Scientific Approach in Physical Education: Improving Creativity and Physical Fitness of Senior High School Students in Mountainous Areas

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Abstract Background: This paper discusses the scientific approach in Physical Education. Physical Education emphasizes personal or body fitness. It promotes healthy living by exercising the body. **Purpose:** This study was aimed at analyzing the influence of the Physical Education approach to the creativity and physical fitness of high school students in mountainous areas. **Methods:** The method used was an experiment with pre-test and post-test designs. The populations of this study were students of Lembang Public Senior High School 1, consisting of 2 groups. 36 students were taken as samples through simple random sampling technique. The instruments used were creativity tests and physical fitness tests. The data were processed using independent t-test statistical analysis with a confidence level of 0.05. **Results:** The independent t-test calculation results, both the student's creativity and physical fitness components, showed a significant effect. **Conclusion:** The scientific approach in Physical Education carried out 3 times a week can increase the creativity and physical fitness of high school students living in mountainous areas. Meanwhile, if it is only done once a week, the results will be lower.

Keywords Physical Education, Scientific Approach, Creativity, Physical Fitness

1. Introduction

School is a formal education where students are educated. Their abilities must be nurtured and prepared. Their potential should be developed, thus they have personal qualities, a healthy body and soul, as well as an independent temperament and character. The educational process, including Physical Education and Sports, is an effort to support the achievement of national education goals. Physical Education is an inseparable part of the education system. Physical Education in the 20th century places more emphasis on physical fitness, motor skills, and social knowledge [1,2]. The problem that occurs in the field is that the learning process is less attractive which causes Physical Education students to be less enthusiastic about carrying out a movement activity, so that the student physical fitness level is low. This strengthens the notion that the old (conventional) curriculum is implemented statically and rigidly by those who apply it in the field [3–5]. Other data show that the prevalence of attending Physical Education (PE) classes had decreased from 31.5% in 2011 to 29.4% in 2013 [6]. Meanwhile, the trend of activist research that affects physical and all components of physical fitness, including body composition, cardiorespiratory, muscle strength, and flexibility HRQOL or Health Related Quality of Life in children, gets less attention than adults [7,8]. Physical Education that is implemented properly is proven to

improve physical fitness and have a positive impact, in general, including improving the quality of life [9]. Until now, there are still many Physical Education teachers who do not understand and master the learning models that can be used in learning, even still using conventional approaches in learning. The lack of the teacher's ability to develop learning models can have various negative impacts, including learning becoming less attractive and less effective in developing creative skills.

In this regard, the government has adopted a policy to implement the 2013 curriculum, at the beginning of the new semester of 2014, for all education units ranging from elementary to senior high school. One of the emphasis of the curriculum is a model approach called the Scientific approach, which consists of the Problem Based Learning approach, the Project Based Learning approach, and the Discovery Learning approach. Through these three approaches, it is hoped that it can develop the student creativity, concentration, and intelligence. Learning models that are assessed scientifically can help overcome the existing problems. Learning can develop students who actively learn about how to look for themselves (investigate themselves) so that the results obtained will last a long time in memory so that these students will not easily forget. Other studies suggest that a scientific approach is best for the present and future [10–12]. With a mindset that continues to be improved and developed, it can develop student intellectual and social aspects and the goal of a life-long healthy life can be realized [11]. Physical Education learning is believed to be able to develop student creativity, one of which is by using a problem-solving based learning model. The approach for learning can significantly increase the concentration of students at the end of the lesson, while the learning material does not affect the level of concentration. In order to increase student concentration, the teacher must plan learning well and choose the right learning approach by considering the allocation of learning time [13,14].

Each person has intelligence outwardly, but it will have a different effect on every aspect. In Physical Education learning that involves motoric aspects, it can provide learning experiences in the thinking process to solve kinaesthetic problems [15]. This is confirmed by other experts who state that intelligence is influenced by environmental factors [16–19], as an inborn trait [20–23], on the contrary, Multiple Intelligence theory states it as a combination of intelligence on inherited potential and skills that can be developed in various ways through relevant experiences [24]. Meanwhile, sensory factors and intelligence are influenced by an independent system, where the type and quality of information received by the sensory system determines a person intelligence [15]. Learning Physical Education in schools needs to be faced with improving the quality of life and preventing various diseases due to lack of movement, so that they can enjoy life properly and modestly [25]. Other researchers have also highlighted and identified the role of physical

activity, physical fitness, and mental health of school age children and their implications for public health, which is an important factor in children lives [26,27].

The opinion above shows that physical fitness can determine the level of a person quality of life. If physical fitness is good, it can support student movement activities both in physical learning and in daily activities, so that they can enjoy life better. Physical Education programs should raise awareness, influence attitudes, and identify alternatives so that people can make the right choices and change behaviour to achieve optimal levels of physical and mental health [28]. Then, students who do regular exercise with a scientific approach at school and through awareness outside of school can improve the performance of their brains. They are expected to excel in school and be able to compete at the national and international levels.

2. Methods

This study used an experimental method, with a randomized control-group pretest-posttest design, because this study used a control and experimental group. The experimental group received Physical Education learning treatment with a scientific approach for 16 weeks with 3 meetings each week, while the control group received Physical Education learning treatment with a conventional approach for 16 weeks with 1 meeting each week. Before the two groups received the treatment, a creativity and physical fitness pretest was conducted first. After the two groups received the treatment, the posttest was carried out with the same test.

Population and Sample

The population in this study were students of Lembang Public Senior High School 1 who lived in mountainous areas. The sampling technique used simple random sampling. The sample in this study were 72 students who were divided into 2 classes, each class consisted of 36 people.

Analysis

Data analysis used SPSS version 22 with the following steps:

- Normality test used Kolmogorov-Smirnov on a p-value > 0.05. Homogeneity test used Levene's test at p-value > 0.05.
- Analysis of hypotheses 1 to 4 used a paired sample t test, while hypotheses 5 to 6 used an independent t test at p-value > 0.05.

3. Results and Discussion

The data served in Figure 1 shows that the experimental

group with the Scientific approach in KBB Region creativity pretest result gained 14106 with an average of 391.83, while the posttest result was 15994 with an average of 444.28. The control group with the conventional approach in the KBB Region creativity pretest result gained 13867 with an average of 385.19, while the post-test was 13894 with an average of 385.94. As a comparator of creativity posttest results, the Bandung private group gained 10704 with an average of 356.80.

Figure 1. The Result Differences of Scientific and Conventional Approaches on Student Creativity in Mountainous Area

The data served in Figure 2 show that the experimental group with the Scientific approach in physical fitness pretest results gained 490 with an average of 13.61, while the posttest results were 568 with an average of 15.78. The control group with the conventional approach in the Region KBB pretest results gained physical fitness 487 with an average of 13.53, while the posttest was 512 with an average of 14.22. As the comparison result of the physical fitness posttest, Bandung private group gained 256 with an average of 8.53.

Figure 2. The Result Differences of Scientific and Conventional approaches on Student Physical Fitness in Mountainous Area

Based on table 1, the results of the paired sample test on the aspect of creativity obtained a significant value in the experimental group of $0.00 < 0.05$, which means that physical learning with a scientific approach had a significant effect on increasing student creativity in mountainous areas. Whereas in the control group, the

significance value was $0.635 > 0.05$, which means that Physical Education learning with a conventional approach had no effect on increasing student creativity in mountainous areas.

Table 1. Results of Paired Test on Creativity

Paired Sample t Test	T	Sig. (2-tailed)
KR_Eks Pre KBB-KR_Eks Post KBB	-7.674	000
KR_Kon Pre KBB-KR_Kon Post KBB	-0.478	635

Based on Table 2, the results of the paired sample test on the aspect of physical fitness, the significance value of the experimental group is $0.00 < 0.05$, which means that it has a significant effect on physical fitness, while the significant value in the control group is $0.049 < 0.05$, which means that it has a significant effect on physical fitness.

Table 2. Results of Paired Test on Physical Fitness

Paired Sample t Test	T	Sig. (2-tailed)
KJ_Eks Pre KBB - KJ_Eks Post KBB	-12.315	000
KJ_Kon Pre KBB-KJ_Kon Post KBB	-2.043	049

Based on Table 3, Physical Education learning with a scientific approach improved creativity and physical fitness for students in the mountainous area compared to Physical Education learning with a conventional method. Physical Education learning with a scientific approach is better than conventional approaches in increasing creativity and physical fitness student's in the mountainous area.

Table 3. Results of Independent Sample T Test

Independent Sample t Test	T	Sig. (2-tailed)
Creativity KBB	7.373	000
Fitness KBB	3.846	000

4. Discussion

Based on the results of processing and analysis of existing data, it shows that Physical Education carried out in mountainous areas with a scientific approach affected increasing student's creativity and physical fitness. Physical Education Learning using a scientific approach is aimed to develop students learning through self-discovery activities by looking for information on their own so that the results obtained will last for a long time in memory. Through this method, students can also learn to analyze and try to solve the problems they face themselves to increase their creativity and physical fitness. Creative people are generally relatively healthy [29], both physically and mentally [30], and even easier to actualize themselves. Some physicians utilize self-actualization to be an indicator of mental health [31,32]. The opinions

expressed describe that creative students are also students who have excellent physical fitness. It is in line with the results of research of Tarigan [33], which states that "Physical Education is carried out with the scientific approach to influence the improvement of student's creativity and physical fitness".

Although Physical Education conducted in mountainous areas with conventional approaches did not affect the increased creativity of students, it affected the improvement of student's physical fitness. Physical Education learning with a conventional approach can stimulate the student's critical thinking, creative thinking of teachers in presenting the lessons, and active participation of students during learning. The group with the technical approach alone (conventional learning) indicates the effect on creativity. However, it is still tiny compared to the group with the global-situational approach method (SG) or tactical approach model [34]. However, sometimes, it makes the teacher forget that the main component of learning in Physical Education is the physical fitness problem.

The results of research show that Physical Education carried out in the mountainous region with a more scientific approach influenced creativity and physical fitness compared to the conventional approach. New thought or idea falsifies previously thought or idea to solve a problem. Creativity is an ability possessed by every individual in creating something new [35,36]. Previous studies stated that Physical Education with a scientific approach had more effects on creativity, concentration, physical fitness, and intelligence of students compared to conventional approaches [33].

Physical Education and Sports in school should have a positive impact on students. It is advisable to use the FITT formula, which means: F = Frequency of exercise 3-5 times/week; I = intensity of light and moderate exercise with pulse zone (Target Heart Range) 50% - 70% X (220-age); T = time to do sports activities, 30-60 minutes; T = the type of aerobic exercise performed [25].

From the research that had been conducted, it is known that there was a positive influence on the level of physical activity, physical fitness, and health-related quality of life [7,9,37-42]. Education is the key to helping change the direction of society for a better future. It is recommended that school leaders, policymakers, the university, and the school committee consider the ecological effect of maximizing the productivity and quality of teachers [43].

5. Conclusion

Physical Education in the mountainous region conducted with a scientific approach gave effects on the increased creativity and physical fitness of students. Physical Education in the mountainous areas conducted with conventional approaches did not affect the increased creativity of students, but it had an impact on the

advanced physical fitness of students. Physical Education in the mountainous region conducted with a scientific approach gave better influence on the student's creativity and physical fitness compared to conventional approach.

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