RedWhitepress https://series.gci.or.id

Global Conferences Series:
Sciences and Technology (GCSST), Volume, 4, 2020
The 1st Progress in Science and Technology Research Symposium (PSTRS) 2019
DOI: https://doi.org/10.32698/GCS-PSTRS389

Design Instruments of Explosive Power Sensor based Kick on Pencak Silat

Nurul Ihsan[1(*)], Bafirman[2], Asep Sujana[3], Anton Yus Permana[3]

[123]Faculty of Sport Science, Universitas Negeri Padang, Indonesia.
*corresponding author: nurul_ikhsan@ymail.com

Abstract. Explosive power is the deciding factor in producing a weighted kick. The purpose of this research is to design an instrument of explosive kick power in pencak silat based on sensors that are effective, efficient, economical and practical. This type of research is development by adaptation of the Borg & Gall model. Design validation was carried out by 4 experts, namely tests and measurements, physiology, IT and pencak silat. Data were collected using a questionnaire through a validity test. The development process with the validation of experts by using a questionnaire as an instrument of validation and obtained an average percentage of 94% with the category of tool validation is very strong / feasible. The conclusion of this research is the design of explosive kick pencak silat instruments is feasible to use.

Keywords: Explosive power, kick, pencak silat

1. Introduction

One of the factors that affect sports achievements is the utilization of technological advances [1, 2]. Knowingly or not the role of technology in relation to the achievement can not be avoided. In addition, another factor in the achievement of the interpretation is the physical condition.The physical condition is a state body, which are categorized in three ways, namely ill, healthy and fit [13].Physical condition has four basic components, namely, endurance, strength, speed and flexibility [3]. The combination of several important components of physical condition will bear some of the important elements in the sporting achievements of one of them is the explosive power [4, 5, 6].In the sports of martial arts, leg muscle explosive power is absolutely necessary [7, 8]. This is because the victory is determined by the incoming target and powerful. Powered here is to have strength and speed. And therefore, an athlete must have the muscle explosive power.

Professional trainer should have a data bank on every element required in the sports he coached [9]. The goal is use as a guideline. To collect valid data, the necessary instruments that have the level of trust and reliability that have been tested empirically. The accuracy of the instrument selection is one that must be considered faktorpenting coach athletes in retrieving data.

In the martial arts for measuring explosive often used the standing broad jump. The purpose of this test is to determine the ability of leg muscle explosive power athletes [10]. Measurement results of the jump is measured from the nearest star to the benchmark ketitik heel, each athlete is given three times repetition, results farthest jump leap made score. When viewed closely the existing instruments able to measure the explosive power seen from afar kick him leap forward made in one leap without a prefix. But the fact that the test is not to measure the explosive power of kicks that have certain characteristics. So that the data collected is not appropriate. Therefore, it is necessary to study the validity of the test.

The purpose of this study was to design a test instrument explosive power of digital-based martial arts kicks that effectively and efficiently after the validity and reliability test.Digitization is a production process that is mixed with a wide variety of electronic components that have an energy source of electricity or energy other fuels formed from a circuit that creates a new process but easy to automation and programs that have been inputted from a piece of software into a software [11]. The resulting instrument is the form of a prototype based on the analysis of the theories and the need to measure the explosive power of digital-based martial arts kicks that uses multiple components in the integrity sensoryang generate explosive power measurement tools are dimensionless kick kg.m / s automatically and generate output power data explosive kick

2. Method

This research method is a research and development [12]. In accordance with the purpose of the study, the necessary data in this study is in the form of comments or ratings from experts design related instrument that will be developed. Respondents will be given a questionnaire is the expert assessment of the instrument designed by experts composed of IT experts on the working procedures of tools, devices and system components used oprasi, expert evaluation and measurement test exercise, physiology expert and martial arts expert. Data collection tools with a questionnaire. Analiss engineering data by using a formula percentage of respondents [13].

3. Result and Discussion

In accordance with the purpose of research is to produce a draft instrument design explosive martial arts kick where the test through the test construct validity, then the following dijasikan related data that dilakaukan isntrumen development results.

a. Specification development
   1) LCD serves as a data viewer in the form of characters and letters, numbers or graphs.
   2) Limit swicht serves asModifiers terminal contact position (of normally open / NO to Close or otherwise of the normally closed / NC to Open)
   3) Power Suplly serves as a power supply voltage direct Provide and distribute it to several hardware or components installed on the device, and adjust the size of the voltage going into the appliance.
   4) Adruino Uno serves asCentral control tool, microcontroller is designed to optimize power consumption to the speed of the process, etc.
   5) Load Cell serves as a major component in the system of digital scales as a sensor measuring the magnitude of the load received

b. How the tool works:
   1) Compose all appliance components into a single assay.
   2) Connect the electrical current to activate the tool
   3) Automatic tool READY lit up with posts on the LCD screen.
   4) Teste took a kicking position overlooking targed sensor (load cell) with a leg that will kick your tread rests on the sensor (limit swicht)
   5) Teste will kick towards the target (sensorload cell) after it says GO on the LCD screen.
   6) After doing one kick, kick explosive power of data will appear on the LCD screen.
   7) Record the power data on a blank ledaktendangan ratings
   8) Press trampled sensor (limit swicht) for further data collection

c. The final design draft Instrument

The resulting instrument is the form of a prototype based on the analysis of the theories and the need to measure the explosive power of digital-based martial arts kicks that uses multiple sensors that integrity components generate explosive power measurement tools are dimensionless kick kg.m / s automatically. This tool uses peaching as targed or target for goal-kick which there is inserted a sensor Load Cell aims to obtain measurement results collision / strong kick automatically will be recorded directly in microcontoler, the use of sensors injaklimit switching function as a place star leg before kicking, take into speed tendangansecara automatic, from the beginning until the sensor stepped foot kicking leg touching the target / peachingyang done by teste.

Figure 1. The final design of instruments

d. Empirical Validity Validity First Phase Expert

In accordance with the purpose of the study, the data will be displayed in this study is a response or expert opinion on the instruments developed. Here is a recapitulation tabulation and expert opinion. After melukan validity test results can be seen empirically test the validity and calculation realibiltas in pengembengan instruments.

Table 1. Presentation and level eligibility para ahli

No.	Expert	Percentage	feasibility level
1	Function	96%	Very Good / Worthy
2		98%	Very Good / Worthy
3	Evaluation and measurement test	87%	Very Good / Worthy
4	exercise	99%	Very Good / Worthy
5	IT	97%	Very Good / Worthy
6	Martial arts	92%	Very Good / Worthy
7		92%	Very Good / Worthy
	Average	94%	Very Good / Worthy

From the results of the validation by the seven experts if averaged the percentage of 94% was obtained andcan concluded that the tool of the development of explosive power test instruments can be used kicks digital based on the measurement of explosive power of the kick. As for some comments and suggestions on the results of prototype instrument that was created is a further development material at the time will do mass production so that it is capable of economic value and can be used regularly.

CONCLUSION

Based on the results of data processing and analysis of data the research that has been done, regarding the development of the test instrument explosive power tendangn digital-based conclusion that the Alatdikatakan valid by category worthy of 4 validator expert in the field of IT, evaluation and test measurement exercise, experts physiology of exercise, and martial arts expert with the calculation of the average percentage of 94%.

REFERENCES

[1] Suwirman, Ihsan N., & Deswandi, S. DEVELOPMENT INSTRUMENT OF KICK SPEED ENDURANCE OF PENCAK SILAT ATHLETE. http://www.iaeme.com/IJMET/index.asp48editor@iaeme.comInternational Journal of MechanicalEngineering and Technology (IJMET). P 48-55

[2] Ihsan, N., Sepriadi, S., & Suwirman, S. (2018). Hubungan Status Gizi Dan Motivasi Berprestasi Dengan Tingkat Kondisi Fisik Siswa Pplp Cabang Pencak Silat Sumatera Barat. *Sporta Saintika*, *3*(1), 410-422.

[3] Syafruddin.(2012)*Ilmu Kepelatihan Olahraga*. Padang; UNP Press

[4] Ihsan, N., & Suwirman, S. (2018). Sumbangan Konsentrasi terhadap Kecepatan Tendangan Pencak Silat. *Media Ilmu Keolahragaan Indonesia*, *8*(1), 1-6.

[5] Stojanovic, M. D., Ostojic, S. M., Calleja-González, J., Milosevic, Z., & Mikic, M. (2012). Correlation between explosive strength, aerobic power and repeated sprint ability in elite basketball players. *The Journal of sports medicine and physical fitness*, *52*(4), 375-381.

[6] Lubis, J dan Wardoyo, H. (2016). Pencak Silat. Edisi ke-3. Jakarta: PT Rajagrafindo Persada.

[7] Ihsan, N. (2017, March). Development of speed measurement system for pencak silat kick based on sensor technology. In *IOP Conference Series: Materials Science and Engineering* (Vol. 180, No. 1, p. 012171). IOP Publishing.
[8] Ihsan, N., & Suwirman, S. (2018). Sumbangan Konsentrasi terhadap Kecepatan Tendangan Pencak Silat. *Media Ilmu Keolahragaan Indonesia*, *8*(1), 1-6.
[9] Lubis, J. (2009). Mengenal Latihan Pliometrik. *Jakarta: Fakultas Ilmu Kesehatan, Universitas Negeri Jakarta*.
[10] Cronin, J., McNair, P. J., & Marshall, R. N. (2001). Developing explosive power: A comparison of technique and training. *Journal of Science and Medicine in Sport*, *4*(1), 59-70.
[11] Priskila M.N.Manege, Elia Kendek Allo, Bahrun, E-Journal Teknik Elektro dan Komputer Vol.6 No.1 (2017), *Rancang Bangun Timbangan Digital Dengan Kapasitas 20Kg Berbasis Microcontroller ATMega8535*. UNSRAT
[12] Sugiyono. 2013. Metode Penelitian Kuantitatif Kualitatif dan R & D. Bandung : Alfabeta.
[13] Zulbahri, Z. (2019). Tingkat Kemampuan Daya Tahan Jantung dan Pernafasan Mahasiswa Pendidikan Olahraga dan Kesehatan Universitas Pasir Pengaraian. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani Dan Olahraga*, *3*(1), 96-101