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Digital based sit-up test instrument development

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Abstract. The purpose of this study is to develop a digital-based Sit-Up Test instrument that is effective in use and is efficient in economic terms. This research is a development research with a model design adapted from Borg & Gall. With a population and sample of students of the Faculty of Sport Sciences, Padang State University, amounting to 10 people for small groups and 45 people for large groups, and 5 experts as validators for testing tools. validation. Data was collected using questionnaires and tool trials. Through the test of produck moment validity and reliability test of Test and Retest. The process of development and trial of this tool is done by validating experts by using questionnaires as an instrument of validation and obtained an average percentage of 96%, the results of small group trials obtained a correlation level of 0.99 and reliability tests with direct trials of 0,92 with a very strong reliability category

1. Preliminary

In *Undang-undang RI No. 3 tahun 2005 tentang Sistem Keolahragaan Nasional on Bab VII pasal 27 ayat 3* (2007:12)   also explained that, "the development and development of achievement sports as referred to in paragraph (1) and paragraph (2) are carried out by trainers who have qualifications and certificates of competence which can be assisted by sports personnel with the approach of science and technology. "Based on this, it is clear that to achieve maximum performance in sports requires the support of sports science and technology. This means, in fostering achievement sports an important thing to consider is the method of approach in training that is based on science, and is supported by technological developments.

One of the implementations carried out in the use of technology in an effort to improve performance in sports is related to the measurement or regarding instruments as a measurement tool. Specifically regarding tests and measurements, the use of technology is highly recommended in order to minimize errors in data collection, so that the data collected has a high level of validity. Based on the description above, there are several components of physical conditions that must be possessed by an athlete in order to achieve achievement, of course this is in accordance with the sport that they are involved in. One component of physical condition that plays an important role in sports performance is strength, because strength is a driving force, and as a deterrent to injury to sports.

This is consistent with the opinion of Syafruddin (2011: 71) says, "every branch of sport requires strength. How much and how much strength is needed and what kind of strength is needed depends on the branch of the sport. . Strength training can be done using weight from one's own weight (internal weight) or using external weight (external load). Outside weight can be free weights such as Dumbells,

Barbells or Gym Machines. While the form of exercise that uses the most widely used weights such as Chin-Up, Push-Up, Sit-Up, or Back-Up.

Crunches are one of the many forms of upper body muscle strength training using internal weights aimed at exercising abdominal strength. Athletes who have good abdominal muscle strength, are expected to be able to engage in motion activities that rely on the stomach or support other movements in sports activities. According to Arsil (2015: 97-98) said, the implementation of the Sit-Up test are: 1) Testee lying on his back on the floor with fingers clasped behind his head as a base, both arms pressed together on the floor and legs open about 20 -30 cm and knees bent, 2) the officer knelt in front of Testee while pressing both feet to keep the two heels in contact with the floor, 3) with the "Yes" signal, Testee tried to sit until he touched his elbows on both knees and return to the original attitude, and 4) the movements are repeated as many times as possible for 1 minute.

2. Research Method

This research method is research and development. Research and development methods are methods used to produce certain products, and test the effectiveness of the product. This study aims to develop a digital Sit-Up Test instrument. Besides this research aims to produce instruments that are more economical and efficient by utilizing ultrasonic waves.

In accordance with the aims and objectives of the study, the characteristics of the population in this study were male UNIK FIK students so that the measurement results were not too significant between the sexes and so that the sample became homogeneous as a small group test subject and field test. Respondents who will be given questionnaires as instruments are experts in the assessment of instruments designed by experts consisting of:

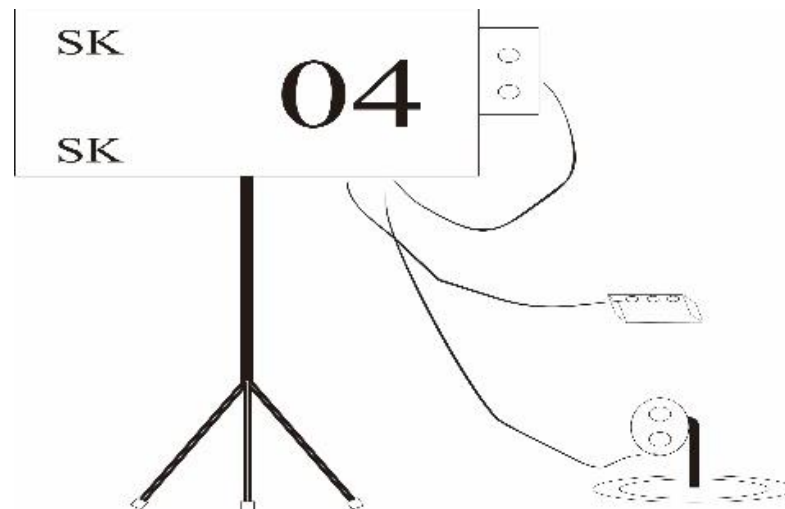- Expert Evaluation and exercise measurement test
- IT experts

The target population in this study is FIK UNP Students, The technique used in the sampling required in this study is the need for samples as the object of reliability testing instruments developed. In this case the technique used is purposive sampling and quota sampling techniques. This technique is a sampling technique with certain considerations that the sample determined is male because the number of students of Physical Education is dominated by men. Quota sampling is a sampling technique using pre-determined quota so that the research process does not take too much time and saves research costs. Then the sample to be taken in this study amounted to 45 students.

3. Results and Discussion

3.1 Design Produced

In this research, the product that will be produced is the result of the development of the Sit-Up Test instrument using a series that will be compiled automatically when collecting data from the Sit-Up that will be counted digitally then converted into the norm of the Sit-Up Test Then the output data will be displayed on the LCD screen so that the measuring subjects can directly record data in the form of Sit-Up Tests in accordance with existing Norms.

The development of this instrument aims to provide effectiveness in reducing errors when recording the results of the manual Sit-Up test achievement process and reducing the test time so that the time efficiency during the Sit-Up test is based on digital. The following is a sketch of a description of the product situation that will result from the development of a digital-based Test Sit-Up.

Figure 1.

Then the instrument was tested using a small group in which a sample of 10 people did the measurement test Sit-Up Test with the test and retest method. The sample used as a small group is the students of FIK Padang State University

From this table, we get sig. (2-tiled) equal to 0.00 <0.05, the data is said to be highly correlated and significant while the correlation coefficient is 0.98.

3.1.1 Expert Sports Evaluation and Measurement Tests. This validation was carried out in July 2019 by way of practice in the field, describing the tools and how it works in the field accompanied by an assessment instrument in the form of a questionnaire.

Table 1.

Correlations

		Stage 1	Stage 2
Stage 1	Pearson Correlation	1	.994**
	Sig. (2-tailed)		.000
	N	10	10
Stage 2	Pearson Correlation	.994**	1
	Sig. (2-tailed)	.000	
	N	10	10

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2. Expert Sports Evaluation and Measurement Tests

No	Expert	f	N	p (%)	Eligibility Category
1	Expert Sports Evaluation and Measurement Tests	80	85	94%	Very Good / Decent

3.1.2 IT Expert. This validation was carried out in July 2019 by way of practice in the field, describing the tools and how it works in the field accompanied by an assessment instrument in the form of a questionnaire

Table 3. IT Expert

No	Expert	f	N	p (%)	Eligibility Category
1	IT Expert	83	85	98%	Very Good / Decent

3.1.3 Test reliability. Reliability test on this tool is used to see the reliability level of the tool by using the Test and Retest method and the calculation of the produck moment statistics, the following results are obtained :

Table 4. Test Reliability

		Test group	retest group
Correlations			
Test group	Pearson Correlation	1	.918**
	Sig. (2-tailed)		,000
	Sum of Squares and Cross-products	1168,578	1188,489
	Covariance	26,559	27,011
	N	45	45
retest group	Pearson Correlation	.918**	1
	Sig. (2-tailed)	,000	
	Sum of Squares and Cross-products	1188,489	1433,644
	Covariance	27,011	32,583
	N	45	45
**. Correlation is significant at the 0.01 level (2-tailed).			

In the table it can be explained that the correlation coefficient obtained from the Sit-Up Test measurement results is 0.92 with the category "Very Strong" with the meaning that it can be said to be realiable and consistent in its use.

4. Conclusion

Based on the results of data processing and analysis of the results of research that has been done, regarding the development of digital based Sit-Up Test instruments conclusions are obtained as follows:

- The tool is said to be valid with a reasonable category of 5 expert validators in the field of IT and Evaluation and sports measurement tests with an average percentage calculation of 96%.
- Small group trial results state that the digital instrument Sit-Up test instrument has a 99% correlation rate and is said to be valid
- The results of the reliability test with a large group trial using the Test and Retest method obtained a correlation coefficient of 0.92 with the category of reliability "Very Strong"

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