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Enhancing Finswimming Technique: A Revolutionary Bifins Training Model for Beginner Athletes

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Abstract: *Finswimming is an engaging and specialized aquatic sport that demands a blend of strength, endurance, and technical precision. For novice athletes, acquiring the essential finswimming techniques is vital for their growth and long-term success in the sport. This study aims to investigate the effect of using a bifins training model specifically designed for beginner finswimmers on the improvement of their finswimming technique skills. The goal of this study was to evaluate the impact of a finswimming bifins training model on enhancing the technique skills of beginner finswimmers. Conducted at the Universitas Negeri Jakarta Diving Club, HS Agung in East Jakarta, the research involved 40 athletes, divided equally into an experimental group and a control group. The study aimed to assess the effectiveness of the training model by comparing the performance improvements between the two groups. A pretest-posttest control group design was used for this pre-experimental research. Data analysis with SPSS showed a significance (2-tailed) value of 0.000, which is less than 0.05, a T-count of 23.933 with 38 degrees of freedom, and a T-table value of 2.02439. These results demonstrated that the experimental group experienced a significantly greater improvement in finswimming technique skills compared to the control group. Thus, the finswimming bifins training model was found to significantly enhance technique skills for beginners. However, the study's limitation is that it focused exclusively on this specific training model.*

Keywords: *Finswimming Bifins; Training Model; Technique Skills, Beginner Athletes.*

INTRODUCTION

Finswimming, also known as diving, is an evolved form of swimming (Safei et al., 2021). The primary distinction between these two sports lies in the use of specific equipment, such as monofins, bifins, and snorkels (Ehrenfeld, 2017). Sport finswimming is a competitive activity that involves using monofins or bifins and can be performed on the surface or underwater (Vašíčková et al., 2017). It is considered a sport where individuals or teams strive to achieve the best possible results in various national or international competitions (Nualnim et al., 2012). However, finswimming has not been included in the Olympics. The events contested in finswimming are governed by the rules set forth by the Confederation Mondiale des Activités Subaquatiques (CMAS) (Collard et al., 2022) among them are finswimming Surface, finswimming Apnea finswimming Immersion, and Bifin (Hlukhov et al., 2022).

Finswimming has recently emerged as a growing and increasingly popular sport in Indonesia (Downie, 2017; Silva, 2020). Many finswimming clubs in the region are now dedicated to developing young talent. The goal of this coaching is to produce exceptional athletes who have the potential to compete at regional and national levels and serve as role models in international competitions (Castagna et al., 2023). Body flexibility and joint proprioception are crucial factors in assessing the potential of talented swimmers and divers in diving sports (Ganchar et al., 2022), the effectiveness of movements, particularly those involving the limbs is crucial (Möller et al., 2022). To enhance performance in finswimming, physical conditioning is a key component for athlete success. Athletes across all sports require good physical condition to effectively execute techniques and tactics during both training and competition (Downie, 2017; Ehrenfeld, 2017). Similar to other sports, finswimming relies on strength, speed, agility, endurance, flexibility, and balance (Barlow et al., 2016; Cadenas-Sanchez, 2020). The training program should be meticulously structured and systematic, focusing on enhancing both physical fitness and functional capabilities of the body. This approach is essential for athletes to achieve optimal performance (Reigal, 2020). Understanding an athlete's physical condition is crucial for effectively managing their training and maximizing their performance potential.

Observations at diving sports clubs in the DKI Jakarta area have revealed that beginner athletes often face challenges with poor technical skills. This problem is linked to several factors, including ineffective training programs and methods. To address this issue, it is crucial to develop a targeted training program that enhances the finswimming technique skills of beginners. Preliminary research, including an initial needs analysis involving 40 beginner athletes from these clubs, was conducted to understand their specific needs. The subjects were chosen to ensure they had similar characteristics and initial skill levels in finswimming.

Field observations indicate that beginner athletes find it more challenging to grasp finswimming techniques compared to other training materials. Therefore, there is a need to design a specialized finswimming training model tailored for beginners. The existing thing as stated by (Ruotsalainen, 2020) certain applications in this case are translated in the form of applications that are easily accessible by smartphones that cannot be separated from student life. In finswimming lessons, students often struggle to understand the material. This situation suggests that integrating applications easily accessible via smartphones could greatly benefit athletes, making it simpler for them to grasp finswimming concepts.

Previous research in finswimming has primarily focused on analyzing the effects of exercise, basic techniques, physiological aspects, stress, conditioning, tests and measurements, and biomechanics in relation to training strategies. For example, 1:1 interval training significantly increased the speed of the 50-meter bifins, while flexibility had no significant correlation with the 50-meter bifin speed in female athletes (Ayu Kusumaningtyas, 2024). Furthermore, research conducted by (Silva, 2020) according to the needs analysis conducted with beginner finswimming athletes, 85% expressed a strong interest in finswimming, 90% had never read a favorite finswimming exercise book, and 85% had not been exposed to variations in finswimming exercises. Additionally, 95% indicated a need for supportive media for popular finswimming practices. The needs analysis with finswimming coaches revealed that the training material currently provided is not varied, and there is a lack of supportive media. Coaches expressed a preference for book media, as they believe digital books could enhance understanding of finswimming training concepts.

Previous research has highlighted a gap in comprehensive investigations of finswimming training models specifically designed for beginners. Existing studies have not thoroughly examined how such models can effectively help beginners grasp training materials and improve their finswimming skills. This research seeks to address this gap by focusing on a training model that enhances material absorption through more targeted methods. The study introduces a modified finswimming training model for beginners and assesses its impact, offering a novel approach not previously explored. It includes a thorough analysis of finswimming bifins training programs, incorporating variations in both land and water training, and introduces new training models and tools.

The literature indicates that finswimming training models can be effective and facilitate easier implementation for beginners. Most studies agree that these models, when combined with appropriate instruction, can improve skills and performance. Therefore, the innovation in this research will focus on evaluating the effects of the finswimming bifins training model for beginners, specifically in enhancing finswimming technique skills.

MATERIALS AND METHODS

Research Design

This study employs a quantitative research approach (Hafidz et al., 2022), specifically utilizing a pre-experimental design (Purwoto et al., 2024). To determine the effect of using the finswimming bifins training model on improving finswimming technique skills in beginner athletes, a pretest-posttest control group design was used.

Participants and data collection

The research involved 40 beginner athletes, divided into 20 in the control group and 20 in the experimental group. Participants form UNJ Diving Club in HS Agung, East Jakarta.The research period spanned from January 15, 2024, when the director of PPS UNJ issued the decree approving the research proposal, to April 27, 2024, when the final research results report was completed. This training model comprises thirty-six methods designed for beginner finswimming athletes, which have been validated by experts in test and measurement, finswimming training materials, and biomechanics. Each training method is conducted both on land and in the swimming pool. The researcher developed an instrument to measure finswimming technique skills. Expert evaluation confirmed that this instrument is valid and reliable for use. The technique skills instruments are in Table 1 and Table 2 for assessment.

Table 1. *Instruments Finswimming Bifins Technique Skills*

N°	Dimension	Indicators	Motion Description	Value	
				Yes	Not
1	Body	Relaxed Head Position Downward View	Look down Arms parallel to the body Chin facing down Breath through the mouth and nose		
		Streamline Agency Position	Horizontal straight body Horizontal straight head with body Floating body position Relaxed body position		
		Position of Hands Parallel to Legs	Streamline *body posture* Position of the arms parallel to the ears Both arms are straight tightly Fixed view down		
		Pelvic and Knee Position	The position of the pelvis slightly on the water surface Straight knee position Both knees tend to be tight Pelvic relaxation		
		The position of the soles of the feet is tightly parallel to the water surface	The second position of the feet is straight and tight Toes stay straight Immobilized ankle Relax the ankle		
2	Leg	Leg movements centered on the groin	Straight legs aligned groin-centered movements Straight fingertip parallel constant motion		
		Knee Alignment and Knee Movement in Harmony with the Pelvis	Energetic straight knee whole movement of the groin Flutter *Kick* Accelerated movement		
		Ankle Position Parallel to Water Level	Energetic Relax Ankle Relax ankles constant motion Simultaneous movement		
		Constant Leg Movement and Lenk	Limbs remain straight and aligned Regular movement patterns not stiff and hard Strong and powerful limb pedaling		
		The distance of the limbs to the water surface is between 25-30 cm	Straight leg position parallel to the water level Maintained and orderly distance not too tight Not disturbed by each leg movement		
3	Arm	Palm Position Close Paddle	Palm tight paddle position Regular movement constant Harmonious movement		
		Elbow Movement Following Arm Paddling Direction	straight elbows rotate following the pattern Movement sourced from the base of the arm Elbow position higher than palm not broken – broken		
		The position of the swing shoulders moves according to the movement of the arms	chin-level shoulders Both shoulders are the same height left and right Shoulder Relaxation Straight Parallel		

3	Arm	The Position of the Counterweight Shoulder Remains Parallel to the Water Level	Shoulder position to be a counterweight Relax and Stable straight parallel to the water surface stability maintained
		The position of the head remains relaxed following the movement of the arms	Straight Parallel Head relax Look Down be a counterweight to the movement
4	Breath	Head Position Parallel Arm Movement	Straight parallel to the water level Relax, look down Become a Movement Control Motion Balancer
		Rotating Arm Position	straight parallel body Regular movement Powerful Stable Pedaling
		Chest Position	Fixed chest on the shaft Stable motion Stability maintained constant
		Hip Position	straight parallel body Regular movement Powerful Stable Pedaling
		Elbow Position	straight parallel body Fluttering movement Powerful Stable Pedaling
5	Coordi-nation	Breath-arm coordination	Straight parallel to the water level relax Become a Movement Control Motion Balancer
		Foot-breath-hand coordination	straight parallel body Regular movement Powerful Stable Pedaling
		The position of the head and hands touching when the hands rotate	stable Simultaneous constant relax
		Motion Alignment	stable Simultaneous orderly constant
		Right-left hand coordination	stable Simultaneous orderly constant

Table 2. *Assessment of Fin swimming Bifins Skills Instrument*

Statement	Assessment Score
YES	1
NO	0

Statistical analysis

The data analysis for this study involved bibliometric analysis , using sources such as Scopus, Web of Science, Crossref, PubMed, and Google Scholar (Simbolon, 2024; Umar et al., 2022). Bibliometric mapping was performed with the assistance of Publish or Perish, Mendeley, and VOSviewer software. Di sisi lain, kata kunci lebih jarang muncul berada di area hijau. Additionally, SPSS 21 was utilized to conduct descriptive tests, normality tests, and T-tests (Jatmiko et al., 2024).

RESULTS

Bibliometric Analysis

Researchers gathered bibliometric data from the most commonly used databases for bibliometric analysis: Scopus, Web of Science, Crossref, PubMed, and Google Scholar. The bibliometric mapping in this analysis was conducted using Publish or Perish, Mendeley, and VOSviewer software. The information obtained is as follows:

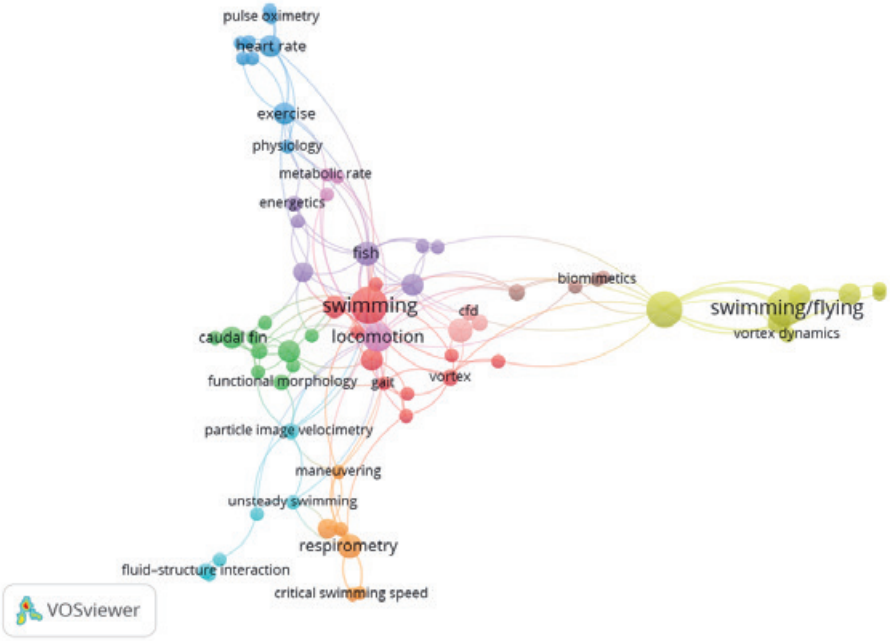

Figure 1. *Visualization of Variable Relationships*

Based on Figure 1 above, it can be seen that the variables Fin swimming, Scuba Diving, and Swimming have been studied by previous researchers.

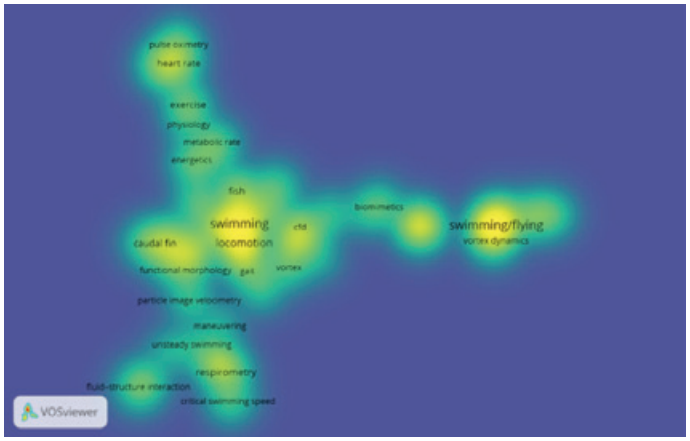

Figure 2. *Keyword Density Visualization Analysis Results*

Figure 2 illustrates the distribution of the keywords «Finswimming,» «Scuba Diving,» and «Swimming.» Each node in the keyword density visualization is colored based on the frequency of items it contains. Specifically, the color of a node reflects the number of items in its vicinity. Keywords that appear frequently are displayed in yellow, while less common keywords are shown in green. In this visualization, «Finswimming,» «Scuba Diving,» and «Swimming» are situated in the greenish-yellow area, indicating that these topics have been extensively studied and researched over the past decade.

Treatment Test of the training Model

Table 3. *Descriptive Results of the Finswimming Training Model Develpoment Test Before Trearment (pretest) and After (posttest)*

Class	N	Mean
Control Group Pretest	20	68.5
Post Test Control Group	20	77.45
Pretest Experimental Group	20	64.35
Post Test Experimental Group	20	91.55

Average *pretest* and *postest* the control group was 68.5 and 77.45. Meanwhile, the treatment group of 64.35 for *pretest* and 91.55 for *posttest*.

Table 4. *Normality Test of Treatment and Control Group Data*

Class	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	Df	Sig.	Statistics	Df	Sig.
Experimental	0.180	20	0.087	0.931	20	0.165
Control	0.109	20	0.200*	0.976	20	0.867

Data normality test results *Pre-test* and *post-test* listed in the table above has *p-value* Sig. 0.165 for the experimental group (treatment) and 0.867 for the control group. Test *Shapiro Wilk* shows > α=0.05, meaning that the data is normally distributed. The data distribution is normal, allowing the use of the Independent Samples Test for the T-test analysis

Table 5. *Independent Samples Test*

		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Post Test	Equal variances assumed	.000	1.000	23.933	38	.000	14.100	.589	12.907	15.293
	Equal variances not assumed			23.933	37.991	.000	14.100	.589	12.907	15.293

Based on the table above, the Sig (2-tailed) value is 0.000, which is less than 0.05. The calculated t-value is 23.933 with 38 degrees of freedom, compared to a t-table value of 2.02439. These results indicate a significant improvement in finswimming technique skills following the implementation of the bifins training model.

DISCUSSION

Based on the test results, it can be concluded that the finswimming bifins training model leads to significant improvements in the technique skills of beginner athletes. The findings of this study are consistent with previous research on 1:1 interval training and flexibility concerning 50-meter bifin speed. This indicates that implementing this training model has a notable positive effect on finswimming performance (Ayu Kusumaningtyas, 2024).

Finswimming is a development sport of swimming (Lin et al., 2021), basic swimming skills are needed for beginner athletes so that finswimming skills will be easier to learn (Soni & Vedawala, 2022). The training model must be compiled based on the level of difficulty to facilitate the trainer in delivering the training material, the trainer must understand the difficulty level of the training model before training (Bıyıklı, 2018). The level of difficulty can be analyzed by understanding the model associated with the athlete's ability to train (Bishop et al., 2011; Charron et al., 2020). Bifins are used in finswimming to swim underwater using freestyle (crawl) and breathing using snorkels (Vašíčková et al., 2017). Dolphin-like style is allowed as long as it is underwater and does not exceed the 15-meter mark, either at the start of the start or on each reversal wall. Diving is only allowed for less than 15 meters from the start and on any reversal wall. The snorkel or head must appear on the surface and break the water before the 15-meter mark (Möller et al., 2022).

Exercises for beginners in finswimming bifins must be done in a way that suits their characteristics. Must pay attention to several things, such as coordination, physical endurance, and technique. Coordination, the movements performed must be coordinated and thorough, especially when doing freestyle (crawl) and breathing using a snorkel. Physical endurance, the physical condition of athletes must be maintained optimally, so that they can improve their performance in swimming. Technique, the technique used must be in accordance with the characteristics of bifins, such as freestyle (crawl) and breathing using a snorkel (Lin et al., 2021; Vasícková et al., 2015; Vašíčková et al., 2017).

The training process must be carried out with clear stages. The process is better done in a row. That is, starting from an easy process and then a more difficult training process (Cañas-Jamett et al., 2020; Sammoud et al., 2019). This is done so that athletes can easily understand every movement of finswimming bifins (Castagna et al., 2023). An exercise model created by researchers to help the results of finswimming skills of bifins. So, this model was created for the needs of novice athletes to convince them that learning this material is more fun. Therefore, this model is expected to be a reference for coaches and for the athletes themselves.

CONCLUSION

Based on the data obtained, from the results of field trials and the discussion of the results of the study, it can be concluded that the development of the bifin finswimming training model has a significant impact on enhancing finswimming technique skills. Therefore, to achieve a perfect product, the researcher will give some suggestions: the trainer needs to provide control and master the material well in the process of delivering the exercise material. Trainers must have excellent supervisory skills in training material delivery techniques.

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