DIFFERENCE IN THE EFFECT OF TECHNICAL - PHYSICAL EXERCISE COMBINATION ON THE SPEED OF 25 FREE METER STYLE (CRAWL) REVIEWED FROM AGE GROUP

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ABSTRACT

This study aims to determine: 1) Differences in the effect a combination of exercises, 2) Differences in swimming speed. 3) Effect interactions between combinations of exercises with age groups. This study used an experimental method with a factorial 2 x 2 design. The sample of the study was 270 people. Sampling in the study using random quota purposive sampling. The collection technique uses test and measurement techniques. Analysis of the data in this study includes a prerequisite test for the analysis and testing of hypotheses.

The results of this study are: (1) There is no significant effect of the combination training method on improving swimming abilities. This can be seen from the probability value of $0.116 > 0.05$. (2) There is no significant difference in age categories to increase swimming ability. This can be seen from the probability value of $0.142 > 0.05$. (3) There are interactions between combinations of exercises with age groups. This can be seen from the probability value of $0.000 < 0.05$. The form of interaction in the form of combination exercise 1 concludes that the increase in swimming ability of the age group 8-10 years is better than the age group 11 - 12 years with a difference in average value of 0.06560 and a probability of $0.025 < 0.05$. Whereas in combination with exercise 2, it was concluded that the increase in swimming ability of the 11 - 12 year age group was better than the age group 8 - 10 years with a difference in the average value of 0.12880 and probability of $0.037 < 0.05$.

Keywords: Combination of Exercise, Speed, Swimming

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INTRODUCTION

Sport is a tool to stimulate physical and spiritual growth and development. Anatomical-anthropometric structures and their physiological functions, emotional stability and intellectual intelligence as well as their ability to socialize with their environment are actually superior to people who actively participate in sports activities than someone who is not actively participating in sports activities (Renstrom & Roux 1988).

As stated by Cholik Motohir (2004: 47) explained that "sports carried out systematically, regularly and terararh will greatly help our efforts to create a healthy lifestyle that is healthy and of good quality. As where explained by Ichsan (1991: 80) that: "Sports basically contain activities that are oriented to motion, their implementation depends on the abilities and goals to be achieved by the culprit".

Swimming is one of the sports that has developed in Indonesia. This inspires the school to participate in advancing student achievement by directing students to participate in swimming clubs in their respective regions or by forming swimming extracurricular activities in schools. The development of early athletes targets students through physical education. In its development, ages 6-12 years are a group of large children, where at this age children can begin to carry out intensive training. At this age children begin to have bodily functions that begin to run well. At this stage, the child starts doing specialization exercises.

According to Nenggala (2006: 75) swimming is " the best sport for sports activities, because swimming is an activity that involves the movement of all body organs for both physical and mental health growth in the form of endurance, ability and speed.

Referring to the book entitled Learning 100 More Swimming Drills, compiled by Blythe Lucero (2013), the forms of technical training given are forms of exercise that function to increase muscle strength so that it can increase freestyle swimming speed:

1. Long swim

2. Kick drills

3. Kick FR and Stoke BR

4. Invisible kick board

5. Scull and kick

6. Single arm stroke

In its development swimming exercises are not only done in the water. Currently swimming pool exercises have been developed by providing ground physical training to improve athletes' ability to swim. Ground training is given to increase muscle strength and

muscle tone, increasing the ability of body muscles is very supportive for increasing swimming speed:

1. Burpies
2. Crabwalk
3. Crawling
4. Speed walking
5. Cherry picker
6. Jumping jack
7. Running / running
8. Plank
9. High plank
10. V Oops
11. Leg lift
12. Water kicking

Training and training in swimming needs a program that can be used as a reference or guideline in implementing it in order to succeed as planned. The coaching factor concerns the problem of coaching itself such as the teacher, the trainer, then the training method and system. The success of a coach, teacher, coach, in improving students' performance, among others, depends on the use of facilities and infrastructure and the application of the theory of improving the physical condition of their students.

METHODOLOGY

This research was carried out in swimming associations in the Madiun Residency area from March to April. The population in this study were all swimming athletes in swimming associations in the Residency area of Madiun. Sampling in the study used random quota purposive sampling with a sample of 40 female athletes, consisting of 20 athletes aged 8-10 years, 20 athletes aged 11-12 years. The research method used in this study is an experimental method with a factorial 2 x 2 design (Brog and Gall, 1983: 685).

Data collection techniques used to obtain data in this study with test and measurement techniques. There are two kinds of data collected, namely: 1) Age group data obtained from collecting data on birth dates and birth years of athletes. 2) Freestyle swimming data results are freestyle swimming speeds measured using the 25 meter freestyle swimming speed test.

Analysis of the data in this study includes a prerequisite test for the analysis and testing of hypotheses.

RESULT AND DISCUSSION

1. Descriptive Statistics

a. Combination of Exercises

Table 1 Descriptive Statistics combination exercises

Combination		Pre test	Post test	diff
combination exercise 1	N	20	20	20
	Mean	1.2151	1.2520	.0369
	Std. Deviation	.29020	.25228	.05451
	Minimum	.84	.93	-.05
	Maximum	1.72	1.69	.16
combination exercise 2	N	20	20	20
	Mean	1.2870	1.2900	.0030
	Std. Deviation	.18106	.21420	.10458
	Minimum	.73	.76	-.22
	Maximum	1.60	1.67	.13

b. Age group

Table 2 Descriptive statistics based on age groups

Age		Pre test	Post test	diff
age of 8-10 years	N	20	20	20
	Mean	1.1065	1.1106	.0042
	Std. Deviation	.20181	.16202	.10960
	Minimum	.73	.76	-.22
	Maximum	1.42	1.49	.16
age 11 - 12 years	N	20	20	20
	Mean	1.3956	1.4314	.0358
	Std. Deviation	.18703	.17287	.04445
	Minimum	1.02	1.05	-.05
	Maximum	1.72	1.69	.13

c. Interaction Combination Exercise and Age Group

Table 3 Descriptive statistics combined exercise and age group

Join		Pre test	Post test	diff
combination of 1 age group 8-10 years	N	10	10	10
	Mean	.9889	1.0586	.0697
	Std. Deviation	.13296	.11408	.05115
	Minimum	.84	.93	.02
	Maximum	1.22	1.27	.16
combination of age groups 8-10 years	N	10	10	10
	Mean	1.2240	1.1626	-.0614
	Std. Deviation	.19390	.19077	.11486
	Minimum	.73	.76	-.22
	Maximum	1.42	1.49	.13
combination of 1 age group 11-12 years	N	10	10	10
	Mean	1.4413	1.4454	.0041
	Std. Deviation	.21542	.19551	.03558
	Minimum	1.02	1.05	-.05
	Maximum	1.72	1.69	.06
combination of 2 age groups 11-12 years	N	10	10	10
	Mean	1.3499	1.4173	.0674
	Std. Deviation	.15101	.15628	.02605
	Minimum	1.18	1.23	.04
	Maximum	1.60	1.67	.13

Data to be analyzed must meet the requirements for normality and homogeneity. Therefore, the data to be analyzed are tested for normality and homogeneity.

2. Data Normality Test

Table 4 tests of normality

Join		Shapiro-Wilk			
		Statistic	df	Sig.	Conclusion
Difference	combination 1 age (3-4) & (7-8)	.854	10	.065	Normal
	combination of 2 age (3-4) & (7-8)	.913	10	.302	Normal
	a combination of 1 age class 5-6 elementary school namely age 11-12 years	.955	10	.729	Normal
	a combination of 2 age classes 5-6 elementary school namely age 11-12 years	.857	10	.070	Normal

1. *. This is a lower bound of the true significance.

2. a. Lilliefors Significance Correction

3. Data Homogeneity Test

Table 5 Levene's Test of Equality of Error Variances[a]

F	df1	df2	Sig.
6.407	3	36	.001

Based on the two test results the requirements analysis above gives the conclusion that the analysis requirements needed for further analysis in looking at the differences in the effect of the training approach and the age group on swimming ability.

The results of homogeneity testing turned out to be concluded that the assumption of homogeneity between observation cells was not fulfilled. Nevertheless a 2 way ANOVA analysis can still be done and there is a possibility of bias in the analysis. So that to compare cell treatments with advanced tests, it is better to use alternative tests that have been provided by SPSS. In this case the author uses the Tamhane test.

4. Hypothesis testing

Table 6 Anava 2 Road Test Results
Tests of Between-Subjects Effects
Dependent Variable: diff

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	conclusion
Corrected Model	.116[a]	3	.039	8.708	.000	
Intercept	.016	1	.016	3.587	.066	
combination	.011	1	.011	2.589	.116	Not significant
Age	.010	1	.010	2.250	.142	Not significant
combination * age	.094	1	.094	21.286	.000	Not significant
Error	.160	36	.004			
Total	.292	40				
Corrected Total	.276	39				

a. R Squared = .421 (Adjusted R Squared = .372)

(a) Comparison between combination training methods

Table 7 comparison between combination training methods

	statistics	Pre test	Post test	difference	F count	P
exercise 1	mean	1.215	1.252	0.037	2.589	0.116
	sd	0.290	0.252	0.055		
exercise 2	mean	1.287	1.290	0.003		
	sd	0.181	0.214	0.105		

(b) Comparison of Swimming Ability Between Age Groups

Table 8 comparison between age groups

	Statistics	Pre test	Post test	difference	F count	P
Age group 8-10 years	Mean	1.106	1.111	0.004	2.25	0.142
	Sd	0.202	0.162	0.110		
Age group 11 - 12 years	Mean	1.396	1.431	0.036		
	Sd	0.187	0.173	0.044		

Based on the table above, the average increase in the age group 8-10 years is 0.004 while in the age group 11-12 years the average increase is 0.036. The results of testing on the 2 way Anava obtained F count value in the training method of 2.25 with a probability value

(sig.) Of 0.142. A probability value of more than 0.05 means that there is no difference in the increase in swimming ability between the ages of 8-10 years with the age group 11-12 years. It can be concluded that the age group 11-12 years has an initial value that tends to be higher than the age group 8-10 years. After being given treatment in the 11 - 12 year age group, it was seen to increase compared to the 8-10 year age group. However, statistical testing concluded that there were no significant differences between the two.

(c) Comparison of Interactions between Combination of Exercises and Age Groups

Table 9 interaction test

Treatment	Statistic	Pre test	Post test	difference	F count	P
combination 1 &	Mean	0.989	1.059	0.070	21.286	0.000
Age group 8-10 years	Sd	0.133	0.114	0.051		
combination 2 &	Mean	1.224	1.163	-0.061		
Age group 8-10 years	Sd	0.194	0.191	0.115		
combination 1 &	Mean	1.441	1.445	0.004		
Age group 11 - 12 years	Sd	0.215	0.196	0.036		
combination 2 &	Mean	1.350	1.417	0.067		
Age group 11 - 12 years	Sd	0.151	0.156	0.026		

Based on the two-way variance analysis as summarized in the ANAVA Table in table 4.8 obtained F-count from the interaction variation source (AXB) of 21,286 with a probability value of 0,000. Probability value <0.05. This means that there is an interaction effect between the combination of exercises with the age category. The form of interaction is described below. Testing the comparison between cells is done by Tamhane statistical test because the assumption of homogeneity is not fulfilled.

Table 10 Comparison of results of combination 1 exercises by age category

| Treatment	Statistic	Pre test	Post test	difference	mean difference	P
combination 1 &	Mean	0.989	1.059	0.070	0.06560	0.025
Age group 8-10 years	Sd	0.133	0.114	0.051		
combination 1 &	Mean	1.441	1.445	0.004		
Age group 11 - 12 years	Sd	0.215	0.196	0.036		

Based on the table above, it is known that in combination exercises 1 athlete aged 8-10 years tends to have a higher increase than athletes aged 11-12 years, namely the average difference between them at 0.06560. Statistic testing also obtained a probability value of 0.025 <0.05. This means that there are significant differences in combination 1 exercises between the age group 8-10 years with the age group 11-12 years. Based on this information, it can be concluded that combination 1 exercises provide better results in the age group 8-10 years.

Table 11 Comparison of results of combination exercises based on age categories

Treatment	Statistic	Pre test	Post test	difference	Mean difference	P
combination 2 &	Mean	1.224	1.163	-0.061	0.12880	0.037
Age group 8-10 years	Sd	0.194	0.191	0.115		
combination 2 &	Mean	1.350	1.417	0.067		
Age group 11 - 12 years	Sd	0.151	0.156	0.026		

Based on the table above, it is known that in combination exercises 2 athletes aged 8-10 years tend to have a lower increase and even have a negative value (decreased ability) compared to athletes aged 11-12 years, namely the average difference between 0.12880. Statistic testing also obtained a probability value of 0.037 <0.05. This means that there are significant differences in combination 2 exercises between the ages of 8-10 years with the age group 11-12 years. Based on this information it can be concluded that combination 2 exercises provide better results in the age group 11-12 years.

Clear interaction test can be seen from the picture means plot. If there are intersections between 2 lines, then there is an interaction between 2 types of treatment
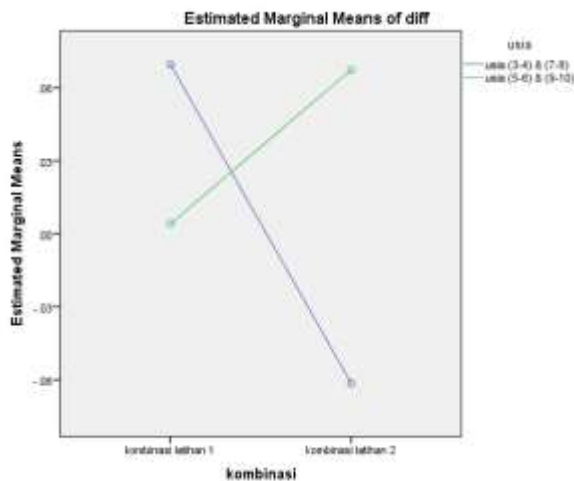
Based on the picture above, it can be seen that there are 2 lines intersection so it can be concluded that there is an interaction between the combination of exercises with the age group. Namely in the combination of exercises 1 age group 8-10 years is better than the age group 11-12 years while in combination training 2 age groups 11 - 12 years tend to be better than the age group 8-10 years.

CONCLUSION

The results of this study are:

1. There is no significant influence on the combination training method on improving swimming abilities. This can be seen from the probability value of 0.116> 0.05

2. There is no significant difference in age category with increasing swimming ability. This can be seen from the probability value of 0.142> 0.05.

3. There are interactions between combinations of exercises with age groups. This can be seen from the probability value of 0.000 <0.05. The form of interaction in the form of combination exercise 1 concludes that the increase in swimming ability of the age group 8-10 years is better than the age group 11 - 12 years with a difference in average value of 0.06560 and a probability of 0.025 <0.05. Whereas in combination with exercise 2, it was concluded that the increase in swimming ability of the 11 - 12 year age group was better than the age group 8 - 10 years with a difference in the average value of 0.12880 and probability of 0.037 <0.05.

REFERENCE

Borg W.R. and Gall, M.D. 1983. *Education Research: An Introduction. 4 th ed.* London: Longman Inc.

Cholik Mutohir, T. 2002. *Gagasan-gagasan tentang Pendidikan Jasmani dan Olahraga.* Unesa University Press: Surabaya.

Ichsan, M. 1991. Seri Bahan Kuliah Olahraga di ITB Manusia dan Olahraga. ITB dan FPOK IKIP Bandung.

Lucero, Blythe. 2013. *101 Swimming More Drills.* Oxford: Meyer & Meyer Sport (UK)

Nenggala, Asep Kurnia. 2006. *Pendidikan Jasmani Olahraga dan Kesehatan.* Jakarta: Grafindo Media Pratama.

Renstrom & Roux. 1988. *Children in Sport* dalam Bloomfield, J, Fricker P.A. and Fitch,K.D.