

The Effect of Swimming Board and Cone Hop Training on Freestyle Swimming Speed among Extracurricular Students at SMPN 6 Mataram in 2024

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Abstract

Objectives: This study aimed to determine the effect of swimming board and cone hop training on freestyle swimming speed among extracurricular students at SMPN 6 Mataram in 2024. The study was based on the problem that students participating in swimming extracurricular activities still showed limitations in freestyle swimming speed, especially in relation to leg power, balance, and movement efficiency.

Materials and Methods: This study used an experimental method with a pretest–posttest design. The participants were 34 students who joined the swimming extracurricular program at SMPN 6 Mataram in 2024. The participants were divided into two experimental groups using ordinal pairing. Experimental Group A consisted of 17 students who received swimming board training, while Experimental Group B consisted of 17 students who received cone hop training. The treatment was carried out for 16 training sessions. Data were collected through freestyle swimming speed tests before and after the training program. The data were analyzed using SPSS version 21. The statistical analysis included normality testing, homogeneity testing, and paired sample t-test.

Results: The normality test showed that the pretest and posttest data for both groups were normally distributed, with significance values greater than 0.05. The homogeneity test showed a significance value of 0.948, indicating that the data variance was homogeneous. The paired sample t-test showed a significant improvement in freestyle swimming speed after swimming board training, with a mean difference of 1.48059, $t = 5.672$, $df = 16$, and $p = 0.000$. Cone hop training also showed a significant improvement, with a mean difference of 0.55059, $t = 17.213$, $df = 16$, and $p = 0.000$.

Conclusions: The results of this study indicate that both swimming board and cone hop training were effective in improving freestyle swimming speed among extracurricular students at SMPN 6 Mataram in 2024. Swimming board training contributed to movement control, balance, and swimming technique, while cone hop training supported leg power and explosive movement. Therefore, both training methods can be used as alternative training programs to improve freestyle swimming performance among students.

Keywords: Swimming Board; Cone Hop; Freestyle Swimming; Swimming Speed; Extracurricular Students

Introduction

Physical fitness is an important component for human health, especially among adolescents. Adolescence is a period of growth and development in which individuals are generally active in carrying out daily activities (Balbir Singh, 2016; Ojeda-Aravena et al., 2023). Good physical fitness allows



adolescents to perform daily tasks without excessive fatigue and still have enough energy for leisure activities and unexpected physical demands (Leuciuc, 2018; Nawawiwetu & Lutfiya, 2020; Nopriani et al., 2023). Therefore, physical activity and sport play an important role in supporting health, growth, and physical development among school-age students (*A Study Of Improvement In Skill Acquisition And Performance In Batting Among Female Cricketers*. | EBSCOhost, n.d.; Edwards et al., 2017; Wallhead & Ntoumanis, 2004).

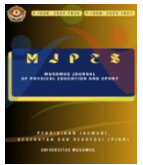
Sport is a systematic activity that contributes to the development of physical, mental, and social potential. Participation in sport can help improve health, maintain physical condition, and prevent various health problems (Kholis, 2016; Kuswoyo et al., 2020). In addition, sport participation may also support psychological aspects such as self-confidence, motivation, concentration, and emotional well-being. In the educational context, sport activities are not only aimed at improving physical fitness but also at developing discipline, cooperation, and achievement motivation among students.

(Lepore et al., 2015; Luo et al., 2022) is one of the most popular sports in the world, including in Indonesia. Swimming can be performed by various age groups, from children to adults. Compared with many other sports, swimming has specific characteristics because it is performed in water. This condition requires swimmers to adapt their body movements to buoyancy, water resistance, breathing control, balance, and coordination. Therefore, proper training methods are needed to improve swimming technique and performance (Myszka et al., 2024; Papadimitriou & Loupos, 2021).

In freestyle swimming, speed is one of the most important indicators of performance. A swimmer must be able to combine body position, arm movement, leg kick, breathing rhythm, and coordination efficiently (Oh et al., 2011; Susanto et al., 2020). Among these components, leg power and body balance are essential for maintaining speed and stability in the water. Weakness in leg movement and body control can reduce swimming efficiency and affect overall performance.

Based on observations conducted on May 27, 2024, at SMPN 6 Mataram, many students participated in the swimming extracurricular program. However, in several competitions, the students had not been able to achieve top-four results. This condition indicated the need for a more structured training program to improve freestyle swimming speed, especially through exercises that support leg power, balance, and movement efficiency.

Swimming board training is one method that can be used to improve swimming technique, body position, balance, and leg movement. By using a swimming board, students can focus more on leg kicks and body stability without being overly distracted by arm movements. Meanwhile, cone hop training is a plyometric exercise that involves jumping movements over cones from side to side. This exercise is useful for improving leg power, agility, and explosive strength, which are important in supporting



swimming speed.

Based on these problems, this study was conducted to examine the effect of swimming board and cone hop training on freestyle swimming speed among extracurricular students at SMPN 6 Mataram in 2024. The findings of this study are expected to provide practical information for teachers and coaches in designing more effective training programs to improve student swimming performance.

Materials and Methods

Study Participants

The participants in this study were students who joined the swimming extracurricular program at SMPN 6 Mataram in 2024. The population consisted of 34 students (Sugiyono, 2012). Since the total population was fewer than 100 participants, all students were included as the research sample. Therefore, this study used a total sampling approach.

The participants were divided into two experimental groups. Experimental Group A consisted of 17 students who received swimming board training, while Experimental Group B consisted of 17 students who received cone hop training. The grouping was conducted using ordinal pairing so that the two groups could be balanced based on their initial ability.

The inclusion criteria were students who were active members of the swimming extracurricular program, participated in the pretest and posttest, and were physically able to follow the training program. Students who were absent during the training sessions, unable to complete the testing procedures, or experienced health problems that prevented them from participating fully were not included in the final analysis.

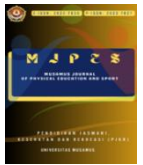
Study Organization

This study used an experimental method with a pretest–posttest design. The experimental method was used to determine the effect of specific treatments on freestyle swimming speed. In this study, the treatments were swimming board training and cone hop training, while the dependent variable was freestyle swimming speed.

The research design is presented in Table 1.

Table 1. Research Design

Group	Pretest	Treatment	Posttest
Experimental Group A	O1	X1	O2
Experimental Group B	O1	X2	O2



Description:

O1:	Initial	test	before	treatment
O2:	Final	test	after	treatment
X1:	Swimming	board	training	treatment
X2:	Cone hop training treatment			

The research procedure consisted of several stages. First, all participants completed a pretest to measure their initial freestyle swimming speed. Second, the participants were divided into two groups using ordinal pairing. Third, each group received a different treatment. Experimental Group A received swimming board training, while Experimental Group B received cone hop training. The training program was carried out for 16 meetings. Fourth, after the treatment period was completed, all participants completed a posttest to measure their freestyle swimming speed after training.

Swimming board training was designed to help students improve body balance, leg kick technique, and movement control in freestyle swimming. During this training, students used a swimming board to support their upper body while focusing on leg movements and body position in the water. Cone hop training was designed to improve leg power and explosive movement. This training involved repeated jumping movements over cones, which aimed to strengthen the lower limbs and improve physical support for freestyle swimming speed.

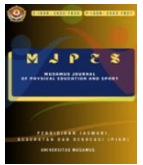
Statistical Analysis

The data were analyzed quantitatively using SPSS version 21. The analysis began with descriptive statistics to summarize the pretest and posttest results. Before hypothesis testing, normality and homogeneity tests were conducted to ensure that the data met the requirements for parametric analysis.

The normality test was conducted using the Kolmogorov–Smirnov and Shapiro–Wilk tests. The homogeneity test was conducted using Levene’s test. After the data met the statistical assumptions, a paired sample t-test was used to examine whether there was a significant difference between the pretest and posttest scores in each group. The level of significance was set at 0.05.

Results

The results of this study showed that both swimming board and cone hop training improved freestyle swimming speed among extracurricular students at SMPN 6 Mataram in 2024. Before hypothesis testing, normality and homogeneity tests were conducted to ensure that the data met the assumptions for parametric analysis.



Normality Test

The normality test was conducted to determine whether the pretest and posttest data in both groups were normally distributed. The results are presented in Table 2.

Table 2. Normality Test Results

Variable	Kolmogorov–Smirnov Statistic	df	Sig.	Shapiro–Wilk Statistic	df	Sig.	Interpretation
Pretest Swimming Board	0.210	17	0.046	0.905	17	0.082	Normal
Posttest Swimming Board	0.123	17	0.200	0.924	17	0.171	Normal
Pretest Cone Hop	0.133	17	0.200	0.965	17	0.724	Normal
Posttest Cone Hop	0.166	17	0.200	0.965	17	0.718	Normal

Based on the Shapiro–Wilk test, all variables showed significance values greater than 0.05. Therefore, the pretest and posttest data for both the swimming board and cone hop groups were normally distributed.

Homogeneity Test

The homogeneity test was conducted to determine whether the variance among the data groups was homogeneous. The result is presented in Table 3.

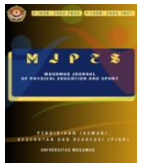
Table 3. Homogeneity Test Result

Test	Levene Statistic	df1	df2	Sig.	Interpretation
Based on Mean	0.120		64	0.948	Homogeneous

The homogeneity test showed a significance value of 0.948, which was greater than 0.05. This result indicates that the variance among the pretest and posttest data for both training groups was homogeneous.

Paired Sample t-Test

A paired sample t-test was used to determine whether there was a significant difference between the pretest and posttest results in each group. The results are presented in Table 4.

**Table 4.** Paired Sample t-Test Results

Pair	Variable	Mean Difference	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)	Interpretation
Pair 1	Pretest X1 – Posttest X1	1.48059	1.07623	0.26103	.672	16	0.000	Significant
Pair 2	Pretest X2 – Posttest X2	0.55059	0.13188	0.03199	17.213	6	0.000	Significant

The paired sample t-test showed that the swimming board group had a mean difference of 1.48059, with $t = 5.672$ and $p = 0.000$. Since the significance value was lower than 0.05, swimming board training had a significant effect on freestyle swimming speed.

The cone hop group had a mean difference of 0.55059, with $t = 17.213$ and $p = 0.000$. Since the significance value was also lower than 0.05, cone hop training had a significant effect on freestyle swimming speed.

These results indicate that both swimming board and cone hop training were effective in improving freestyle swimming speed among extracurricular students at SMPN 6 Mataram in 2024.

Discussion

The purpose of this study was to determine the effect of swimming board and cone hop training on freestyle swimming speed among extracurricular students at SMPN 6 Mataram in 2024. The results showed that both types of training significantly improved freestyle swimming speed. This finding indicates that structured training programs focusing on technique, balance, and leg power can contribute positively to swimming performance (Farizal Imansyah & Akbar Tanjung, 2020; Lavoie & Montpetit, 1986).

The improvement in the swimming board group may be explained by the function of the swimming board as a training aid that helps swimmers focus on leg movement and body position. In freestyle swimming, an effective leg kick helps maintain body balance, supports propulsion, and stabilizes movement in the water. By using a swimming board, students were able to concentrate more on lower-body movement without being overly concerned with arm coordination. This condition may have helped them improve their kicking efficiency and body alignment during freestyle swimming.

Swimming board training also supports technical learning because it allows students to repeatedly practice leg movements in a more controlled manner. Repetition is important in motor skill development because it helps students build movement patterns, improve coordination, and reduce technical errors. Therefore, the significant improvement found in the swimming board group suggests that this training



method is useful for developing freestyle swimming speed, especially among students who are still improving their basic swimming technique.

The improvement in the cone hop group may be related to the role of plyometric training in developing lower-limb power. Cone hop training involves repeated jumping movements that require strength, balance, coordination, and explosive power. In freestyle swimming, leg power contributes to stronger kicks and better propulsion. Although swimming is performed in water, lower-limb strength remains important because effective kicking supports speed and movement stability.

The paired sample t-test showed that cone hop training also had a significant effect on freestyle swimming speed. This indicates that land-based physical conditioning can support swimming performance when the exercise targets relevant physical components. Cone hop training may help students develop stronger leg muscles, faster muscle contractions, and better coordination, which can be transferred to kicking performance in freestyle swimming.

The findings of this study are in line with the view that swimming performance is influenced by both technical and physical factors. Swimming board training emphasizes technical aspects, especially body position and leg kick technique, while cone hop training emphasizes physical aspects, especially leg power and explosive movement. Therefore, both methods provide different but complementary benefits for improving freestyle swimming speed.

The results also showed that some students experienced greater improvement than others. This may have been influenced by differences in physical condition, training seriousness, attendance, motivation, and activities outside the treatment schedule. Since this study used a quasi-experimental approach, the researcher could not fully control the participants' activities outside the training program. Students who practiced outside the scheduled treatment sessions may have shown greater improvement, while students who were less serious or not in optimal physical condition during the posttest may have shown smaller improvement.

Overall, the findings suggest that both swimming board and cone hop training can be used as practical training alternatives for school swimming extracurricular programs. Swimming coaches and physical education teachers may combine technical training in the water with supporting physical exercises on land to improve students' freestyle swimming performance more effectively.

Conclusions

Based on the results of the normality test, homogeneity test, and paired sample t-test, this study concluded that swimming board and cone hop training were effective in improving freestyle swimming



speed among extracurricular students at SMPN 6 Mataram in 2024.

Swimming board training showed a significant improvement in freestyle swimming speed, with a mean difference of 1.48059, $t = 5.672$, $df = 16$, and $p = 0.000$. This indicates that swimming board training effectively improved students' freestyle swimming performance by supporting leg movement, body balance, and swimming technique.

Cone hop training also showed a significant improvement in freestyle swimming speed, with a mean difference of 0.55059, $t = 17.213$, $df = 16$, and $p = 0.000$. This indicates that cone hop training effectively improved students' freestyle swimming performance by supporting leg power and explosive movement.

Therefore, both swimming board and cone hop training can be applied as alternative training methods to improve freestyle swimming speed among students. Future studies are recommended to examine other factors that may influence swimming performance, such as arm strength, breathing technique, training intensity, motivation, and nutritional condition.

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