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# Stimulating motor competence through field games: an experimental study On elementary school students

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**Abstract**: Motoric competence is a competency that requires understanding in carrying out physical activities. However, in the learning process motor competence is carried out without the support of understanding so that it results in students experiencing difficulties and confusion in executing the motor skills they have when in a different environment during training or learning. The research aims to measure the success of stimulation of motor competence by using the field games approach. The research was conducted in the pre-experimental type with the One Group Pretest Posttest Designs type. The experiment was conducted on twelve elementary school students in fourteen meetings. The research involved twelve fourth grade elementary school students who were taken randomly by selecting numbers at random. The instrument for measuring students' motor skills used the Test of Gross Motor Development revision 2 edition (TGMD-2) and understanding of playing using the Games Performance Assessment Instrument (GPAI) and the measurement results were analyzed using a quantitative descriptive method. The results showed that there had been an increase in the rating of students' motor skills and the average score of students' games performance. This result is due to the learning that is carried out using the field games approach which is able to encourage students to be active in making movements and facilitating metacognition processes such as decision making, critical thinking, and problem-solving. The conclusion of learning done with the field games approach can stimulate students' motor competence.
**Keywords**: stimulation, motor competition, field games.

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## INTRODUCTION

Motor competence is essential in optimizing student development. This is related to students who have good motor competence will affect the domain of progressive cognitive and social-emotional development. Motor competence can be interpreted as proficiency in fundamental movement skills in general including object control and the development of locomotor skills. Motor competence and physical activity will strengthen over time (Stodden et al., 2008). Some of the benefits when students have good motor competence are being able to have a healthy and fit body because it improves the cardiorespiratory system (Cohen et al., 2015), increases the performance of the metabolic and neuromuscular systems (Laukkanen et al., 2014), causes positive changes in the index physiological and anthropometric health of normal-weight and obese students (Lambrick et al., 2016), determinants of fitness in adolescence (Barnett et al., 2008). These benefits are relevant to efforts to maintain and develop adequate physical fitness and motor competence in students because these factors are important contributors to the health and well-being of students (M Haga, 2008). Other benefits are stimulating cognitive development and academic achievement of students ((Fedewa & Ahn, 2011); (Tandon et al., 2016), improving psychological and mental health (Lobstein et al., 2015), beneficial for social and emotional development (Strong et al., 2005).

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In the developments that are happening nowadays, it is found that many students are less active in carrying out movement activities because they spend more time watching television or playing with gadgets. The results of a study conducted by (Hallal et al., 2012) showed that the proportion of children aged 13–15 years who did moderate to vigorous intensity physical activity for less than 60 minutes per day was 80.3% (80.1–80.5) and inactivity increases with age, is higher in women than men, and increases in high-income countries. Students who are less active in physical activity can increase the risk of many adverse health conditions, including major non-communicable diseases such as coronary heart disease, type 2 diabetes, and breast and colon cancer, as well as shortened life expectancy (Lee et al., 2012) . Lack of physical activity is an important contributor to non-communicable diseases in high-income countries, and is increasing in low- and middle-income countries (Bauman et al., 2012). Students with low motor competence tend to have poor physical fitness compared to students with high motor competence. Differences in physical fitness results between groups were relatively constant over time. (Monika Haga, 2009)(Cattuzzo et al., 2016).

Another impact is that students who are less active in carrying out bodily activities experience delays in social, emotional, and cognitive development that occur throughout their lives (Kohl 3rd et al., 2012), and those with low motor skills show a less active attitude in learning than children who have good movement skills (Kohl 3rd et al., 2012)(Yudanto et al., 2021). In addition, students have delays in mastering math skills, difficulty paying attention, and delays in movement skills (Pagani et al., 2013), delays in the mastering language (Byeon & Hong, 2015), and there is an increased risk of long-term mental health problems, such as depression, low achievement, and low self-esteem (Watt et al., 2015).

Related to the urgency of motor competence for the development of students as a whole, it should be of great concern to all teachers and parents. For this reason, promoting the application of an active lifestyle as an effort to stimulate motor competence for students must always be encouraged, even from an early age. This is because early childhood is a critical time for the development of motor competence which allows students to successfully participate in various types of physical activity. In addition, motor competence cannot be mastered just like that, but there is a learning process in it (Robinson et al., 2015) and is an integral part of a holistic view of student development (Estevan & Barnett, 2018).

The results showed that there was a strong relationship between physical fitness, motor competence, and self-perception among students which varied according to gender. This implies that all these factors are important contributions to facilitate participation in physical activity in students (Vedul-Kjelsås et al., 2012). (Stodden et al., 2008) suggested physical activity that could be used as an effort to promote the development of motor competence in early childhood through various exploratory movement experiences. In middle and late age children the level of motor competence is higher by means of making larger motors involved in various physical activities, sports and games.

Problems related to efforts to promote motor competence that exist today are that it is still unclear which correlations should be targeted to ensure the most effective interventions, targeted interventions, and adapted to develop (Barnett, Lai, et al., 2016). The research that has been conducted regarding the motor competency stimulus and its role in promoting physical activity still focuses on measuring physical activity in students without any understanding (Stodden et al., 2008). Based on these problems, motor competence is a competency that requires an understanding that underlies physical activity. Motor competence without the support of understanding, namely students can only execute motor skills in an appropriate environment when practicing or studying. However, students will find it difficult and confusing to execute their motor skills when they are in a different environment when practicing or studying. In addition, the stimulation of motor competence does not only focus on improving fundamental movement skills but also includes students' understanding. For this reason, research is needed to find the right way to stimulate students' motor competence. The stimulation that is carried out is not only limited to improving motor skills but also must be able to improve thinking skills and understanding of games.

Related to this description, research was conducted to find a series of physical activities that can be used to stimulate an increase in students' motor competence. The form of a series of physical activities is packaged in the form of a structured game. The use of field games in research is to encourage a process of understanding within students. The basis for choosing field games as an approach to improve motor skills is because it focuses on learning to understand the game and how to be smart in a game. Students are encouraged to represent complex games in the form of simplified games and make decisions about important things to learn while playing games (Almond, 2015).

This aims to encourage students to be able to execute motor competence according to the conditions being faced. The urgency of this research is to encourage students to have an understanding in playing and developing techniques so that playing skills are formed. The importance of understanding the game because the ability to execute techniques not only requires good motor skills but also requires the ability to solve problems and make decisions. This encourages students to be able to apply and develop their motor skills in various situations.

## METHOD

### Types of research

The research aims to determine the success of stimulating motor competence of elementary school students. Motor competence in question is not only limited to physical activity skills but also includes skills in problem solving. The type of research used is pre-experiment with the type of One Group Pretest Posttest Designs.

This study aimed to examine the use of field games to improve the motor competence of elementary school students. The motor competence referred to in this study is not only limited to physical activity skills but also includes skills in problem solving and understanding of play (Costa et al., 2021; Strotmeyer et al., 2021). The research was carried out by implementing field games that had been adapted to students' physical learning. For this reason, the type of research used is pre-experiment with the type of One Group Pretest Posttest Designs.

### Subjects

The study involved 12 fourth grade elementary school students who were taken from two classes in one school. Determination of participants based on male gender and have good motor skills. Then, the determination of students who will be involved as participants is done randomly by choosing random numbers.

### Procedure

The experiment used a game-centered approach with an emphasis on learning to understand games so as to enable students to become intelligent in a game or better known as teaching game for understanding (TGFU). The game used is a baseball game (field games) which is modified by the size of the field and the rules of the game.

The research was carried out by asking students to conduct an experiment by playing a modified baseball game. The trial was divided into six stages. These six stages were adopted from the revised TGFU model (Kirk & MacPhail, 2002). In the first stage the researcher compiles the rules of the game that will be carried out by students. The second forms students' understanding by playing games that have been arranged in stage one. The third encourages students to think strategically by integrating the understanding that has been gained from playing the game in the second stage with the existing understanding of the students. The fourth encourages students to find ways related to the problems they face and make decisions about the techniques to be used in the game. The five processes of implementing the motion according to the technique that has been selected. Sixth, encouraging the development of playing skills which is supported by an understanding of tactics and good performance of motor skills. All of these stages will be recorded using video to make it easier to make observations.

Overall the research was carried out in fourteen meetings which were divided into four phases. In the initial phase it is intended to provide an explanation regarding the purpose of implementing the learning carried out as well as preparing equipment. The second phase is carried out for the introduction of games and how to play to students. The third stage is pretest data collection, the fourth stage is the implementation of the intervention, namely students are asked to play games that have been prepared beforehand, and finally there is posttest data collection.

**Table 1**. Course Schedule

| Phase | Session | Material Focus | Stages |
|---|---|---|---|
| Introduction to Game Forms | 1 | Introduction and explanation of learning objectives | Introduction to Game Forms |
| | 2 | Game Introduction | Introduction to Game Forms |
| Pretest | 3 | Games Play | Games Skill |
| Intervention | 4 | Games Play | Understanding Game Concepts |
| | 5 | Games Play | Understanding Game Concepts |
| | 6 | Games Play | Decision Making |
| | 7 | Games Play | Decision Making |
| | 8 | Games Play | Skills Execution |
| | 9 | Games Play | Skills Execution |
| | 10 | Games Play | Skills Execution |
| | 11 | Games Play | Skills Execution |
| | 12 | Games Play | Games Performance |
| | 13 | Games Play | Games Performance |
| Post Test | 14 | Games Play | Games Skill |

**Data collection instruments**

The instrument for collecting data on motor skills using the TGMD-2 includes locomotor movement skills and object control which as a whole includes twelve components of fundamental movement skills. The data collection instrument for students' understanding of playing uses the Games Performance Assement Instrument (GPAI) (Memmert & Harvey, 2008). The components used in GPAI consist of making decisions, executing skills, and the ability to protect opponents (covering), and the player's ability to return to base. Of the four components, the criteria used in the assessment are accuracy in making decisions, effectiveness in executing skills, accuracy in guarding opponents, ability to be able to return to base.

**Data analysis**

Data analysis was performed with quantitative descriptive. Data analysis was carried out by means of data analysis on the results of measuring motor skills using TGMD-2 and students' understanding using GPAI. Motor Skills Data Analysis (TGMD) is carried out by giving a score for each activity carried out by students. The scoring will then be added up and converted to a standard score and converted to a quotient table. The conversion results will then be matched in the descriptive rating table.

Analysis of data on students' playing comprehension measurement by tallying each performance shown by students according to the criteria for each component and calculating the index by means of the appropriate performance value divided by the number of appropriate and inappropriate scores. Furthermore, calculations were carried out to determine student performance in playing modified baseball games by adding up the index values for each component and dividing by the number of components. For involvement in the game is calculated by adding up the overall performance of each student whether it is suitable or not according to the four components. The next step is to classify the results that have been achieved by students into four classes, namely very effective performance, effective performance, moderately effective, weak performance, and very weak performance. Classification aims to determine the level of success of students in improving motor competence using baseball games. Lastly, data analysis used the t-test to find out the differences in the results of the pre-test and post-test for measuring motor skills and playing comprehension.

## RESULTS AND DISCUSSION

### Result

Based on the results of the pretest related to the ability of motor skills in table 2, it shows that students have dominant motor skills that are below average and average. This result still shows the ability of students is still below average.

**Table 2**. Results of Motor Skills Pretest

| Gross Motor Qoutient | Absolute (F) | Relative (%) | Descriptive Ratings |
|---|---|---|---|
| > 130 | 0 | 0 | Very Superior |
| 121-130 | 0 | 0 | Superior |
| 111-120 | 0 | 0 | Above Average |
| 90-110 | 5 | 42 | Average |
| 80-89 | 7 | 58 | Below Average |
| 79-79 | 0 | 0 | Poor |
| <70 | 0 | 0 | Very Poor |

Based on the distribution of pretest data in Table 2, the dominant students' play understanding is in the category of moderately effective and effective performance. The results show that students' understanding of playing is relatively in the less category. Furthermore, in terms of the recap of GPAI results in table 3, it is obtained an overview that overall students are able to carry out the game. All students already have scores on each performance component assessed, namely skill execution, decision making, and covering. Students have shown a lot of their ability to play games which can be seen from the many students' involvement in the game. This shows that students have an understanding of the game being played. However, based on the analysis of each component in the execution of the skills of all students there are still many who are not effective in executing skills during the game. The ineffectiveness of students in executing an average of 3.58, which means that there are many students who are more than three times ineffective in executing skills. This causes the student skill execution index to be sufficient (0.63).

Furthermore, for the decision-making component there are also students who are still not suitable in making decisions with an average of 3.42 with an index of 0.57 which means that there are many students who are not suitable in making decisions more than three times and are quite large from the overall decision-making activity. student decisions. For the non-conformity covering component, the average is 2.92 with an index of 0.65. The average obtained on the covering component is relatively smaller than the other components. However, the average discrepancy by students is still more than twice.

**Table 2**. Pretest Results of Measurement of Students' Playing Comprehension

| No. | Skill execution | | | Decision-making | | | Covering | | | Games Performance | Games Involvement |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SE | | | DM | | | | | | | |
| | Effective | Ineffective | Indeks | Appropriate | Unappropriate | Indeks | Appropriate | Unappropriate | Indeks | GP | GI |
| 1 | 8 | 5 | 0.62 | 8 | 5 | 0.62 | 8 | 5 | 0.62 | 0.62 | 39.00 |
| 2 | 6 | 5 | 0.55 | 7 | 3 | 0.70 | 6 | 3 | 0.67 | 0.64 | 30.00 |
| 3 | 6 | 3 | 0.67 | 3 | 4 | 0.43 | 5 | 2 | 0.71 | 0.60 | 23.00 |
| 4 | 10 | 6 | 0.63 | 7 | 6 | 0.54 | 6 | 4 | 0.60 | 0.59 | 39.00 |
| 5 | 5 | 2 | 0.71 | 5 | 5 | 0.50 | 6 | 3 | 0.67 | 0.63 | 26.00 |
| 6 | 4 | 2 | 0.67 | 3 | 2 | 0.6 | 2 | 0 | 1 | 0.76 | 13.00 |
| 7 | 11 | 5 | 0.69 | 5 | 2 | 0.71 | 4 | 5 | 0.44 | 0.62 | 32.00 |
| 8 | 4 | 2 | 0.67 | 1 | 2 | 0.33 | 4 | 1 | 0.8 | 0.60 | 14.00 |
| 9 | 4 | 1 | 0.80 | 1 | 3 | 0.25 | 4 | 2 | 0.67 | 0.57 | 15.00 |
| 10 | 5 | 3 | 0.63 | 6 | 6 | 0.5 | 5 | 4 | 0.56 | 0.56 | 29.00 |
| 11 | 5 | 4 | 0.56 | 5 | 3 | 0.63 | 5 | 4 | 0.56 | 0.58 | 26.00 |
| 12 | 3 | 5 | 0.38 | 2 | 0 | 1 | 2 | 2 | 0.5 | 0.63 | 14.00 |
| Rata-rata | 5.92 | 3.58 | 0.63 | 4.42 | 3.42 | 0.57 | 4.75 | 2.92 | 0.65 | 0.62 | 25.00 |

**Table 3** Recapitulation of Students' Play Understanding

| Games Performance Score | Absolute (F) | Relative (%) | Descriptive Ratings |
|---|---|---|---|
| 0,80-1,00 | 0 | 0% | Very Effective Performance |
| 0,60-0,79 | 4 | 33% | Effective Performance |
| 0,40-0,59 | 8 | 67% | Moderately Effective |
| 0.20-0,39 | 0 | 0% | Weak Performance |
| 0,00-0,19 | 0 | 0% | Very Weak Performance |
| Jumal | 12 | 100% | |

The results of the posttest motor skills in Table 5 show that there has been an increase. In the pretest results there was no increase to two students who were at an above average rating. In the average rating there is also an increase in the number of students to six people and also only four students remain who are still at the below average stage.

**Table 4**. Motor Skills Pretest Results

| Gross Motor Qoutient | Absolute (F) | Relative (%) | Descriptive Ratings |
|---|---|---|---|
| > 130 | 0 | 0 | Very Superior |
| 121-130 | 0 | 0 | Superior |
| 111-120 | 2 | 17% | Above Average |
| 90-110 | 6 | 50% | Average |
| 80-89 | 4 | 33% | Below Average |
| 79-79 | 0 | 0 | Poor |
| <70 | 0 | 0 | Very Poor |

Furthermore, based on table 6 related to the results of measuring students' playing comprehension carried out using GPAI, it shows that there has been an increase for each component of student performance compared to the pretest results. For the basic engineering component there has been an average increase in the effective category and a decrease in the ineffective category and an increase in the average index. The increase also occurred in the decision-making and covering components. The measurement results show that the number of appropriate activities carried out by students increases and there is a decrease in the inappropriate category. In addition, there has been an increase in the average value of each index of decision making and covering. Based on the recapitulation of students' playing comprehension in Table 7, it was found that there had been an increase of one level. The results of the posttest showed that there were two students who had reached the very effective performance category and ten students had reached the effective performance category. These results indicate that there has been an increase in the posttest results of students' playing comprehension compared to the pretest results.

**Table 5.** Pretest Results of Measurement of Students' Playing Comprehension

| No | Skill Execution | | | Pengambilan keputusan | | | Covering | | | Games Performance | Games Involvement |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Effective | Ineffective | Indeks | Appropriate | Unappropriate | Indeks | Appropriate | Unappropriate | Indeks | GP | GI |
| 1 | 8 | 4 | 0.67 | 10 | 3 | 0.77 | 8 | 3 | 0.73 | 0.72 | 36.00 |
| 2 | 11 | 6 | 0.65 | 12 | 6 | 0.67 | 10 | 2 | 0.83 | 0.72 | 47.00 |
| 3 | 7 | 1 | 0.88 | 8 | 1 | 0.89 | 7 | 2 | 0.78 | 0.85 | 26.00 |
| 4 | 5 | 2 | 0.71 | 5 | 2 | 0.71 | 5 | 1 | 0.83 | 0.75 | 20.00 |
| 5 | 5 | 1 | 0.83 | 5 | 2 | 0.71 | 5 | 3 | 0.625 | 0.72 | 21.00 |
| 6 | 5 | 2 | 0.71 | 3 | 1 | 0.75 | 4 | 1 | 0.8 | 0.75 | 16.00 |
| 7 | 7 | 3 | 0.7 | 7 | 0 | 1 | 7 | 2 | 0.78 | 0.83 | 26.00 |
| 8 | 9 | 4 | 0.69 | 11 | 2 | 0.85 | 11 | 2 | 0.85 | 0.79 | 39.00 |
| 9 | 10 | 4 | 0.71 | 10 | 3 | 0.77 | 10 | 4 | 0.71 | 0.73 | 41.00 |
| 10 | 12 | 5 | 0.71 | 11 | 6 | 0.65 | 12 | 5 | 0.71 | 0.69 | 51.00 |
| 11 | 7 | 2 | 0.78 | 7 | 3 | 0.7 | 7 | 1 | 0.88 | 0.78 | 27.00 |
| 12 | 4 | 1 | 0.8 | 4 | 1 | 0.8 | 4 | 2 | 0.67 | 0.76 | 16.00 |
| Rata-rata | 7.50 | 2.92 | 0.74 | 7.75 | 2.50 | 0.77 | 7.50 | 2.33 | 0.77 | 0.76 | 30.50 |

**Table 6**. Recapitulation of Students' Play Understanding

| Games Performance Score | Absolute (F) | Relative (%) | Descriptive Ratings |
|---|---|---|---|
| 0,80-1,00 | 2 | 17% | Very Effective Performance |
| 0,60-0,79 | 10 | 83% | Effective Performance |
| 0,40-0,59 | 0 | 0% | Moderately Effective |
| 0.20-0,39 | 0 | 0% | Weak Performance |
| 0,00-0,19 | 0 | 0% | Very Weak Performance |
| Jumlah | 12 | 100% | |

**Discussion**

The purpose of the research conducted was to stimulate students' motor competence through field games. Through this game students are encouraged to have an understanding of playing and developing techniques so that playing skills are formed. This playing skill is important because the ability to execute techniques not only requires good motor skills but also requires the ability to solve problems and make decisions. Students who have understanding of play and understanding that allows them to master the patterns of the game. This encourages students to have technical and tactical skills to develop appropriate and imaginative responses, to have positive experiences so as to be able to provide motivational encouragement and facilitate other students' active involvement in games (Mandigo & Corlett, 2010).

Based on the results of the research conducted, it was found that there had been an increase in motor skills and game performance from students who were stimulated through playing field games. The increase in motor skills that occurs shows that the students' fundamental movement skills are getting better. The existence of good motor skills (fundamental movement) also identifies students' motor competence getting better (Norman et al., 2019; Barnett, Salmon, et al., 2016). Apart from that, related to games, student performance has increased which in this study includes execution of basic techniques, decision-making skills, and covering. These results indicate that students can have the technical and tactical skills needed in the game (Gustian et al., 2019).

The increase in motor skills and game performance stimulated by field games occurs because students are encouraged to have the ability to make good and right decisions. This process occurs because field games are able to facilitate metacognition processes such as decision making, critical thinking, and problem solving (Mandigo & Corlett, 2010). In addition, the implementation of learning that is carried out using the field games approach has several advantages quoted from (Werner et al., 1996), namely: 1) students must be able to understand the form of a game and will lead to the introduction of unique problems to be solved. The thing to note at this stage is that the teacher carefully determines the size and shape of the game and the number of people involved. 2) Gradually students must learn to follow the main and additional rules that have been determined in each game. 3) Students are introduced to tactics through a gradual introduction to the principles of motion based on the simple ideas of space and time. Investigating these simple ideas leads children to progress to more challenging situations. 4) Model games for increasing understanding also emphasize skill execution and performance games. However, this can be achieved if students see what is needed in doing a skill. When students are ready for skills within the context of the game, technical instructions are given. However, the level of performance (level of difficulty) is in accordance with the ability of students.

There is an increase in students' motor competency achievement through field games because students get the opportunity to combine/repeat movements and take risks (Branje et al., 2022), develop skills (Barba-Martín et al., 2020), increase enjoyment so as to be able to motivate students in learning student movement skills (Jia, 2021; Vasileva-Stojanovska et al., 2015; Gil-Arias et al., 2021). This shows that the use of field games can be used to stimulate students' motor competence.

Based on the research results which show that the stimulation of motor competence does not only focus on improving movement skills but also includes student understanding. These results are in line with the results of research (Strotmeyer et al., 2021) that stimulation of motor competence must

include (1) movement abilities; (2) movement knowledge; and (3) movement motivation. In this study, students were encouraged to do fundamental movements by playing games. This has an impact on students' fundamental movement skills, thinking abilities, and problem solving skills. In addition, learning that is carried out through games has a fun effect on students so that it allows students to continue doing these activities outside the classroom. The results of this study show that motion learning is not only limited to movement skills but also understanding of play.

## CONCLUSION

Based on the results of the study, it showed that there had been an increase in students' motor skills and understanding of playing. These results show that learning using field games can improve motor competence which includes motor skills, execution of basic techniques, decision making, and covering. The implications of this study are related to interventions in motion learning in schools. Motion learning at school has an important role for students' overall motor achievement in children and adolescents (Lorås, 2020). Motion learning in schools is not only limited to achieving motor skills but must include motor competence. In addition, the implementation process must be carried out with a play approach that directs decision making, critical thinking, and problem solving. For this reason, it must be the concern of many parties related to increasing student motor competence that emphasizes the understanding that underlies movement activities. It is intended that students are able to execute motor competence in different environments during practice or study as well as when participating in competitions. For this reason, the stimulation of motor competence does not only focus on improving fundamental movement skills but also includes students' understanding.

Some limitations of this study are the small sample size and only male students. Furthermore, this study did not involve a control group so there was no comparative data. For this reason, further studies are needed which can cover a larger sample and be able to compare the results between the experimental group and the control group.

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