-posttest research design. Before testing the hypothesis, the data was tested with a normality test and a homogeneity test using (SPSS) version 2.1. The trial was carried out through the stages of giving a pretest (pretest) to determine students' initial abilities, then treatment/stimulus as an effort to improve students' fundamental motor skill in the initial test, the treatment was given using manipulative games.

The manipulative games used are throwing, catching, kicking, and rolling the ball. Treatment trials were given in 10 meetings, and then divided into several groups of four to five students. Each group is given a competition to complete the tasks contained in the manipulative game within 8 minutes. The teacher acts as a facilitator to supervise the game by the nature of the manipulative game. Student activities in playing games are documented through video recordings which are then analyzed using the kinovea application to assist teachers in providing assessments.

## Results

Table 1 shows that all variables' significance value ( $p$ ) is greater than 0.05, so the data is normally distributed. Because all data are normally distributed, the analysis can be continued with parametric statistical analysis.

Table 1. Normality Test Result

One Sample Kolmogorov Smirnov	Sig.	Note	Conclusion
Manipulative	0.095	Ho accepted	Normal data
Games	0.312	Ho accepted	Normal data

Using Homogeneity Levene statistics by testing the pretest and posttest data, A homogeneity test was conducted to determine whether the sample came from the same variance or homogeneous. The homogeneity results are as follows can be seen in Table 2.

Table 2. Test of Homogeneity of Variances

Levene Statistic	df <sub>1</sub>	df <sub>2</sub>	Sig.
3.424	1	58	0.071

The description of the results of the research on fundamental motor skill data in the pretest before the treatment and after the treatment (posttest) with throwing and catching movements produces the following data.

### Throwing Movement

Throwing movement data before the pretest is more dominant in the low category with a total of 17 students (57%) with a standard score range of 4-5, very low category 11 students (36%) with a standard score range of 1-3, for the high category two students (7%) with a standard range of scores 6-7. While the scores after being given treatment (posttest). Four students were in the very high category (13%) with a standard score range of 8-12, the high category was 25 students (83%) with a standard range of 6-7 scores, and the low category was one student (4%) with a standard range of 4-5 scores. The results of the data (pretest) and data (posttest) can be seen in Table 3.

Table 3. Frequency Distribution of Pretest and Posttest Throwing Movements

Assessment	Score	Frequency			
		Pretest		Posttest	
Relative	Standard	Absolute (Fa)	(%)	Absolute (Fa)	(%)
Very High	8–12	0	0.00%	4	13.0%
High	6 – 7	2	7.0%	25	83.0%
Low	4 – 5	17	57.0%	1	4.0%
Very Low	1 – 3	11	36.0%	0	0.00%
Total		30	100%	30	100%

### Capture Movement

The data captured by movement result with a relatively small number of assessment indicators so that the assessment before the treatment (pretest) is more dominant in the high category with a total of 21 (70.0%) students in the standard score range of 4-5. 9 (30,0%) students in the low category, the standard score ranges from 2–3, while the score after the treatment (posttest) is most dominant in the very high category with a total of 16 (53.33%) score ranges 6 and 14 (46.67%) students in the category high score range 4–5. The results of the data (pretest) and data (posttest) can be seen in Table 4.

Table 4. Frequency Distribution of Pretest and Posttest Catching Movements

Assessment	Score	Frequency			
		Pretest		Posttest	
Relative	Standard	Absolute (Fa)	(%)	Absolute (Fa)	(%)
Very High	6	0	0.00%	16	53.33%
High	4 – 5	21	70.00%	14	46.67%
Low	2 – 3	9	30.00%	0	0.00%
Very Low	1	0	0.00%	0	0.00%
Total		30	100%	30	100%

### Kicking Movements

The results of kicking movements before the treatment (pretest) were more dominant in the low category with a total of 27 (90%) students in the standard score range of 4–5 and 3 (10%) students in the very low category with a standard score range of 1–3, while the value after the treatment (posttest) is most dominant in the high category with a total of 23 (76.66%) with a score range of 6-7, 5 (16.66%) students in the very high category with a score range of 8-12, 2 (6.66%) ) low category score range 4–5. The results of the data (pretest) and data (posttest) can be seen in Table 5.

Table 5. Frequency Distribution of Pretest and Posttest Kicking Movements

Assessment	Score	Frequency			
		Pretest		Posttest	
Relative	Standard	Absolute (Fa)	(%)	Absolute (Fa)	(%)
Very High	6	0	0.00%	5	16.66%
High	4 – 5	0	0.00%	23	76.66%
Low	2 – 3	27	90.00%	2	6.66%
Very Low	1	3	10.00%	0	0.00%
Total		30	100%	30	100%

### Ball Rolling Movements

The results of kicking movements before the pretest were more dominant in the very low category with a total of 20 (66.66%) with a standard score range of 1-3. 8 (26.66%) students in the low category with a standard score range 4-5 and 2 (6.66%) high category students with a standard range of 2-3 scores. While the score after the treatment (posttest) was most dominant in the very high category with a total of 18 (60.00%) with a score range of 6-7.10 (33.33%) students in the high category with a score of 4-5.2 (6.66%) low category score range of 2–3. The results of the data (pretest) and data (posttest) can be seen in Table 6.

Table 6. Frequency Distribution of Pretest and Posttest Ball Rolling Movements

Assessment	Score	Frequency			
		Pretest		Posttest	
Relative	Standard	Absolute (Fa)	(%)	Absolute (Fa)	(%)
Very High	6	0	0.00%	18	60.00%
High	4 – 5	2	6.66%	10	33.33%
Low	2 – 3	8	26.66%	2	6.66%
Very Low	1	20	66.66%	0	0.00%
Total		30	100%	30	100%

In Figure 1, the percentages of pretest and posttest manipulative play scores on fundamental motor skill are given.

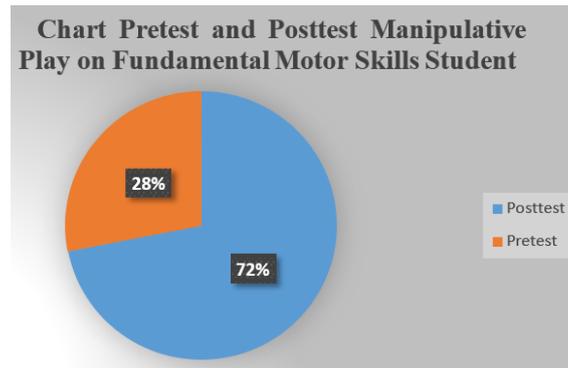


Figure 1. Pretest and Posttest Manipulative Play on Fundamental Motor Skill

Based on the influence test that has been carried out to answer whether the proposed hypothesis is accepted or rejected using the t-test, the results of fundamental motor skills are obtained with a count of 58.44 and then compared with a  $t_{table}$ . Then obtained  $DB = (N-1)$  with a significant level of 5% of 1.699. From the results of the calculations,  $t_{count}$  and  $t_{table}$  can be concluded that the fundamental motor skill test with a count of  $58.44 > t_{table}$  1.699, so the hypothesis shows the influence of manipulative games on the fundamental motor skill of elementary school students with a percentage of 45.50%. The results of the processed t-test values can be seen in Table 7.

Table 7. Processed Value of Pretest and Posttest t-test Percentage Increase

Treatment	Description	$t_{count}$	d.b	$t_{table}$	Level	Percentage
					Significant	Improvement
Manipulative Games	Pretest - Posttest	58.44	29	1.699	5%	45.50%

## Discussion

Based on the study results, it was found that there was an increase in the fundamental motor skill of elementary school students. These results can be seen from before the treatment (pretest) and after the treatment (posttest) using the assessment rubric Test of Gross Motor Skill-Second Edition (TGMD-2), which consists of catching, throwing (Bremer & Lloyd, 2014). This result is supported by Isti's research (2020, p.50) that the game of baseball (throwing and catching the ball) has a positive impact on improving the fundamental motor skill of elementary school students.

Furthermore, Supriadi's (2019) results show that games can improve fundamental motor skills in elementary school students, especially lower grades. This result happens because traditional games are fun while playing.

The characteristic that always wants to play is inherent in students (Nugrahastutik & Puspitaningtyas, 2016). The application of play can also improve the ability and basic skills of locomotor, non-locomotor, manipulative motion (Hidayat, 2017). With a playful approach, students also have the opportunity to express what they feel and think, so indirectly, students by playing can develop gross, smooth muscles, creativity reasoning, imagination, and developing themselves. Moreover, students get satisfaction in playing (Supriadi, 2019). By playing, students can also develop physical aspects, fine and gross motor skills, social, emotional, personality, improving skills, intelligence, namely intellectual, emotional, and spiritual intelligence (Maria & Novianti, 2020).

The application of manipulative games has many benefits, making it easier for elementary school students to play them. Besides, the tools and facilities used are not too expensive and do not use much money because the game tools are easy to modify. The tools used only need imagination and creativity. Furthermore, manipulative games involve many people, so that the use of learning time is effective. Besides involving many people (students) will cause students to be able to communicate with peers related to the manipulative game model that is carried out, the process of interaction through communication will form an attitude of togetherness, honesty, responsibility, sportsmanship, spirit to compete and obey the rules made (Fajrin, 2015).

In addition, the application of the game also has a positive impact on positive control of social skills, physical and motor abilities, and student control (Lubans et al., 2010). Manipulative games that are carried out are still traditional, meaning that games are designed using elements that do not use many good facilities or tools. Manipulative (traditional) games can also increase effectiveness and attract students' enthusiasm in participating in physical education learning (Tandon et al., 2016). In line with this, manipulative (traditional) games can also develop sportsmanship, honesty, tenacity, patience, and motor skills. Moreover, games can teach teamwork and form friendly, caring, and patient characters (Wilczyńska et al., 2021). Traditional games have great cultural value to develop students' abilities, including skills, courtesy, character, activeness, creativity, and exercise, and a means to develop students' abilities (Widodo & Lumintuarso, 2017).

Since the rules can be made due to the player's agreement, each region has traditional games with their characteristics. In this case, traditional games can make students more active in carrying out movement activities, eliminate boredom from the learning process, and work collaboratively to achieve the expected learning goals because traditional games use simple equipment. Traditional games also contain elements that can develop students' abilities, including intellectual, emotional, character, personality, creative, and cognitive abilities. They can also develop elements of basic locomotor, non-locomotor, and manipulative movements because traditional games contain a lot of motion activities, namely the fundamental motor skill of running, walking, jumping, leap (long jumps), horizontal jumping, catching, kicking, throwing, and rolling the ball (Veldman et al., 2018).

The traditional games used have been modified and arranged so that students are easy to play and learn the game by the principles of game development. In addition, aspects that need to be considered in modifying traditional games are movement activities that are adapted to the development of student movement, simple models that are

easy to understand in order to improve skills, fitness, encourage students to do physical activities, maximize active learning time and teach the value of cooperation that can solve the problem indirectly. The manipulative games used in this study are throwing and catching the ball with obstacles and throwing and catching the ball with the target.

Physical activity (motion) in the game is modified in fundamental motor skill activities. The selection of fundamental motor skills as movement activities because at elementary school age is the golden age (the golden years) where students begin to experience sensitivity/sensitivity to receive stimuli, and also the sensitivity of students varies along with the rate of growth and development of students individually (Sutini, 2018) since students have very large abilities and curiosity. Furthermore, the development of the movement of elementary school students, especially the lower class, is at the stage of fundamental motor skill development. Fundamental motor skills are movement skills that are important in supporting the skills needed for a physically active life inculcation of fundamental motor skills developed from an early age becomes the capital always to be healthy and reduce the risk of diseases such as hypertension, diabetes, osteoporosis, and cardiovascular disease (Bremer & Lloyd, 2014).

Fundamental motor skill is one of the movements that do not occur naturally. However, it occurs with more complex physical and sports activities so that by mastering fundamental motor skills, students can take part in carrying out every physical activity (Burstiando & Kholis, 2017). Fundamental motor skills can also be one of the stages that will make students actively explore the ability to move in their bodies. Fundamental motor skill develops from the process of learning outcomes by responding to a stimulus in the form of motion control and movement skills that are influenced by maturity and environmental factors (Lemos et al., 2012).

Along with this, fundamental motor skills are one of the abilities that need to be mastered by elementary school students, considering that one of the goals of physical education programs in the learning process is so that students are skilled in carrying out physical activities both in the form of games and movement skills (Fadilah & Wibowo, 2018). Fundamental motor skills are also factors for developing physical, cognitive, social, and growing self-confidence (Lubans et al., 2010). Mastery of fundamental motor skills helps students control their bodies, adapt to the environment, and form good skills. On the other hand, failure in mastering the fundamental motor skill of students will cause students to become frustrated and fail to develop movement skills during adolescence and adulthood. Poor fundamental motor skills will harm students' physical activities and skills in the future (Supriadi, 2019).

The existence of motion learning in manipulative (traditional) games that have been modified intends to help or contribute to students mastering fundamental motor skills even though the increase is not too large. Because the motion learning process has stages, namely cognitive, associative, automation, and takes time to master these skills (Clark, 2007), many benefits are obtained in learning fundamental motor skills, including for student health, student motor development, cognitive development of students, social skills of students, emotional development of students (Bakhtiar, 2014) In addition, the benefits obtained by students in learning fundamental motor skills and doing physical activities include recognizing motion, improving the quality of motion, other

benefits increasing cognitive abilities, fitness, psychological and mental health (Tandon et al., 2016). On the same side, the benefits of learning fundamental motor skills are increasing students' self-confidence to adapt, interact, and participate in playing in the environment around students (Fadilah & Wibowo, 2018). The magnitude of the benefits obtained by students in learning fundamental motor skills should be a concern for parents and teachers. In addition to improving students' motor skills, they can also improve cognitive, affective, and emotional-social skills to meet learning objectives.

Based on the results of the analysis that the researchers did, it proved that the modified manipulative game improved the fundamental motor skills of elementary school students. The existence of these results is expected to make manipulative games that can be used as concepts and important points to be applied in the learning process of physical education in schools can be achieved properly.

The advantage of this research is that it can improve fundamental motor skills by using manipulative games. In addition, the tools and facilities needed do not cost much, so that they can be modified according to the circumstances in each school. The drawback in this study is that the skill assessment indicator only covers two fundamental motor skills: catching and throwing the ball. There are also shortcomings in the small number of participants and the implementation time of the game is also not long. Therefore, there is a need for further research to be tested with a wider number of participants for a long time and cover all aspects of fundamental motor skills.

## **Conclusion**

The application of manipulative games can improve the fundamental motor skills of elementary school students. There is an increase in student scores before the treatment (pretest) and after the treatment (posttest) with indicators of skill assessment, catching, and throwing the ball. Manipulative games are designed to be simple, meaning movement activities that follow the development of student movements that refer to the characteristics of student development. In addition, the manipulative games are conceptualized using a play approach so that there is an element of competition in it that will attract students to do good fundamental motor skills activities. The achievement in this research is due to traditional games simply arranged, movement activities following the development of student fundamental and the characteristics of student development. In addition, traditional games are conceptualized using a playing approach by competing to attract students' interest in doing good fundamental movement activities.

## **Recommendations**

Based on the results of the research conducted, it is hoped that it can be developed further to add scientific sources that have many innovations in choosing teaching methods and as teaching materials that can be used as a staple in fulfilling learning media in schools so that the objectives of the learning process can be achieved properly by fundamental motor skills learning.

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