

Development of the *Circuit Training* Physical Exercise Model For students in Lampung

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Abstract: *This research aims to produce a product of circuit training physical exercise model for sport archery. Sample in this research were 8 people consists of 6 male athletes and 2 female athletes and sampling technique used was saturation sampling technique. The data collection techniques were questionnaires and tests. Furthermore, data were analyzed descriptively and tested by t-test. Research result shows that the average score of normalized N-Gain is 0,73 (high), efficiency score was obtained a score ratio of 1,41 > 1 (high), attractiveness 81% (attractive) and there are significant average scores between posttest and pretest which is 342 > 293, it shows that $t_{count} > t_{table}$ which is 21,44 > 2,36.*

Keywords: physical training, circuit training, archery

1. Preliminary

Indonesia's achievement in sports tend to experience uncontrolled and unstable tides. One of the problems of this situation is the weakness of sports coaching foundation, so that Indonesia's achievement in sports is unstable and easily collapsed. In line with that, it needs achievements guidance from the beginning that managed properly and correctly in accordance to the principle of long-term coaching. In this case, early coaching factor needs to be done through a structured and sustainable sports nursery program with a right concept.

According to Lumintuarso (2010), sports nursery process arranged with a pattern that is structured in accordance to the developmental function of athletes at nursery ages, which starting from elementary school to high school ages. The first step in sports nursery process is talent scouting to identify children's talents (ages 10–12 years old) in sports field. The second step is talent development, which identifies the suitability of children (ages 10-13 years old) to certain sports for future achievement. The third step is athletes coaching at ages 14-16 years old through nursery centers / clubs that refer to certain sports. The fourth step is through the Center of Student Sports Training and Exercise (PPLP), which is a filter or selector from sports centers that show children's results according to standards achievement at ages 15-19 years old. The fifth or final step is competition, which is the first phase of athlete learning to compete on a real competition vessel (*the golden age*) in order to develop students' talents in the field of sports.

PPLP's contribution to improve sports, both regional and national sports achievements is huge. Several numbers of athletes who managed to scent Indonesia's name in international matches were born from PPLP. Therefore, the existence of PPLP as a source of potential young athletes has a very strategic and important role in breeding some outstanding prospective athletes.

The spearhead of PPLP coaching is young athletes who are expected to become forerunners of qualified athletes which

are able to lift the image of regional sports in various national events as well as the name of their nation and country in various international events. In general, all PPLP athletes are harvested and required to undergo a daily training program that has been drafted by trainers and given the opportunity to follow several tests as an evaluation of achievement progress.

Sports nursery program through PPLP must be conducted carefully, accurately, and demanding a commitment together to achieve maximum results to prepare future athlete candidates who are expected to be the ambassadors of the country in international sports arena.

Lampung Province has established several PPLPs, one of them is PPLP Archery which was established in 1994. The first time PPLP Archery Lampung follow the national championship is between PPLPs at Ragunan in 1995 and PPLP Archery Lampung became the third general champion, in 1996-1998 Lampung always became the general champion, in 1999 PPLP Archery Lampung ranked down became the third general champion. Then, in 2000 Lampung became the general champion again, in 2001 ranked down again into the third champion, in 2002 even more down into the fifth place and the next several years until these days, the achievements always up and down. But the distribution of archery sports in Lampung has begun to spread widely and already exist in some districts and cities such as in Pesawaran district, Pringsewu district, and the city of Metro, even this year there is the 8th Provincial Sports Week (Porprov) game which is scheduled for November-December 2017. There are 22 branches of competed branches of sports such as athletics, basketball, volleyball, bridge, badminton, chess, wrestling, judo, karate, kempo, archery, wall climbing, pencak silat, swimming, football, futsal, sepak takraw, softball, taekwondo, table tennis, boxing, wushu, and archery sport branch is the first branch that follows the Porprov competitions.

Archery is a statistical sport that requires good physical condition, strength and endurance, especially in upper body muscles (neck muscles, shoulder muscles, biceps, triceps,

lower arm muscles, arm muscles, abdominal muscles, and torso muscles). When performing archery techniques, especially when pulling the bowstring, the muscles will experience isotonic contractions, especially on the first pull (*primary draw*). In full draw, on the arm that pulling the bowstring, the fingers should touch the chin and the fingers should be clinging under the chin (*anchoring*) and the arm that holding the bow must be completely locked as well as the pulling arm, resulting in an isometric contraction.

The muscles that involved in pulling the bowstring should receive special attention in archery sports because these muscles work very hard to pulling and holding the burden of a heavy bow and take place repeatedly in a series of archery movements. Therefore, these muscles must have the strength and endurance to be able to make pulling movement of the bowstring to remain consistent and steady in accordance to motion process (*axis*). The main muscles to be trained and developed in archery sport are neck muscles, shoulder muscles, biceps, triceps, forearm muscles, wrists, abdominal muscles, and torso muscles (*consumer guide*, 2015)

Based on the phenomenon that appears from unstable achievements in PPLP archery Lampung and the needs of physical condition for archery athletes, circuit training physical exercise model for Lampung's students must be conducted. The circuit training physical exercise model focuses on the required muscles for archery that consists of 7 posts, such as; post 1 *basic plank position*, post 2 *reverse plank*, post 3 *single leg plank position*, post 4 *plank arm reach position*, post 5 *side plank position*, post 6 *elevated side plank position*, post 7 holding the bow in set-up position and holding, and it can be seen in the following figure:

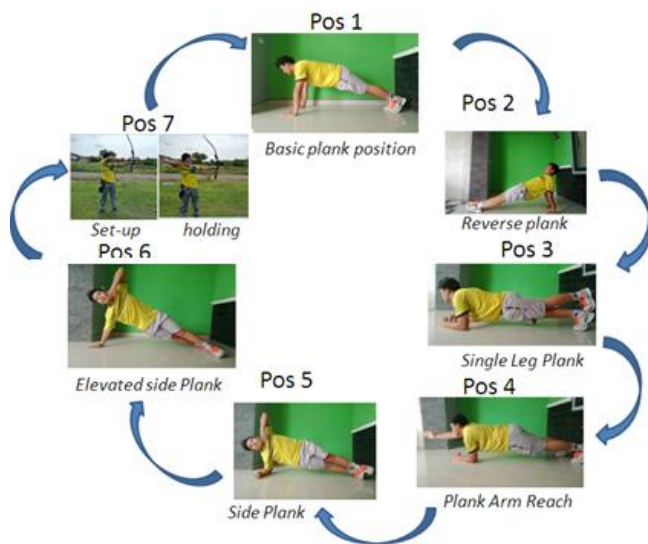


Figure 1.1: Syntax Exercises of *Circuit Training*

Physical condition is a very important element in almost sport branches. Therefore, physical exercise should receive serious attention, carefully and systematically planned so the level of physical fitness and functional ability of all body tools will be better.

Exercises loading should be sustainable if it needs to be upgraded regularly (*progressive overload*). In designing

overload training, Bompa (2005) suggests using the step type approach system or ladder system

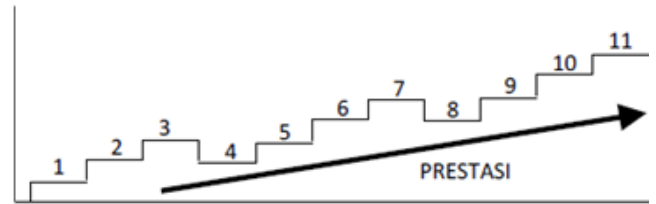


Figure 1.2: The Step Type Approach System (Bompa, 2005).

As stated by Harsono (2015: 153), the following psychological aspects:

The physical exercise program should be well and systematically planned and aims to enhancing the physical fitness and functional abilities of the body system, thereby, enabling the athletes to achieve better performance.

If the physical condition is good, then:

- 1) There will be an increase of the circulatory system and heart work abilities
- 2) There will be an increase in strength, flexibility, stamina, speed and other physical condition components
- 3) There will be a better economical motion during training
- 4) There will be a faster recovery of body organs after exercise
- 5) There will be a fast response from our body's organisms if at any time such response is required.

2. Research Method

The research design is the generic ADDIE design model as a guide to build the tools and infrastructures of effective and dynamic training program, as well as support the performance of the training itself. So it helps the training instructor to manage training and learning activities.

The population in this study is all Lampung's students who follow the archery training. Samples taken in this research are athletes from PPLP Archery Lampung with total of 8 people consist of 6 male athletes and 2 female athletes.

After the sample was determined, first, sample should be tested by normality test. So researcher could know whether the samples used in this research normal or not. The following variant of formula is used:

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i} \quad (\text{Sudjana, 2005: 273})$$

Information:

O_i : Observation Frequency

E_i : Expected Frequency.

k : Total of samples

The result of normality test from the initial data sample was obtained $\chi^2 = 21,4$ $dk = k - 1 = 8 - 1 = 7$ With $\alpha = 0,05$ and $dk = 7$, from the chi-square distribution table, it was obtained $\chi^2_{0,95} = 14,1$. Samples stated as normal because $\chi^2 > \chi^2_{0,95}$ so samples can be used in this research.

The experimental design used in the field trial is *One-Group Pretest-Posttest Design*, which consists of an experimental group without any control group. This design compares pretest scores (test before using the *circuit training* physical exercise model) with posttest scores (test after using the *circuit training* physical exercise model), documentation data collection techniques, observations, questionnaires and tests.

The experimental design can be seen in the following figure:

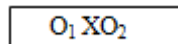


Figure 2.1: Pattern of *One-Group Pretest-Posttest Design* Information:

O₁ :Pretest before follows learning by using *hots-based problem based learning* model.

O₂ :Posttest after follows learning by using *hots-based problem based learning* model. (Sugiyono, 2011: 75)

Based on *One-Group Pretest-Posttest* research design, to see the usage of *hots-based problem based learning* model on thematic learning result is to see the difference between posttest and pretest scores (O₂ - O₁).

3. Result and Discussion

Percentage of experts validation to product components are material expert 90%, design expert 78% and media expert 90%, so it was obtained an average overall validation score of 86%. The data are presented in the following bar chart form:

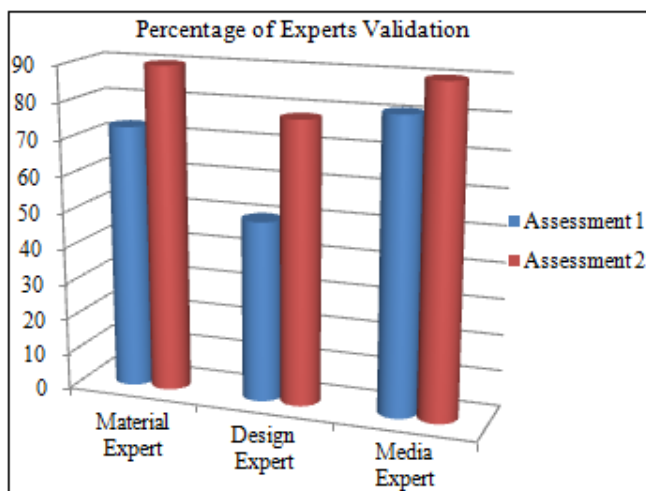


Figure 3.1: Bar Chart of Experts Validation Percentage

Field tests were conducted on a number of athletes to obtain and know the results of the *circuit training* physical exercise model. Field tests were conducted with research subjects from PPLP archery Lampung with the total of 8 people. The exercise results can be seen from pretest and posttest scores, which are the scores before and after using the *circuit training* physical exercise model. In addition, this group was made to see the suitability and easiness of the *circuit training* physical exercise model to improve archers' accuracy of 30 meters distance after follow the training

The results of *pretest* and *posttest* exercises in field tests was obtained average pretest score of 293 and average posttest

score of 342. The scores are presented in bar chart form in the following bar chart:

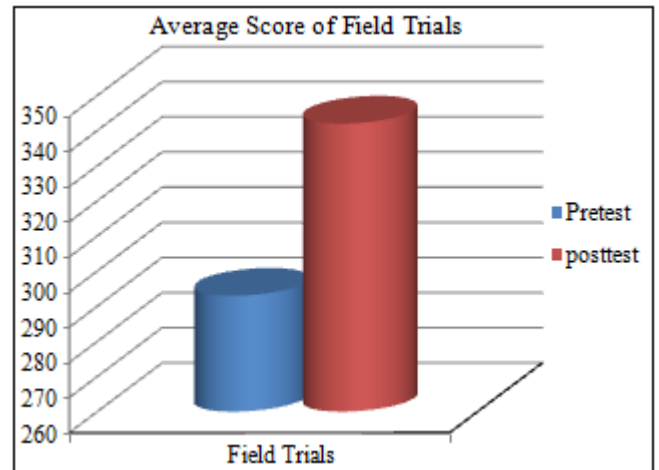


Figure 3.2: Bar Chart of Field Trial Average Score

Product effectivity test was conducted by using normalized N-Gain *i.e.* comparing the results of physical exercise before and after using *circuit training* physical exercise model. Exercise is stated to be effective if (N-Gain) $\geq 0,70$. N-Gain score was obtained from field *pretest* and *posttest* scores. It was known that N-Gain in field test is effective because $0,73 \geq 0,70$. Therefore, it can be concluded that based on the results of normalized N-Gain calculation, it resulted in high qualification, so the usage of the *circuit training* physical exercise model proved to be effective.

Table 3.1: Effectivity of *Circuit Training* Physical Exercise Utilization

No.	Sample	N-Gain	Classification	Effectivity Level
1	Field Trial	0.73	High	Effective
	Average	0.73	High	Effective

The efficiency measurement of the *circuit training* exercise model in physical exercise was done by comparing the time required based on the training plan (time provided) with the time spent on exercise in general. From the test result, it was obtained that the provided time data is 120 minutes in one physical exercise. The time spent in this study was 85 minutes in one physical exercise.

$$\text{Efficiency} = \frac{\text{time provided}}{\text{time spent}} = \frac{120 \text{ minutes}}{85 \text{ minutes}} = 1,41 \text{ (high)}$$

Based on the result of above time calculation, it was obtained a ratio score of 1.41 with high classification, so it can be concluded that the usage of the *circuit training* physical exercise model proved to be efficient because $1,41 > 1$. The usage of the *circuit training* physical exercise model on PPLP archery Lampung was known by filling the questionnaires, data were taken from athletes from PPLP archery Lampung.

Table 3.2: Attractiveness of *circuit training* Physical Exercise Model

No.	Sample	Percentage	Attractiveness Classification	Classification Level
1	Field Trial	81%	Attractive	Easy
	Average	81%	Attractive	Easy

Source: Data Processing

Based on the table above, it can be concluded that the usage of physical circuit training model as physical exercise in PPLP archery Lampung proved to be attractive because it was obtained 81% percentage with attractive classification.

$t = 21,44$ (after consulted with table $t_{0,05}$ on Arikunto, 2010: 402) $d.b = N - 1 = 8 - 1 = 7$. With $t_{0,05}$ t value = 2,36 So, $21,44 > 2,36$ or $t_{count} > t_{table}$.

Conclusion

The difference between *pretest* and *posttest* result were significant. The result of hypothesis test, there are influences between *circuit training* exercise model to the level of accuracy of archers after *circuit training* physical exercise at PPLP archery of Lampung Province.

4. Conclusion

The data analysis results of research and development of the *circuit training* physical exercise model can be concluded in these following statements:

- 1) The development results of *circuit training* physical exercise model and the easiness of athletes to perform physical exercises. It was also seen from the increment of accuracy score result of archery in experiment group. So, the *circuit training* physical exercise model product is suitable to be used as a physical exercise model on athletes from PPLP archery Lampung.
- 2) The *circuit training* physical exercise model was effectively used as athletes' physical exercise in PPLP archery Lampung because it increases the results of archers' accuracy score. It can be seen that the average score of archers' accuracy before using *circuit training* physical exercise model was less effective than after using the *circuit training* physical exercise. So it can be concluded, the *circuit training* physical exercise in the experimental group was effective.

5. Recommendations

Based on the conclusions described above, the suggestions can be given in these following statements:

- 1) Provide a physical exercise model that can reduce athletes' boredom level, so athletes are motivated to do more passionate and fun physical exercise.
- 2) To achieve specific physical exercise goals, coaches should be able to choose an exercise form based on the needs of the muscles used during archery and physical exercise materials as an alternative in physical exercise to make an effective physical exercise activity. This can foster the enthusiasm of athletes in doing physical exercise so that athletes are more enthusiastic, and can improve the results of archery scores.
- 3) Local governments are related in fostering local athletes to improve their achievements, provide good training facilities to the whole range of coaches. So, coaches will be more creative to prove an exercise program.
- 4) To other researchers to conduct a more in-depth and extensive study of other variables related to the physical exercises implementation in order to improve the archery's accuracy results.

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