

# Multivariate Test of Archery Curriculum Implementation Effects

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## ABSTRACT

Archery is a sport that requires special skills, both accuracy, coordination and mental and improve body physically. With the archery curriculum implemented at the Unimed archery training and training center, it is expected to produce reliable athletes from North Sumatra. Therefore, the planning, maturation and quality control program of Unimed archery training and training center is highly prioritized, because with the maturity of the curriculum, it will be able to anticipate coaching and training problems that crave the best solutions in the face of competition for achievement.

So by looking at the multivariate test results significantly at the 95% confidence level, there are 4 p-values indicating  $<0.05$  so it can be concluded that there is an influence of the Unimed Archery (X) archery training center and training on the improvement of archery basic techniques (Y1) and archery results (Y2) junior athletes training center and Unimed archery training.

**Keywords:** *Multivariate Test, Archery Training, Archery Curriculum*

## INTRODUCTION

Archery is a sport that requires special skills, both accuracy, coordination and mental and improve body physically. This is in line with the opinion of Leroyer et al (1993) which states that the skill in archery is defined as the ability to shoot arrows at a given target within a certain time span and accuracy, in line with that, according to Nishizone et al, (1987: 364), for Getting a good record in archery competition required a good balance and shooting ability during the archery process. There are 6 stages of movement in archery techniques (Nishizone et al, 1987), namely Archery Preparation, Pulling a bowstring, full draw, aiming, releasing a rope and advanced movements, while Pekalski (1990) distinguishes archery techniques from interactions between arrows and archers.

The success of an athlete is influenced by a number of factors that support one another. These factors come from inside and outside the athlete itself

which includes physical, psychological, technical, tactics, coach, training facilities, infrastructure, social, and so on. Alderman in Sudibyo Setyobroto (1993: 16) states that an athlete's appearance can be viewed from three dimensions, namely:

1. Dimensions of physical fitness include endurance, explosive strength, speed, flexibility, agility, reaction, balance, accuracy, and so on.
2. The dimensions of skills include: kinesthetic, specific sports skills, motion coordination, and so on.
3. Dimensions of physical traits include: physical condition, height, weight, body shape, and so on.

In addition to the three dimensions, coaching and nursery are factors that greatly affect the success of an athlete. With good and tiered coaching, achievements will be easily achieved. But on the contrary, achievements will be very difficult to achieve if the coaching and nursery athletes are not done well.



Picture 1. One of Archery Technique (Aiming)  
Source : Jean A Barret, Archery Sport.

Unimed is one of the State Universities in North Sumatra that began conducting archery training by establishing an Archery Training and Training Center. Unimed as a center for archery training and training has several advantages, namely: (a) having a strategic location (b) available archery arenas and standards where national archery competitions have been held at Unimed (c) The availability of human resources both sports experts and athletes who are ready to be coached and trained are Unimed students, (d) Unimed has supporting facilities as a center for training and archery training such as a complete physical lab and digital physical test instruments.

In addition to complete infrastructure facilities the training center and archery training Unimed has a curriculum in its guidance. With the archery curriculum implemented at the Unimed archery training and training center, it is expected to produce reliable athletes from North Sumatra. Therefore, the planning, maturation and quality control program of Unimed archery training and training center is highly prioritized, because with the maturity of the curriculum, it will be able to anticipate coaching and training problems

that crave the best solutions in the face of competition for achievement.

The problem in this research is whether there is an influence of the Unimed Archery Training and Training Center Curriculum on the improvement of archery basic techniques and archery results of junior athletes at Unimed Archery Training and Guiding Center simultaneously.

## **MATERIALS & METHODS**

### **Research methods**

This study aims to obtain a picture of the differences in the effect of independent variables on the dependent variable. There is one independent variable in this study, namely the Unimed Archery Training and Training Center Curriculum. As the dependent variable is the improvement of the basic techniques of the archery of the junior athletes of the Unimed Archery Training and Coaching Center and the results of the archery of the junior athletes of the Unimed Archery Training and Training Center.

This research was conducted in the Archery field, Medan State University, Jl. Willem Iskandar Pasar V Medan, North Sumatra Province in 2018. The sample used in this study were junior athletes who were members of the Unimed Archery Training

and Training Center with a total of 20 people. The sampling technique in this study was purposive sampling.

This research is an experimental study with One Group Pre and Post Test Design. In this design, the experimental unit is subject to treatment with two measurements. The first measurement is done before the treatment is given, and the second measurement is done after the treatment is carried out, (Moh. Nazir, 2003).

**Research Instruments**

To measure the presence and absence of the ability of the object under study, used the instrument, which is in the form of a test. This test can be used to measure basic abilities and achievement, usually this test is carried out before, during and after running an exercise program to find out how much improvement during running the exercise program. The test used is the basic archery technique (archery stages) and the archery test a distance of 15 meters.

**Data analysis technique**

Data analysis technique used in this study is to use analysis techniques with the MANOVA test. MANOVA test is used to determine the effect of independent variables on several dependent variables simultaneously. Researchers are interested in discussing this because researchers want to know the many benefits of a comprehensive designed training curriculum.

**RESULT**

This study aims to determine the effectiveness or influence of the Unimed Archery Training and Training Center Curriculum (X) on Improving Archery Basic Techniques (Y1) and Archery Results (Y2) Junior Athletes Training Center and Unimed Archery Training.

**a. Basic Archery Techniques**

The results of the pre-test analysis of basic archery technique variables obtained the highest score of 130, the lowest score of 101, the average score of 119.1, the standard deviation of 8.55, the median of 121, mode

124. Many class intervals are 6 and the length of the class interval is 5. Frequency distribution of the data can be seen in table 1.

**Table 1:** Frequency Distribution of Pre Test Scores for Basic Archery Techniques Junior Athletes Training Center and Unimed Archery Training.

Interval	Absolute Frequency (f)	Relative Frequency (%)
101 - 105	3	15
106 - 110	1	5
111 - 115	1	5
116 - 120	5	25
121 - 125	6	30
126 - 130	4	20
Total	20	100

The results of the post test analysis of the basic archery technique variables obtained the highest score of 142, the lowest score of 122, the average score of 133.55, the standard deviation of 5.86, the median of 135, mode 137. Many class intervals are 6 and the length of the class interval is 4. Frequency distribution of the data can be seen in table 2.

**Table 2:** Post Test Frequency Distribution Scores of Basic Archery Techniques Junior Athletes Training Center and Unimed Archery Training.

Interval	Absolute Frequency (f)	Relative Frequency (%)
122 - 125	2	10
126 - 129	3	15
130 - 133	4	20
134 - 137	7	35
138 - 141	2	10
142 - 145	2	10
Total	20	100

**b. Archery Results**

The results of the pre-test analysis of the archery results obtained the highest score of 265, the lowest score of 37, the average score of 132.8, the standard deviation of 61.31, the median of 139, the mode of 139. Many class intervals are 6 and the length of the interval class is 38. Frequency distribution from data these can be seen in table 3.

**Table 3:** Distribution of Pre Test Frequency Score for Archery Results of Junior Athletes Training Center and Unimed Archery.

Interval	Absolute Frequency (f)	Relative Frequency (%)
37 - 75	3	15
76 - 114	6	30
115 - 153	2	10
154 -192	7	35
193 - 231	1	5
232 - 270	1	5
Total	20	100

The results of the post test analysis of archery results obtained the highest score of 315, the lowest score of 195, the average score of 257.15, the standard deviation 32.66, the median 255, mode 252. Many class intervals are 6 and the length of the class interval is 20. Frequency distribution of data these can be seen in table 4.

**Table 4: Post Test Frequency Distribution Scores on Archery Results of Junior Athletes Training Center and Unimed Archery Training.**

Interval	Absolute Frequency (f)	Relative Frequency (%)
195 - 215	2	10
216 - 236	3	15
237 - 257	5	25
258 - 278	5	25
279 - 299	3	15
300 - 320	2	10
Total	20	100

### HYPOTHESIS TESTING

H0: There is no effect of the Unimed Archery Training and Training Center Curriculum (X) on the Improvement of Basic Archery Techniques (Y1) and

Archery Results (Y2) Junior Athletes Training Center for Unimed Archery and Training.

H1: There is an influence of Unimed Archery Training Center and (X) Curriculum on Improving Archery Basic Technique (Y1) and Archery Result (Y2) Junior Athlete Training Center for Unimed Archery Training and Coaching

**Table 5: Descriptive Statistics**

	Score	Mean	Std. Deviation	N
Score	less	96.50	3.416	4
	enough	101.83	5.913	6
	good	107.40	2.951	10
	Total	103.55	5.862	20
Score	less	250.25	26.196	4
	enough	245.00	32.354	6
	good	267.20	34.778	10
	Total	257.15	32.658	20

Table 5 above, shows the descriptive test results. The table above explains the average of each category in each of the basic techniques of archery and the results of archery in the post test.

**Table 6: Multivariate Tests<sup>d</sup>**

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power <sup>b</sup>
Intercept	Pillai's Trace	.999	5833.502 <sup>a</sup>	2.000	16.000	.000	11667.004	1.000
	Wilks' Lambda	.001	5833.502 <sup>a</sup>	2.000	16.000	.000	11667.004	1.000
	Hotelling's Trace	729.188	5833.502 <sup>a</sup>	2.000	16.000	.000	11667.004	1.000
	Roy's Largest Root	729.188	5833.502 <sup>a</sup>	2.000	16.000	.000	11667.004	1.000
Category	Pillai's Trace	.619	3.813	4.000	34.000	.012	15.251	.845
	Wilks' Lambda	.401	4.636 <sup>a</sup>	4.000	32.000	.005	18.543	.912
	Hotelling's Trace	1.444	5.417	4.000	30.000	.002	21.667	.949
	Roy's Largest Root	1.409	11.974 <sup>c</sup>	2.000	17.000	.001	23.949	.985
a. Exact statistic								
b. Computed using alpha = .05								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Design: Intercept + Category								

For the F test results, ignore the part labeled "Intercept." The row below in the table above shows 4 numbers giving the P value for four different multivariate tests.

These results explain that if there is a significant influence of the independent variables on all dependent variables. If asked "Overall, is there a significant influence of the independent variables on a set of dependent variable groups", "by looking at the results of this multivariate test, if 4 p-values indicate <0.05, then significantly at the 95 confidence level % it can be concluded that there is an influence of the Unimed (X) archery training and coaching curriculum center on improving archery basic techniques (Y1) and archery results (Y2) junior athletes at the Unimed archery training and coaching center.

**Table 7: Multiple Comparisons**

Dependent Variable		(I) Score	(J) Score	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval		
							Lower Bound	Upper Bound	
Score	Bonferroni	less	enough	-5.33	2.658	.183	-12.39	1.72	
			good	-10.90*	2.436	.001	-17.37	-4.43	
		enough	less	5.33	2.658	.183	-1.72	12.39	
			good	-5.57	2.126	.054	-11.21	.08	
		good	less	10.90*	2.436	.001	4.43	17.37	
			enough	5.57	2.126	.054	-.08	11.21	
	Games-Howell	less	enough	-5.33	2.957	.229	-13.80	3.13	
			good	-10.90*	1.946	.006	-17.27	-4.53	
		enough	less	5.33	2.957	.229	-3.13	13.80	
			good	-5.57	2.588	.153	-13.33	2.19	
		good	less	10.90*	1.946	.006	4.53	17.27	
			enough	5.57	2.588	.153	-2.19	13.33	
	Score	Bonferroni	less	enough	5.25	21.108	1.000	-50.79	61.29
				good	-16.95	19.346	1.000	-68.31	34.41
enough			less	-5.25	21.108	1.000	-61.29	50.79	
			good	-22.20	16.886	.618	-67.03	22.63	
good			less	16.95	19.346	1.000	-34.41	68.31	
			enough	22.20	16.886	.618	-22.63	67.03	
Games-Howell		less	enough	5.25	18.602	.957	-48.61	59.11	
			good	-16.95	17.103	.604	-66.54	32.64	
		enough	less	-5.25	18.602	.957	-59.11	48.61	
			good	-22.20	17.188	.428	-68.43	24.03	
		good	less	16.95	17.103	.604	-32.64	66.54	
			enough	22.20	17.188	.428	-24.03	68.43	

Based on observed means.  
 The error term is Mean Square(Error) = 1069.315.  
 \*. The mean difference is significant at the .05 level.

Table 7 shows the results of the homogeneity test that is the Levene test. It is said that all variables have the same variant if the sig value. > 0.05. This value will later affect what Post Hoc test choice is used. If Sig. > 0.05 then the Post Hoc test uses the Benferroni Test, whereas if <0.05 it uses Games-Howell. The results above indicate the dependent variable has a different variant because there is Sig. > 0.05 and Sig. <0.05 so the Post Hoc test used later is also different. Each row shows the results of the test of the influence of one independent variable, namely the category of each dependent variable. From the results above, see the value in the "Sig." Column. It said significant if the value of Sig. <0.05.

**CONCLUSION**

The conclusion and answer of the hypothesis is that the Unimed archery training and training center curriculum significantly influences the improvement of archery basic techniques and archery results with Sig. <0.05 on all tests used (table 6 category rows) which means H0 Rejected or H1 Accepted.

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