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Development and Effectiveness of the Bosco Training Model to Improve Students Physical Fitness

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Abstract

This study focuses on creating a physical fitness training model for students, evaluating its validity, and assessing how the training model affects students' physical fitness. The research follows a research and development (R&D) approach at the limited trial stage, based on the Borg and Gall model. The study involved 89 high school students. Data was collected through questionnaires, direct observation, and documentation. The result of the research and development process was the Bosco physical fitness training model, which includes shuttle run exercises in a W-shape and triceps push-ups. The training was conducted four times a week, with three trials per session, and the highest score from each session was recorded. There was a noticeable improvement from the pre-test to the post-test results, with a significance level of 0.000, which is less than 0.05. As a result, the null hypothesis (H0) was rejected, indicating a significant difference in the average scores before and after implementing the Bosco training model. The Bosco model is classified as “appropriate” and is suitable for use as a physical fitness training model for students. It can be integrated into physical education programs to enhance students' overall physical fitness.

Keywords: bosco training model, physical fitness, shuttle run, training development
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Introduction

The most recent report from the World Health Organization (WHO) in 2024 reveals that approximately 81% of teenagers between the ages of 11 and 17 worldwide are not getting enough physical activity, leading to poor physical fitness among adolescents. This issue poses a significant challenge to the health of future generations globally. The situation is also present in Indonesia. According to data from the 2021 National Sport Development Index (SDI), published by the Ministry of Youth and Sports (Kemenpora 2021), the physical fitness level of students in Indonesia is classified as very low. This information was later updated in the 2022 report, which shows that 83.9% of high school students fall into the "poor" or "very poor" categories regarding their fitness. These results emphasize the importance of increasing efforts to enhance the physical fitness of students in Indonesia.

According to Ardian and Yasin (2024), physical fitness plays a key role in overall well-being, going beyond just physical endurance to include energy levels, stamina, and mental health. Through Physical Education (PE), students have the opportunity to form healthy lifestyle habits, enhance their motor skills, and cultivate strong character traits (Nasution & Tarigan, 2021). Additionally, physical fitness is closely linked to an individual's ability to carry out daily tasks efficiently without experiencing undue tiredness (Pranata, 2022).

However, several studies have indicated that the physical fitness levels of students in Indonesia are still low and are not adequately addressed by the lack of systematic and practical training programs in schools. This situation highlights a gap between the need to enhance physical fitness and the current approaches used in physical education.

Several earlier studies have tried to create training models to boost physical fitness. Bile et al. (2021) made a training model using traditional games, and it was shown to improve students' fitness and increase their interest in learning. On the other hand, Lismana et al. (2022) discovered that the 2018 Healthy Heart Gymnastics Series V greatly enhanced endurance and muscle strength in female students from junior high school. However, there is still a lack of research focused on developing a physical fitness training model tailored for senior high school students, using a method that is easy to measure, simple, and suitable for students.

The Bosco fitness training model provides a practical and easy to implement training program even with limited facilities. The main objective of developing this training model is to produce innovations that support physical education learning activities to improve students' physical fitness. The results of this study are expected to contribute to improving the quality of teaching and serve as a reference for teachers when designing training programs that are applicable, effective, and enjoyable for students.

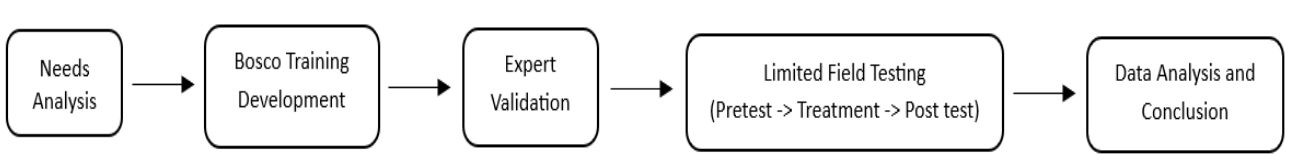
Methods

Research Design

This study uses the Research and Development (R&D) method, which is rooted in the Borg & Gall model and is applied in a restricted Level 3 trial. This approach is widely utilized in research focused on development. Generally, researchers modify certain phases of the process according to the specific goals of the study and the level of the investigation (Borg & Gall, as cited in Putri, 2023). In this study, the following steps were implemented throughout the development process.

Figure 1

Research Procedure



First, a needs analysis was carried out by gathering initial data through questionnaires and initial fitness assessments using TKSI (Tes Kebugaran Siswa Indonesia) to evaluate the physical condition of the students. Next, the model development phase involved creating the Bosco Training Model based on the findings from the needs analysis. Then came the expert validation stage, where physical education experts reviewed the design and content to ensure it was both technically and pedagogically sound. Following this, there was a revision stage to improve the model based on the experts' feedback. The final step was a limited field test, which involved implementing the model with a selected group of participants, following a pre-test, 16 weeks of intervention, and a post-test, to assess its feasibility and effectiveness.

Participants

The study involved all senior high school students, with a total of 89 participants. Among them, 45 were male and 44 were female, with ages ranging from 14 to 17 years. The research used a total sampling method, meaning every member of the population was included in the sample. Data collection took place during physical education lessons, specifically in five classes: three classes from the 10th grade and two classes from the 11th grade.

Instrument

The research tools used to assess students' physical fitness in this study included a questionnaire delivered through Google Forms, which had 10 questions focusing on students' physical fitness and 10 more questions given after the post-test. Additionally, documentation and observations were conducted using the TKSI test battery. The TKSI comprised various test components, all of which have proven validity and reliability.

The Hand and Eye Coordination Test showed a validity value of 0.751, which is higher than 0.103 (r calculated > r table), indicating very high validity. It also had a reliability coefficient of 0.689, which is considered high reliability. The Vertical Jump Test had a validity value of 0.805, which is greater than 0.103, classifying it as high validity, and a reliability value of 0.683, also indicating high reliability. The T Test resulted in a validity value of 0.714, which is above 0.103, showing high validity, and a reliability coefficient of 0.693, which is high reliability. The Hand Touch Reaction Test had a validity value of 0.323, which is above 0.103, categorized as low validity, although it demonstrated high reliability. The Dipping Test produced a validity value of 0.520, which is higher than 0.103, indicating moderate validity, and a reliability coefficient of 0.714, considered high reliability. Lastly, the Beep Test showed a validity value of 0.257, which is above 0.103, classified as low validity, but had a reliability coefficient of 0.738, which is high reliability.

Procedure

The research procedure consisted of three main stages, structured according the Borg & Gall Level 3 development model: needs analysis, model development and validation, and limited field testing. In the needs analysis stage, the researcher distributed a questionnaire containing 10 questions to obtain preliminary information related to student physical fitness levels, lifestyle habits, exercise intensity, dietary patterns, and sleep quality. These data were used to obtain a comprehensive overview of student initial physical fitness condition.

The next step was creating and checking the Bosco fitness training model. This model was made using the findings from the needs analysis. It was then reviewed by physical education experts who checked its content and design to make sure it was practical for teaching and matched the students' needs.

The final part of the process was a limited field test, which had three stages.

First, a pre-test was done using the TKSI to measure the students' current level of physical fitness. Then, the Bosco training model was implemented for 16 weeks, with sessions held three to five times a week, each lasting 90 minutes. Research by Panggraita and Mega (2020) shows that this training model significantly improves physical fitness. After the training period, a post-test was conducted to assess the improvement in fitness levels. Additionally, students' views on how effective the Bosco model was were gathered through an evaluation questionnaire along with quantitative data.

The efficacy of the intervention was then assessed by analyzing and comparing the post-test results with the pre-test data. Data triangulation was used as a complementary strategy by merging quantitative information from TKSI with qualitative information from the survey. Figure 1 shows how this method allowed for a more thorough and in-depth evaluation of the developed research workflow's efficacy.

Data Analysis

To make sure the developed training model's content and design were appropriate, an expert validation process was carried out prior to its implementation with the students. An expert in physical education completed this validation by evaluating the training model's design and content

Table 1

Normality Test of Results Pre-test and Post-test Variables

Variable	Statistic	df	Sig.
Pre-test Hand Eye Coordination	.183	89	.000
Post-test Hand Eye Coordination	.123	89	.002
Pre-test Vertical Jump Test	.167	89	.000
Post-test Vertical Jump Test	.175	89	.000
Pre-test T Test	.093	89	.056
Post-test T Test	.145	89	.000
Pre-test Hand Touch Reaction	.107	89	.014
Post-test Hand Touch Reaction	.430	89	.000
Pre-test Dipping Test	.069	89	.200*
Post-test Dipping Test	.114	89	.006
Pre-test Beep Test	.118	89	.004
Post-test Beep test	.063	89	.200*

Table 2

Hypothesis Test

Test Statistics	Z	*Asymp.Sig. (2-tailed)*
Post-test Hand Eye Coordination – Pre-test Hand Eye Coordination	-5.488[b]	.000
Post-test Vertical Jump – Pre-test Vertical Jump	-5.460[b]	.000
Post-test T Test – Pre-test T Test	-7.905[b]	.000
Post-test Hand Touch Reaction – Pre-test Hand Touch Reaction	-5.822[c]	.000
Post-test Dipping Test – Pre-test Dipping Test	-8.148[b]	.000
Post-test Beep Test- Pre-test Beep Test	-8.181[b]	.000

(Mardapi, 2023). In order to verify the validity of the employed instrument, the validation process was carried out methodically by gathering theoretical and empirical data. Following the completion of the data collection procedure, a normality test was used to start the analysis and ascertain whether the data could be distributed normally. The Wilcoxon Signed Rank Test non-parametric test was used to continue the analysis after the test results demonstrated that the data did not satisfy the assumptions of normality and homogeneity.

In the last phase, the researcher tested hypotheses and examined the variations between the pre-test and post-test outcomes following the intervention. The impact of training on the students' overall improvement in physical fitness was determined using the results of the hypothesis testing.

Results

Before deciding on the statistical methods, the researcher first checked for normality to assess how the data was distributed. Table 1 presents the results of the normality test, showing that most of the data, except for the pre-test Dipping Test, had a significance value greater than 0.05. A significance value less than 0.05 indicates that the data is not normally distributed. Therefore, it is evident that most of the data does not meet the assumption of normality, particularly the pre-test T Test, pre-test Dipping Test, and post-test Beep Test. Based on this, the Wilcoxon Signed Rank Test was chosen as the appropriate non-parametric statistical method, since the pre-test and post-test data did not follow a normal distribution.

In a scientific context, a hypothesis offers an initial answer to specific research questions that are clearly defined as problem statements (Sugiyono, 2018 as cited in Gea et al., 2023). The importance of the hypothesis testing results shown in Table 2 is that all the variables examined in the study — Hand Eye Coordination, Vertical Jump Test, the T Test, Hand and Touch Reaction Test, Dipping Test, and Beep Test — have p-values of 0.000. These values are all below the critical threshold of 0.05, indicating statistical significance.

Also, the average comparisons indicated an improvement from the initial exam to the final exam in all measured variables. Hand Eye Coordination increased by 35.45%. The Vertical Jump Test showed an improvement of 5.64%, while the T Test showed a decrease of 9.83%. The Hand and Touch Reaction Test increased by 15.24%. The

Dipping Test showed a relatively high increase of 39.82%, and the Beep Test improved by 6.04%. The overall average improvement across all treatment variables was 15.40%. These findings further support the idea that the Bosco training program can lead to statistically significant improvements in students' physical fitness.

Discussion

The findings from the research confirm that the Bosco training model positively changes the physical fitness of students across different dimensions. As shown by the gained score in the post-test result from each component of the TKSI variables. The largest increase was in the Dipping Test (39.82%), followed by Hand and Eye Coordination (35.45%) and Hand Touch Reaction (15.42%). Moderate improvements were also seen in the Vertical Jump Test (5.64%) and Beep Test (6.04%). However, one component, the T Test, experienced a decline of 9.83%. Overall, the average increase reached 15.40%. These results illustrate that the Bosco training model is effective in improving the physical fitness of high school students, especially in terms of coordination, reaction speed, and endurance.

The progress School-Based Interventions Reported 2021 is in line with previous findings that pointed out active training programs improve multiple domains within fitness. A good number of literature that examined school-based physical activities demonstrate that participation in physical activities improves the level of fitness and enhances the different domains of fitness (Vaquero-Solis et al., 2020). Also, comparative studies have shown that different sorts of training programs, for instance, resistance training, and interval training, have significant influence on the particular fitness components that get improved (Wu et al., 2023).

These results also support evidence showing explosive training to improve jumping performance, sprint ability and change of direction speed (Ramirez-Campillo et al., 2023; Zheng et al., 2025). In addition, Shuttle Run training has demonstrated to be significantly effective for the development of cardiorespiratory fitness in adolescents (Jovanovic et al., 2024). Conversely, when it comes to upper body strength related exercises like the triceps pushup in connection with resistance training a meta-analytic study has demonstrated that resistance training significantly enhances incremental both of the upper (upper and lower limbs).

To endorse the acceptance of the research hypothesis, the model`s effectiveness in improving student physical fitness is enhanced by the pre-test and post-test data. As a result, Bosco training model should be recognized as a valid and reliable alternative training program that is impactful in improving physical fitness and applicable in the case of senior high school students.

Conclusions

As such, this work establishes an appropriate Bosco physical fitness training model for senior high school students. The training model based on Shuttle Run and Tricep Push Up exercises, has shown to be an efficient way to enhance significantly physical fitness level in students as a whole, taking into account different evaluated dimensions (Hand Shape Coordination, Dip Test and Hand & Touch Reaction Time). The model was considered as a valid and applicable model in physical education lessons influenced students to interest in motivation to practice.

The Bosco Training Model can be actually generalizable by the physical education teachers as a simple and effective modality for an alternative training program aiming at augmenting participant's in school activities or participation and increasing their physical fitness performance, Considering that it may be a model adapted to health -related activities or athletics programs introduced within educational institutions, this could make more substantial contribution on promoting students' general health condition with no underestimating enhancing their overall quality of physical fitness.

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