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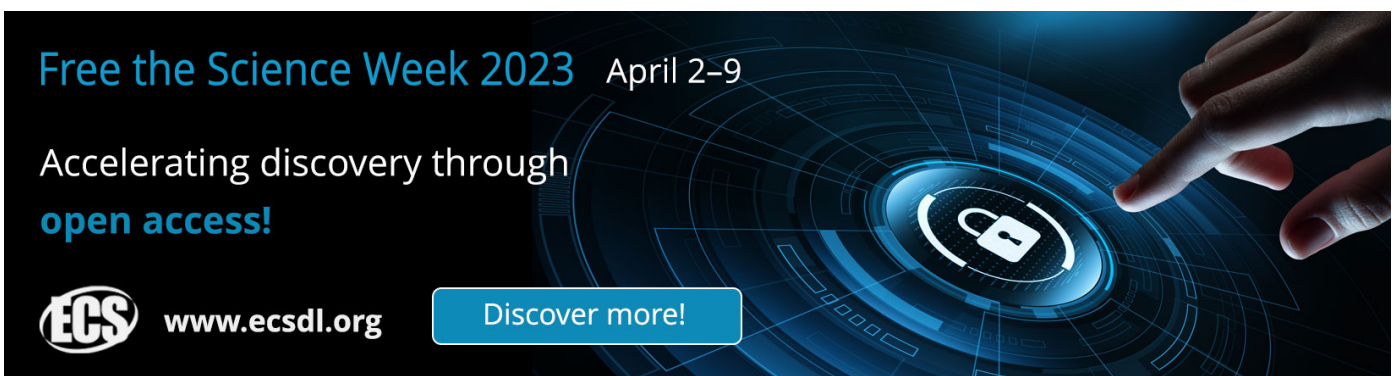
Constructing Student's Physical Preparedness through Game-Based Activities in Disaster-Safe School

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Constructing Student's Physical Preparedness through Game-Based Activities in Disaster-Safe School

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Abstract. Indonesia is a country that has great potential for disaster. A major earthquake hit the Special Region of Yogyakarta, especially Bantul Regency, in 2006. This has demanded the establishment of a disaster-safe school that is ready to anticipate disasters. Disaster-safe school students need to be fully prepared in various aspects, including physical aspect. Therefore, this study aims to determine the increase in physical fitness before and after carrying out game-based physical activities for upper grade students in a Disaster-Safe School. This study adopted an experimental method that involved one group pre-test-post-test design. Participants were upper grade students (grade 4 to 5) in Madrasah Ibtidaiyah Negeri 2 Bantul, totaling 74 people under such criteria as aged 10 to 12 years and following the complete treatment. The instrument used was the Indonesian Physical Fitness Test (IPFT) for children aged 10-12 years. Data analysis using paired sample t-test. The results showed that there was an increase in the physical fitness of students after being given treatment in the form of game-based physical activity for 12 meetings. Good physical fitness is a form of physical preparedness in facing various emergencies including disasters. The better physical fitness level of students, the more physically prepared they will be when facing disasters.

1. Introduction

Indonesia is a disaster-prone country. Likewise, Special Region of Yogyakarta, Bantul Regency in particular, is among the most-disaster prone regions. A tectonic earthquake of 5.8 – 6.2 SR that once hit the area on May 27, 2006 is a highly risky disaster [1]. One of preventive measures taken by the government to mitigate the risks of disasters includes implementation of disaster-safe school program. Disaster-safe schools are schools that are committed to implementing the culture of safety and health, aware of risks, and fully equipped with pre-, during, and post-disaster plans as well as prepared to respond to emergencies and disasters [2]. Nevertheless, in fact, disaster-safe school has merely been a status due to the fact that schools solely focus on development of facilities while preparedness of students has remained untouched.

Children are often the most prone to disaster impacts as their lack of understanding of the risks around them often leads to absence of preparedness in coping with disasters. Meanwhile, it is obvious that great potential of disaster comes with greater needs for anticipative measures. Education has been seen as the most effective way to provide understanding about disaster in an effort to nurture disaster preparedness [3]. To build schools' disaster preparedness and raise awareness of all elements, disaster risk reduction should be made part of education in either individual or collective level in school setting and integrated into both intracurricular and extracurricular curriculum in formal education institution [4].

Integration of disaster preparedness into school subject can be done through, for example, Physical Education subject that aims at improving quality of human lives, both physically and spiritually. Physical Education can serve as a tool to nurture disaster preparedness that includes physical preparedness (through development of motor skill and physical ability, knowledge, and reasoning as well as formation of healthy living habit to stimulate balance growth and development through physical



activities and sports [5]. Sound physical preparedness manifests itself in physical fitness. However, as a matter of fact, the level of physical fitness in school remains low. A study reported that physical fitness of grade IV and V students in disaster prone zones was poor [5]. It is apparent that such condition is far from ideal for mitigating disaster risks through physical preparedness.

Physical preparedness can be improved through physical education learning. However, as physical fitness at school remains poor, improvement efforts through learning management and improvement of physical fitness of students as the main goal are necessary [7]. There were obstacles in the implementation of physical education at school such as the lack of time allotted for learning, the lack of facilities and infrastructure available, teachers’ lack of skills in managing classroom as well as monotonous materials given in the class. Facing such conditions, students do not take PE subject seriously because of serious boredom they experience, making it difficult to improve their physical fitness.

Physical fitness is a manifestation of physical preparedness that requires model and learning variation based on needs for handling emergency situations. Game-based physical activities implemented in physical education can be an alternative that suits the characteristics of the students. Activities that involve games and movements bring relatively permanent effects. Playing games will improve physical, psychological, and social qualities of children besides increasing their physical fitness and motor skill while developing their attitude and behavior to build an active lifestyle. Providing students with some game-based physical activities to train their physical and motor skills by incorporating movements that demonstrate physical fitness components will affect children’s physical fitness. The games should focus on children’s physical endurance training in handling emergency situations so that they are physically prepared to mitigate disaster risks. Therefore, this research aims to examine improvement of students’ physical fitness through game-based physical activities in disaster-safe school setting.

2. Method

2.1. Design

This research was an experimental research that adopted One Group Pre-test-Post-test Design. In a One-Group-Pre-test-Post-test experiment, a single group of participants is pretested before receiving particular treatment. After certain period of time, this group of people will undergo another test (post-test). Treatment results are considered more accurate as conditions before and after treatment are compared [8]. Steps in this research included determination of research subject (a total of 74 from grade 4 to 6 students), pre-test using Indonesian Physical Fitness Test (*Tes Kesegaran Jasmani Indonesia*) instrument for children aged 10-12 years, provision of treatment in form of game-based physical activities through PE subject every once a week (according to classroom schedule) for 12 meetings from July to November 2019, and a post-test using the same instrument.

2.2. Participants

Table 1. Details of the Number of Participants based on Grades and Gender

No	Grade	Male	Female	Total
1.	4	15	16	31
2.	5	9	12	21
3.	6	17	5	22
	Total	41	33	74

This research took place in a disaster-safe school namely State Madrasah Ibtida’iyah 2 Bantul (commonly known as MIN Kebonagung) from July to November 2019. Research participants were 74 grade 5-6 students selected based on criteria such as age (10 to 12 years old), full participation in pre-test and post-test as well as full participation in 12 treatment sessions. The characteristic of participants can be seen in table 1.

2.3. Data Collection

Data were collected using test and measurement techniques. Instrument used in this research was Indonesian Physical Fitness Test (IPFT) for children aged 10 to 12 years old [9]. Test validity for male and female participants was 0.884 and 0.897 respectively. Meanwhile, reliability for male and female participants was 0.911 and 0.942 respectively. IPFT comprises of 40-meter sprint, 60-second pull up, 30-second sit up, vertical jump, and 600-meter running. The 40-meter sprint aims at measuring speed using time unit (second). Pull up, on the other hand, is to measure strength and endurance of arm and shoulder muscles in seconds. Vertical jump is to measure explosive power in centimeters (cm). Meanwhile, sit-up measures strength and endurance of abdominal muscles by counting the number of movements within 60 seconds. Lastly, the 600-meter running aims to measure heart and lung endurance, blood circulation and breath in time unit (minutes and seconds). Students’ achievement from each item was converted into scores ranging from one to five before being totaled and classified into test norms as presented in Table 2.

Table 2. Norms for Indonesian Physical Fitness Test (IPFT) for Children Aged 10 – 12 Years [9]

Total Score	Classification
22 – 25	Very Good
18 – 21	Good
14 – 17	Fair
10 – 13	Poor
05 – 09	Very Poor

2.4. Data Analysis

Data that compared physical fitness in both pre-test and post-test were analyzed using paired sample t-test. As data analysis required the use of normally distributed data, normality and homogeneity tests were performed [10]. Performance of normality and homogeneity tests aimed to generate better analysis results. Data analysis was performed using SPSS 20 for Windows.

3. Results

Table 3. Descriptive Statistics for Pre-Test and Post-Test for Students’ Physical Fitness

Statistics	Pre-test	Post-test
N	74	74
Mean	12.80	14.34
Median	13.00	14.00
Mode	11.00	13.00
Std. Deviation	3.53	1.75
Minimum	6.00	11.00
Maximum	22.00	19.00
Sum	947.00	1061.00

Results of descriptive statistics for pre-test and post-test data on students’ physical fitness are presented in Table 3. From results of normality test using Kolmogorov-Smirnov formula, it is known that both pre-test and post-test data were normally distributed ($p > 0.05$). Meanwhile, results of homogeneity test indicated homogeneity of pre-test and post-test data ($p > 0.05$). As results of assumption tests for both pre-test and post-test data indicated normal distribution and homogeneity of data, data analysis could be proceeded. Results of paired sample t-test demonstrate significant differences in students’ physical fitness between pre-test and post-test or after performing game-based physical activities within 12 meetings ($t=4.224, p=0.000$). Students demonstrated increase in physical fitness after receiving treatment as indicated by 12.03% increase ($M_{pre}=12.80 < M_{post}=14.34$). It can be seen in table 4.

Table 4. Summary Analysis of Students’ Physical Fitness in Pre-Test and Post-Test

Physical Fitness	Mean	Paired Sample t-test		
		t	df	p
Pre-test	12.80	4.224	73	0.000
Post-test	14.34			

Students’ physical fitness improved after receiving treatment during the 12 game-based physical activity training sessions. Referring to the given data, differences in physical fitness of upper grade students at MIN 2 Bantul Year 2019/2020 can be presented in figure 1.

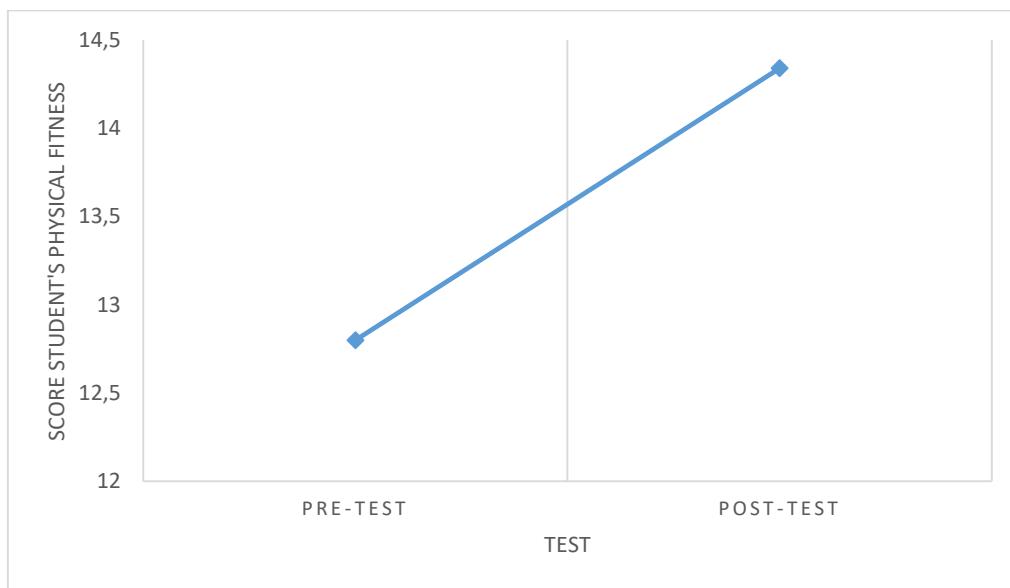


Figure 1. Differences in Mean of Students’ Physical Fitness in Pre-Test and Post-Test

Results of paired sample t-test on Indonesian Physical Fitness Test (IPFT) demonstrate significant differences in several components including speed, strength/endurance of arm/shoulder and abdominal muscles, and cardiovascular endurance. On the other hand, no significant difference is demonstrated in explosive power despite small increase in post-test score. This can be seen in Table 5.

Table 5. Summary Analysis of Students' Physical Fitness in Pre-Test and Post-Test based-on IPFT Components

Components	Test	Mean	t	df	P
Speed	Pre-test	8.53	4.047	73	0.000
	Post-test	7.97			
Strength/endurance of arm/shoulder muscles	Pre-test	18.14	3.422	73	0.001
	Post-test	12.74			
Strength/endurance of Abdominal muscles	Pre-test	13.27	-7.294	73	0.000
	Post-test	18.82			
Explosive Power	Pre-test	26.81	-0.063	73	0.950
	Post-test	26.85			
Cardiovascular Endurance	Pre-test	3.90	4.714	73	0.000
	Post-test	3.09			

4. Discussion

Results of this research demonstrate that game-based physical activities influence students' physical fitness positively. This fact is in line with the statement saying that a regular training for six to eight weeks will generate specific results in which our bodies adapt to the given training [11]. Systematic, progressive and repetitive training will repair human's organ system and will eventually make physical performance optimal [12]. Training conducted three times a week is suitable for beginners and will produce significant improvement. Regular and measurable physical training in sufficient amount and time will change the ability to produce greater amount of energy and improve physical performance [13][14]. Motions performed repeatedly during training will cause conditioned reflex development, motion learning, and motion memorization process [12]. Results of this research are also supported by results of the study that physical activity learning program (fundamental movement) integrated into school subject significantly improves children's cognitive, psychomotor, and affective abilities [15]. Physical activities comprise of all types of movement produced by the body when performing daily activities such as working, exercising, or doing chores (doing laundry, sweeping), travelling (walking, cycling, riding motorcycle), and enjoying recreation (sports, outbound) [15].

Results suggest that performing game-based physical activities within 12 meetings can improve physical fitness up to 12.03%. It demonstrates that physical activities in form of games can influence students' physical fitness. Playing activities are means of socialization that allow students to explore, discover, express their feelings, get creative, and learn in fun ways [17]. Play significantly influences a child's development [18]. Meanwhile, play possesses certain values (the value of play), which include development of social, emotional, and cognitive skills [17]. In addition, play provides children with many benefits that can support their development. If children are given opportunities to engage in activities that require body movements, their bodies will be healthy and their muscles will grow strong [19]. Besides, being engaged in such activities will allow other body parts to move while enabling children to channel their extra energy and prevent them from getting anxious. For children, sitting for hours is not only boring but also uncomfortable and full of pressure. It is apparent that young children often exhibit active behavior, move a lot, and possess limited attention span [20].

Improved physical fitness among students found in this research was directed towards development of physical preparedness in coping with emergency situations such as disasters. Similarly, physical fitness is a manifestation of body's power and ability to adapt to the given physical release without experiencing excessive fatigue [21]. Preparedness is an effort to anticipate certain condition through organization of effective and efficient steps. Disaster preparedness is part of disaster management process as well as critical element in proactive disaster risk reduction control activity prior to occurrence of disasters. In this regard, the concept of preparedness being implemented focused on the ability to prepare for

emergency situation related to disaster effectively and efficiently. One of the ways to develop physical preparedness is maintaining physical fitness. Physical activities that vary are not only the most effective but also the safest alternative to attain physical fitness as they can increase fitness as well as improve stress tolerance and concentration level [22]. Regular, continuous, gradual physical activities that involve the right movement are highly recommended and able to improve the functions of body organs.

5. Conclusion

Game-based physical activities done in 12 meetings of physical education (PE) subject in disaster-safe schools can significantly improve students' physical fitness. Treatment given by PE teachers based on researchers' intervention has contributed to students' physical preparedness. It implies that PE teachers need to create activities that vary and include game-based activities in their learning to improve physical fitness of their students. It is recommended that future researchers impose stricter control over factors that influence physical fitness such as age, gender, genetics, food intake, environment, and sleeping habit. Future researches should also consider adding control group into research subjects to control other factors.

6. Acknowledgement

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