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Development an instrument of speed kick in pencak silat based on technology

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Abstract

The aims of this research was to develop an instrument for pencak silat kick speed for trainers, and producing of the valid and reliable instruments. This study is a kind of research and development (R & D) which used 4D development model (define, design, develop, and disseminate) from Thiagrajhan, *et al.* (1974). The development of this technology-based pencak silat kick speed instrument was adopted from the original version of Johansyah Lubis (2004). Data collection was done through observation, interviews, and documentation. Data analysis for validity using Content Validity Ratio (CVR) from the results of eight experts, and reliability testing using product moment results from test-retest. The results of the study were (1) the need for trainers to develop technology-based of pencak silat kick speed instruments, and (2) technology-based pencak silat kick speed instruments have strongly valid and reliable. Validity testing using Content Validity Ratio (CVR) showed that 0.94 was classified in the high category from a minimum of 0.75. Reliability testing using the test-retest with product moment correlation showed that: (1) male athletes: sickle kicks of 0.90 to 0.91, front kicks of 0.77 to 0.98, and kick "T" of 0.83 to 0.92; (2) female athletes: sickle kicks of 0.80 to 0.94, front kicks of 0.99 to 0.99, and "T" kicks of 0.96 to 0.97. Based on the results obtained we have concluded that the product developed has a significant high level of validity and reliability.

Keywords: Instruments, speed, kick, pencak silat, technology

Introduction

The development of sports in Indonesia is not only seen from the popular aspects of sports such as soccer and so on, it is not inferior to the original Indonesian sport, namely pencak silat martial arts. Pencak silat is an original martial art of Malay culture (Indonesia) inherited from ancestors to be preserved, developed and fostered by the people of Indonesia and other countries (Kriswanto, 2015: 13) ^[11]. Pencak silat has two categories, match category and art category. In the match category the athlete performs a series of hands and feet to find points (Lubis, 2004: 7-8) ^[13]. Pencak silat in finding points uses arm and leg attack techniques, both of which play an important role in finding points during the competition, because in addition to falling attack techniques can only be done with arms and legs (Kriswanto, 2015: 59) ^[11]. In the technical match category, attacked that were often carried out by most athletes are kick techniques. In carrying out attacks on all techniques in pencak silat must be carried out quickly (Hariono, 2006: 67) ^[7]. The success of athletes in carrying out attack techniques must certainly have good speed, so that the attack cannot be captured by the opponent. Regarding the attack technique that is carried out quickly, an instrument is needed to measure the speed of the martial arts athlete.

Instrument is a mechanism of a tool used to measure phenomena, collect data, and make decisions made by researchers (Colton & Covert, 2007: 5) ^[2]. The instrument is not only to measure one phenomenon, but a social and natural phenomenon. Sugiyono (2013: 148) ^[18] explains the research instrument is a tool used to obtain data from social and natural phenomena. A good measurement indicator is reliable and valid, because it can reduce errors in measurement (Kimberlin & Winterstein, 2008: 2276) ^[10]. Every good instrument has validity and reliability (Fan & Le, 2011: 367) ^[5]. Validity is interpreted as the accuracy of an instrument, reliability as an consistency of an instrument if used repeatedly will still produce the same data.

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The trainers' interviews at "UMY Open 2017" were represented by the provinces of Jawa Tengah (Sukoharjo), Yogyakarta Special Region (Yogyakarta and Sleman), South Kalimantan (Banjarmasih), and West Java (Indramayu). The results of the interview stated that the trainers took measurements not using the recommended instruments. When taking measurements, especially speed, still using a stopwatch, counting the number of kicks for 10 seconds means that the tool is still manual.

The instrument for pencak silat athlete speed kicks was first made by Johansyah Lubis (2004)^[13] in the pencak silat book "measuring the speed of pencak silat kicks". Analysis of the pencak silat kick speed measurement instrument made by Johansyah Lubis (2004)^[13], obtained the following analysis; Johansyah Lubis's version of the instrument is still general, and manual; the implementation requires a lot of time and energy; The Johansyah Lubis version of the instrument has a discrepancy between the implementation carried out with the results of the assessment.

These instruments are often used by trainers, practitioners, and researchers in previous studies to determine the speed of pencak silat kicks. Sigiyono (2013: 135)^[18] states that although existing research instruments are standardized, they need to be developed and developed by researchers, so that the instruments that will be used to take measurements will be able to produce more precise data. Based on the analysis obtained in Johansyah Lubis pencak silat (2004)^[13], it is necessary to develop a pencak silat kick speed instrument that can answer these problems.

Research Methods

Type of research

This research is kind of research and development model. This development research has a title Gall *et al.* (2003: 570)^[6] said that development research is not to test a hypothesis, but to create new products, and the product can be useful in certain fields of science or society so that the products produced will be a solution for existing problems. This development produced a product in the form of a pencak silat kick speed instrument and a guidebook. This study uses a 4D model, the models are: define, design, develop, and desiminate (Thiagarajan, 1974: 5)^[20]. The time of this study was conducted in May 2018 every Monday and Thursday during the trial of products or instruments. Performed at the Martial Arts Hall in the Pencak Silat Student Activity Unit (UKM). Instrument reliability testing researchers used a saturated sampling technique. Sugiyono (2013: 126)^[18] said: saturated sampling is a sample of relatively few people then all existing members are used as samples. Based on this, the subject for testing the reliability of the instruments of pencak silat kick speed, son 15 and daughter of 15 people so that the number of subjects was 30 people.

Procedure

1. Define, at this end the process of analyzing the needs of the instrument with five stages, namely: front-end analysis, learner analysis, task analysis, concept analysis, specification of objectives
2. Design, in the design process produces a new instrument draft, which is a technology-based pencak silat kick speed instrument with four stages, namely: criterion-test, media selection, format selection, and initial design.
3. Develop, in the develop process it produces valid and reliable technology-based pencak silat kick speed instruments with two stages, namely: expert appraisal and

4. Disseminate, in this process market or distribute instruments that have been completed in three stages, namely; validation testing, packaging, and diffusion and adoption.)

The research model and hypothesis in this study can be described and explained

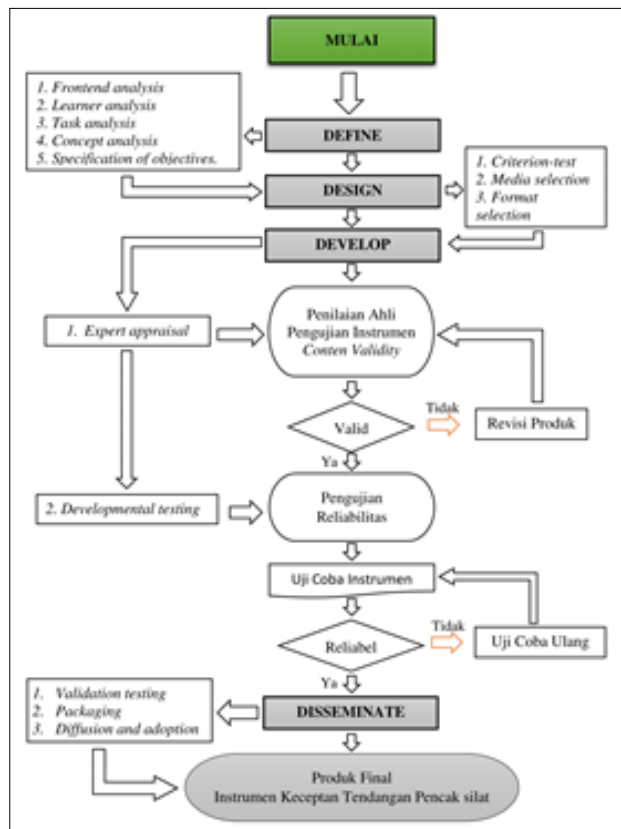


Fig 1.

Product Test, Instrument, and Data Collection. Technique. This development research was carried out by testing produk with two tests, namely: Test the validity with eight experts using content validity and reliability testing with 30 samples using test-retest. Data collection for preliminary studies is done through observation, interviews, and documentation.

Data analysis technique Content Validity Ratio (CVR)

The data analysis technique in the study of the development of pencak silat speed instruments uses the Content Validity Ratio (CVR) formula. The CVR formula from Lawshe is as follows:

$$CVR = \frac{(ne - N/2)}{N/2}$$

Information:

ne = Number of respondents stating what they are

N = Total response

Table 1. Minimum one-party CVR test scores, p = 0.05

Number of Minimal Value research

Test-retest

Testing to analyze data obtained through test-retest using correlation analysis. Samuel & Okey (2015: 23)^[16] states the

results of this correlation range from +1 to -1. A correlation of 0 (zero) indicates no correlation, if the correlation close to -1 shows a perfect negative correlation, a correlation close to +1 indicates a perfect positive correlation. Samuel & Okey (2015: 24) [16] states that correlation analysis is by product moment with the following formula:

- r: Correlation coefficient
- n: Number of subjects
- x: First experiment
- y: Second experiment

Table 1: Criteria for Strength of Relations between Two Experiments

Nr	scores	Interpretation of scores
1	0	There is no correlation
2	> 0 – 0,25	Correlation is very weak
3	> 0,25 – 0,5	Sufficient correlation
4	> 0,5 – 0,75	Strong correlation
5	> 0,75 – 0,99	Correlation is very strong
6	1	Perfect correlation

Sarwono (2010: 119) [17]

$$r_{xy} = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{n(\sum X^2) - (\sum X)^2} \sqrt{n(\sum Y^2) - (\sum Y)^2}}$$

Research Results And Discussion

Based on the results of interviews obtained from the martial arts trainers stated that: 1) all trainers stated

Table 2: Results of Content Validity Ratio (CVR)

No	E	BTE	TE	CVR	(Valid 0,75)
1	8	0	0	1	Valid
2	8	0	0	1	Valid
3	8	0	0	1	Valid
4	8	0	0	1	Valid
5	8	0	0	1	Valid
6	8	0	0	1	Valid
7	8	0	0	1	Valid
8	8	0	0	1	Valid
9	8	1	0	0,75	Valid
10	8	0	0	1	Valid
11	8	0	0	1	Valid
12	8	0	0	1	Valid
13	8	0	0	1	Valid
14	8	1	0	0,75	Valid
15	8	0	0	1	Valid
16	8	1	0	0,75	Valid
17	8	0	0	1	Valid
18	8	1	0	0,75	Valid
	Rerata		CVR	0,94	Valid

The importance of instruments in measuring pencak silat: 1) the trainers stated in measuring kick speed using a stopwatch, meaning that the instrument is still manual; and 2) all trainers stated the need for the development of a measurement instrument for pencak silat sports. Based on the results of the trainers' statement, it can be concluded that, the trainers need the development of instruments to measure technology-based pencak silat kick speed.

Instrument Validity

Based on the assessment of experts with eight experts, the technology-based Pencak silat kick speed instrument has a high validity value with an assessment of eight. Experts produce Content Validity Ratio (CVR) of 0.94.

Kick Speed Instrument, (essential), BTE (useful not essential), TP (unnecessary or important).

Instrument Reliability

Testing the instrument in the form of kick results that were done twice, then correlated and analyzed using the product moment with the results of the correlation as follows:

1. Male Kick Speed

The calculation of product moment analysis on technology-based pencak silat kick speed instruments with male kicks was obtained from the correlation between first and second kicks, with high reliability results (very strong correlation).

Table 3: Results of Conten Validity Ratio (CVR) Kick Speed Instrument.

Nr	Kick Name	Product Moment	scores	Valid. (PM> 0.75 - 0.99)
1.	Sickness kick	0,90 – 0,91	Strong correlation	Correlation is very strong
2.	Front Kick	0,77 – 0,98	Strong correlation	
3.	"T" kick	0,83 – 0,92	Strong correlation	

2. Speed of a Women's Kick

Calculation of product moment analysis on technology-based pencak silat kick speed instruments with female kicks was obtained from the correlation between first and second kicks, with high reliability results (very strong correlation).

Table 4: Results of Conten Validity Ratio (CVR) Kick Speed Instrument

Nr	Kick Name	Product Moment	scores	Valid. (PM> 0.75 - 0.99)
1.	Sickness kick	0,80 – 0,94	Strong correlation	Correlation is very strong
2.	Front Kick	0,99 – 0,99	Strong correlation	
3.	"T" kick	0,96 – 0,97	Strong correlation	

Conclusion

Based on the process and stages of research and development that have been carried out using the 4D models by Thiagarajan, this research and development can be summarized as follows:

1. There is a need for trainers to develop pencak silat kick speed instruments, in this case, all national and all DIY pencak silat trainers are needed regionally.
2. The technology-based pencak silat kick speed instrument has a high validity value with the assessment of eight experts producing Content Validity Ratio (CVR) of 0.94 and high reliability values with the product moment correlation from technology-based pencak silat kick speed instruments. sickle kick reliability of 0.90 to 0.91, front kick of 0.77 to 0.98, and kick "T" of 0.83 to 0.92. Then the female athlete's kick is obtained with a range value of crescent kicks of 0.80 to 0.94, front kicks of 0.99 to 0.99, and kicks of "T" of 0.96 to 0.97.

Suggestion

This technology-based pencak silat kick speed instrument can be used by trainers as a shade measuring device. Apart from being used for trainers and athletes, this technology-based

pencak silat kick speed instrument can be used as an instrument for research for students.

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