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Jurnal Keolahragaan, 11 (2), 2023, 152-161

Using net games to stimulate the motor competence of elementary school students

Uray Gustian[1]*, Putra Sastaman[1], Zsolt Nemeth[2]
[12]Department of Sports Coaching Education Teaching Training and Education Science Faculty, Universitas Tanjungpura, Kota Pontianak, Indonesia
[2]Department of Theory and Practice of Sports, Institute of Sport Science and Physical Education, Faculty of Sciences, University of Pecs, Hungary
* Coressponding Author. Email: uray.gustian@fkip.untan.ac.id

Received: 15 November 2022; Revised: 31 July 2023; Accepted: 11 August 2023

Abstract*:* Motor competence is essential to develop an active lifestyle, a healthy weight status, and a physical-activity habit. Motor competence stimulation focus on measuring the physical activity of playing games. The study investigated the potential improvement of motor skill by playing net games. Through the study, students are taught to make important decisions and acquire tactical knowledge by simplifying complex games. This research adopted an experimental design using One Group pretest-posttest method. Samples were collected through random sampling method in two classes of a selected elementary school. The Games Performance Assessment Instrument (GPAI) and the Gross Motor Development Test version 2 (TGMD-2) were used to assess students' playing understanding, motor skills, and numeric knowledge. Utilizing quantitative descriptive analysis, data were examined. The findings showed that the posttest values for motor skill aspects (95) were greater than the pretest results (88, 5). The average increase of each component for playing game was execution skill of 0.05, decision-making of 0.04, opponent coverage of 0.03, and overall of 0.05. Different test results show that t-test (t=4.50), both for game understanding and motor skill aspects, which were greater than t-tables (1,796). The statistics showed that the skills after treatment were significantly different from the students' ability before treatment. This improvement in decision-making, technical execution, cover, support, game performance, game participation, pleasure, perceived competence, and intention to engage in physical activity is attributable to the usage of net games. The conclusion is that the use of net games is effective in improving the motor competence of elementary school students. However, the study only involves a small number of students, hence it is recommended for including a larger number of students in the further research, as well as using more rigid study design (control group) and take in different elementary schools.
Keywords: motor competence, net games, elementary school students

How to Cite: Gustian, U., Sastaman, P., & Nemeth, Z. (2023). Using net games to stimulate the motor competence of elementary school students. *Jurnal Keolahragaan*, 11 (2), 152-161. doi: https://doi.org/ 10.21831/jk.v11i2.54555

INTRODUCTION

Motor competence are an important component in promoting an active and healthy lifestyle from an early age (Drenowatz et al., 2021). This is because levels of physical activity and musculoskeletal fitness are significantly predicted by motor ability, a significant independent predictor (King-Dowling et al., 2020; Moss et al., 2020). However, during the past ten years, children's sedentary behavior and a decrease in physical activity in children. (Pombo et al., 2023; Adank et al., 2018; Van Kann et al., 2019). A decrease in motor skills also occurs in adolescents. (Urrutia-Gutierrez et al., 2017). Lack of physical activity leads to morbidity and premature death (Lopes et al., 2021). Adolescents with low motor skills have a decreased perception of physical abilities and tend to avoid physical activity (McIntyre et al., 2015).

the importance of motor skills for students because they can encourage active physical activity so that physical skills can be improved and maintain long-term health (Pombo et al., 2023; Carballo-Fazanes et al., 2022). Motor skills are strongly correlated with cognitive

development and mathematical problem-solving skills. (Willoughby et al., 2021). The importance of motor skills for students because they can encourage active physical activity so that physical skills can be improved and maintain long-term health (Luz et al., 2019). In that connection, there is a need for a motor skills intervention of physical activity that emphasizes the importance of achieving motor competence from an early age. (Famelia et al., 2018). Children with strong motor skills may move quickly and confidently in a range of physically demanding circumstances. (Washburn & Kolen, 2018). In addition, motor competence can encourage young people's ongoing involvement in physical activity, especially for those at risk of low participation (Hands et al., 2016).

Children and adolescents need to improve their motor competencies, thus it is necessary to introduce them to a variety of stimulating activities. Stimulation targeting to increase physical activity in children and adolescents because it has clear positive feedback with motor competence (Lima et al., 2017). Creating strategies should focus on the development of object and locomotor control during childhood in order to encourage physical activity. (Strotmeyer et al., 2022). However, the stimulation that was carried out still focused on measuring physical activity without any understanding (De Meester et al., 2016); Khodaverdi et al., 2022; Gustian et al., 2023) while the achievement of motor competence must be based on understanding (Stephanou et al., 2020). The development of correct self-knowledge should be connected to the growth of motor competence in each individual. (Utesch et al., 2018). In addition, it has not fully provided the opportunity to develop motor competence in general (Thomaidou et al., 2021). For pupils to become competent, self-assured, and driven while producing motions, the stimulus should concentrate on teaching movement skills and promoting motor competence. (Estevan et al., 2021).

In connection with these problems, a study is needed to find the right way to stimulate motor competence in students. As for ways that can be done by giving children more time in open spaces, experience structured activities, and by expanding the existing outdoor play space whenever possible (True et al., 2017). Many of the studies conducted are still limited to measuring the correlation of motor competence with other components and have not studied the proper stimulation, especially in school learning. (Valentini et al., 2020; Sheehan & Lienhard, 2019; Niemistö et al., 2022).

The study carried out stimulates motor competence by using a Games approach. Accurate knowledge of current skill levels is necessary to deliver sufficient movement experiences that improve motor competence and physical fitness while guaranteeing a stimulating atmosphere. (Drenowatz et al., 2021). Playing games will provide additional opportunities to improve fitness, experience, and practice, affecting the rate and direction of motor development. (Sigmundsson & Haga, 2016). Learning with a games approach encourages students to learn to make important decisions by representing simplified complex games (Almond, 2015). In addition, It has been demonstrated to be capable of fostering the skills, comprehension, tactical understanding, and decision-making necessary for gameplay (Abad Robles et al., 2020). Improvements in decision-making, skill execution, game performance, number of decisions made, number of game involvements, intention to be physically active via play, and application of knowledge in games are additional advantages (Barquero-Ruiz et al., 2021; Morales-Belando & Arias-Estero, 2017; Levenberg et al., 2020; De Meester et al., 2016). For this reason, the game approach is as an effective teaching strategy to ensure students are experiencing quality learning and desired aims, focus areas, and learning outcomes. (Usher et al., 2015).

METHOD

Study Design

Experiments were conducted to test the application of games to stimulate motor competence. The experiment used was the One Group Pretest Posttest Designs type. The study

only involved one experimental group. The study was carried out by implementing modified field games in the physical learning of elementary school students.

Partisipan

The study involved twelve upper grade elementary school students. Students who become participants must have an ideal body, not experience physical and mental disabilities, and be in a state of mind. The participants involved were twelve male students selected from two classes with a total of 56 students. Determination of participants using random sampling techniques and determining the number of participants based on the games played. The age range of the participants ranged from seven to eight years.

Procedure

The games used in this study are net games. Net games are tennis games in which the way of playing and the rules of play are modified. The modifications made were to increase the number of ball reflections regressively and replace the ball with a volleyball. The number of players consists of six people in one team. Students play the game in a way similar to playing a tennis ball, except that the ball is hit by hand and is played by two teams. Motor competence in this study includes motor skills and students' understanding of playing which includes fundamental movement skills, ability to execute skills, accuracy in making decisions, and effectiveness in guarding opponents (covering).

The research was carried out by asking students to conduct an experiment by playing a modified tennis game. The tryout is divided into six stages adopted from the revised Teaching Games model (Stolz & Pill, 2014). In the first stage of compiling 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.

Instrument

The Test of Gross Motor Development-2 (TGMD-2) was used to test motor abilities during data collection. TGMD-2 includes locomotor movement skills and object control which as a whole includes twelve components of fundamental movement skills.

The Games Performance Assumenet Instrument (GPAI) assesses players' understanding of game play. The GPAI component consists of making decisions, executing skills, and the ability to guard against Covering opponents. Of the three components, the criteria used in the assessment are accuracy in making decisions, effectiveness in executing skills, and accuracy in guarding opponents.

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 net games. Lastly, the t-test was employed in data analysis to see if the pre-and post-test outcomes for evaluating motor abilities and playing comprehension differed.

RESULT AND DISCUSSION

Results

The results of the motor skill measurement showed that there was an increase that was achieved by students. These results are illustrated in table 1. In the posttest, there were two students who had succeeded in reaching the Above Average category. At the time of the pretest, no students had succeeded in reaching the Above Average category. Meanwhile, in the posttest, there were six students in the Average category and four students in the Below Average category. In addition, in terms of the posttest mean is greater (95) than the pretest results (88.5). These results can be categorized as an increase in ability from the results of the student's motor skill test. Students in the Below Average category on the posttest were reduced from five students to four students. In the average category in the posttest, it decreased from seven students to six students. However, not a single student has motor skills that fall into the superior or very superior categories.

Table 1. Motor skill test result

Gross Motor Qoutient	Pretest	Posttest	Descriptive Ratings
> 130	0	0	Very Superior
121-130	0	0	Superior
111-120	0	2	Above Average
90-110	7	6	Average
80-89	5	4	Below Average
79-79	0	0	Poor
<70	0	0	Very Poor

Table 2. Motor skill measurement results

		Mean	N	Std. Deviation	Std. Error Mean
Motor skill	pretest	88.50	12	3.58	1.03
	posttest	95.00	12	10.00	2.88

The results of measuring students' playing comprehension presented in table 3 show that there has been an increase in the mean value for the skill execution component of 0.05, decision making of 0.04, and covering of 0.03. For understanding of playing as a whole there has also been an increase in the posttest mean compared to the pretest results. The mean increase that occurred was 0.05. Judging from the distribution of results achieved by students both pretest and posttest, it shows that the standard deviation ranges from 0.05-0.10. These results show that the distribution of the results achieved by students is closer to the mean value.

Table 4 shows the distribution of student achievement results showing that for the skill execution component the results of the posttest all students have reached the Effective

Performance category. For the decision-making component, the dominant posttest results have reached the category of Effective Performance. These results show that there is an increase compared to the pretest results which are still dominated at the Moderately Effective stage. The same result also occurs in the covering component. All students have succeeded in achieving the Effective Performance category compared to the pretest results of only seven students achieving the Effective Performance category. In terms of the overall distribution of student understanding measurement results, there were ten students who had succeeded in achieving the Effective Performance category. These results show an increase compared to the pretest results where only seven students managed to reach the Effective Performance category.

Table 3. Results of measurement of students' playing comprehension

		Mean	N	Std. Deviation	Std. Error Mean
Eksekusi Skill	pretest	.63	12	.10	.03
	posttest	.68	12	.06	.02
Pengambilan Keputusan	pretest	.56	12	.09	.03
	posttest	.60	12	.09	.03
Covering	pretest	.60	12	.08	.03
	Posttest	.67	12	.05	.01
Game Understanding	pretest	.60	12	.05	.02
	posttest	.65	12	.05	.01

Table 4. Recapitulation results of the student's games understanding measurement

Games Performance Score	Eksekusi Skill		Pengambilan keputusan		Covering		Games Performance		Descriptive Ratings
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	
0,80-1,00	0	0	0	0	0	0	0	0	Very Effective Performance
0,60-0,79	9	12	2	8	7	12	7	10	Effective Performance
0,40-0,59	2	0	9	4	5	0	5	2	Moderately Effective
0.20-0,39	1	0	0	0	0	0	0	0	Weak Performance
0,00-0,19	0	0	0	0	0	0	0	0	Very Weak Performance

The results of the different test (table 5) obtained the results for the understanding game aspect showing t count (4.50) greater than t table (1.796). The same results also occur in aspects of motor skills showing t count (4.50) is greater than t table. These results indicate that there has been an increase in the results achieved by students during the pretest and posttest. Judging from the significance level, it shows understanding of playing by 0.001 or less than 0.05, which means that there is a significant increase. In contrast to the motor skill aspect, the significance level obtained was 0.17 which was greater than 0.05, which means that the increase has not been significant. Overall motor competence which includes understanding of playing and motor skills can be stimulated by using net games.

Table 5. Game Understanding and Motor Skill t test results

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Game Understanding Motor Skill	Pretest-Posttest	.06	.04	.01	.08	.03	4.50	11	.001
	Pretest-Posttest	6.50	8.01	2.31	1.41	11.58	2.81	11	.017

Discussion

The results showed that the implementation of net games can stimulate the achievement of students' motor competence. The measurement results are also related to motor skills at the time of the posttest, there are students who reach the Above Average category, which did not exist before during the pretest (see table 1). The results of measuring students' understanding of playing the posttest scores achieved by students were better than the pretest scores (see table 3) even though the difference was relatively small. Based on the results of the t test, both playing comprehension and motor skills were proven to be effective in increasing motor competence, although in the aspect of motor skills the increase was not significant.

Net games successfully enhance metacognition and performance in physical education classes, playing them increases playing comprehension and motor abilities (Stephanou et al., 2020). Students also advance in decision-making, technical execution, cover, support, performance, participation, and pleasure during games, as well as perceived competence and inclination to engage in physical activity (Ortiz et al., 2023). The intention to engage in physical activity, the number of decisions taken, and good game performance are all encouraged by learning to utilize net games. (Barquero-Ruiz et al., 2021). Additionally, it is crucial that online games provide kids the opportunity to comprehend the game in-depth, encourage additional involvement possibilities, and help players build their physical literacy. (Meléndez Nieves & Estrada Oliver, 2019). The use of net games can also effectively promote sport-related motor development concepts, physical activity, and cultural awareness (Lynch & Ottaway, 2018). Net games encourage students to play physically active so as to stimulate the achievement of children's motor competence (Lysklett et al., 2019).

Research conducted emphasizes aspects of understanding and motor skills due to the introduction of motor competence should be linked development knowledge (Utesch et al., 2018) and developing motor skills in general (Thomaidou et al., 2021). The use of net games allows students to be active in carrying out physical activities and is closely related to the development of motor competence (Lima et al., 2017; Utesch et al., 2019; Drenowatz et al., 2021; Famelia et al., 2018; Urrutia-Gutierrez et al., 2017).

The implications of this study are related to interventions in motion learning in schools. Motion learning at school has an important role for overall student motor achievement in children and adolescents (Lorås, 2020). To enhance student learning in physical education, teachers must acquire in-depth subject knowledge, adhere to five pedagogical processes, and employ good classroom management. (Li & Li, 2023). Movement learning is not only limited to achieving motor skills but also includes understanding how to play so as to be able to achieve motor competence. Apart from that, the implementation process is carried out using an approach that leads to an understanding of playing which includes the effectiveness of skill execution, the accuracy of making decisions, and the accuracy of covering.

CONCLUSION

Based on the results of measuring motor skills and understanding of playing, the mean posttest is greater than the mean pretest. In addition, the results of both t-test measurements show that t count is greater than t table. Based on these results, it was concluded that the use of net games was effective in stimulating the development of motor competence in elementary school students. learning using net games is able to encourage students to make a number of decisions made, number of game involvements, and effectively promote sport-related motor development concepts. These results make net games can be used as one of the learning activities to stimulate students' motor competence.

The limitations of the research conducted were the limited number of participants involved and the absence of a control group. The results of this study cannot be generalized to all elementary school students and it is not certain that the results achieved by students are the result of the interventions given.

Related to this, further research is needed to test the use of net games in a larger and more varied number of participants and involve a control group.

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