



Digital-based Vertical Jump Test Tool; Is it effective for power measurement?

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Abstrak: Penelitian ini bertujuan untuk mengetahui apakah alat tes *vertical jump* berbasis digital efektif digunakan untuk pengukuran *power* pada pelatih dan atlet PB Pusri Palembang dan Ranau *Gymnastic Club*. Penelitian ini menggunakan jenis penelitian metode penelitian deskriptif kuantitatif, dengan menggunakan angket dan tes *vertical jump* menggunakan alat *vertical jump* berbasis digital. Analisis data yang digunakan adalah presentase *error* secara perhitungan manual. Selanjutnya, mengambil kesimpulan dari tes dengan menggunakan uji presentase *error* secara digital dan penarikan kesimpulan. Subjek penelitian dalam penelitian ini adalah pelatih dan atlet Pengurus Besar Pusri Palembang dan Ranau *Gymnastic Club*. Subjek penelitian berjumlah 22 orang. Hasil penelitian menunjukkan bahwa didapatkan nilai keefektifan sebesar 96,16% dan hasil analisis angket menyatakan alat tes *vertical jump* layak untuk digunakan dengan hasil analisis angket pada atlet PB Pusri Palembang sebesar 96,75%, hasil analisis angket pada atlet Ranau *Gymnastic Club* sebesar 97%, sedangkan hasil analisis angket pada pelatih PB Pusri Palembang dan Ranau *Gymnastic Club* sebesar 100%. Berdasarkan hasil tersebut dapat disimpulkan bahwa alat *vertical jump* berbasis digital ini efektif digunakan untuk mengukur *power* pada pelatih dan atlet PB Pusri Palembang dan Ranau *Gymnastic Club*.

Kata Kunci: Efektivitas, *vertical jump*, berbasis digital

Abstract: This research aims to find out whether a digital-based *vertical jump* test tool is effective for measuring *power* in coaches and athletes at PB Pusri Palembang and Ranau *Gymnastics Club*. This research uses a quantitative descriptive research method, using a questionnaire and a *vertical jump* test using a digital-based *vertical jump* tool. The data analysis used is the percentage error using manual calculations. Next, draw conclusions from the test using a digital error percentage test and draw conclusions. The research subjects in this study were coaches and athletes from the Pusri Palembang Executive Board and the Ranau *Gymnastic Club*. The research subjects were 22 people. The results of the research showed that the effectiveness value was 96.16% and the results of the questionnaire analysis stated that the *vertical jump* test tool was suitable for use with the results of the questionnaire analysis on PB Pusri Palembang athletes being 96.75%, the results of the questionnaire analysis on Ranau *Gymnastic Club* athletes being 97%, while the results of the questionnaire analysis for PB Pusri Palembang and Ranau *Gymnastic Club* coaches were 100%. Based on these results, it can be concluded that this digital-based *vertical jump* tool is effectively used to measure *power* in PB Pusri Palembang and Ranau *Gymnastic Club* coaches and athletes.

Keywords: effectiveness, *vertical jump*, digital based

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INTRODUCTION

Sport is any form of physical activity that must be done by everyone with the aim of maintaining health, improving the quality of human life and giving the impact of a healthy lifestyle or strong physique, so that it can be ensured that the development of a person's body system can run well and smoothly. According to (UU No 11 Tahun 2022, 2022) on Sports in article 1 paragraph 22 on sports coaching and development is a conscious effort carried out systematically to achieve sports goals. Sports goals include maintaining and improving health and fitness, achievement, intelligence, and human quality. Indonesia is a developing country, currently the development of science and technology which



is often referred to as science and technology, with the existence of science and technology can facilitate all activities of the user.

The progress of science and technology is currently advancing very rapidly, and now humans are struggling with technology. (Yoda, 2020), especially in the current millennial era, both in the fields of science and technology. It is generally assumed that mastery and application of science and technology will ensure the progress of society. Science and technology until now also has a very important role in all human activities in various activities, especially for the field of sports, science and technology has helped in the learning process much easier and more effective, talent search, training, and even matches athletes and coaches are greatly helped by the existence of science and technology today. (Antoni & Suharjana, 2019).

In the development of an increasingly sophisticated era, technology cannot be separated in various other disciplines, including sports science. We have seen many sports technology innovations lately, of course with this development it is hoped that sports will be more advanced and popular in the community so that people are more fond of doing sports (Garcia & Badri, 2019). In the current era, the development of technology in every field is very extraordinary, especially in the field of sports itself, digital sports equipment is currently very easy to use. (Homon et al., 2022). In addition, there are also many changes and developments that occur in learning in the world of education, especially in learning PJOK, changes that occur in the world of education require PJOK teachers to have varied learning techniques. (Prasetyo & Handayani, 2020). The development of varied learning techniques can help educators to design learning creatively so that the learning process becomes innovative, interesting, more qualified and can improve student learning outcomes (Destriana et al., 2018).

The development of modern technology cannot be separated from people who have high ideas and creativity. (Cholik, 2021). So that with the development of technology today can be used or accessed easily by others with the help of technology (Giartama et al., 2020). The development and advancement of technology in the field of sports is also very necessary to advance sports achievements. (Mulyana et al., 2022). The use of technology to improve the performance of athletes. Sports that foster and develop athletes in a planned, gradual, and sustainable manner through competition to achieve success with the support of science and technology. (Blynova et al., 2020). Within the scope of the school, supporting facilities are needed in order to create good and smooth learning, good facilities and complete physical and health education facilities and infrastructure must be owned by a school, in order to achieve a good teaching and learning process (Sudibyo & Nugroho, 2020). In this study, researchers used new technology to measure digital-based jump height, namely vertical jump. The effectiveness of using a digital-based vertical jump test tool which will function to measure the highest possible jump and test the accuracy of the vertical jump test tool.

Based on previous research conducted by (Rachmi Marsheilla Aguss, Eko Bagus Fahrizqi, 2021). The effectiveness of Vertical Jump on the ability of Men's Volleyball Smash, from this study there is a conclusion that vertical jump is very influential and even plays a role in one's ability when doing smash in a volleyball game. Other research was also conducted by (Silalahi et al., 2021) With the application of vertical jump measurement in real time for sports athletes, from this research it can be concluded that based on the results of functionality testing of the features in the android application that has been made, it can be concluded that all features can run well even from the results of application testing the level of delay or waiting time contained in the vertical jump height measurement application is under 1 second, it can be concluded that the application delay time is functionally good. So far, the way to do the vertical jump measurement test is done manually using chalk powder then as time goes by, technology is also increasingly emerging and the many innovations in the development of digital-based test equipment and even application-based can help make it easier for users.

Based on the above problems, it is necessary to conduct research to determine the effectiveness of digital-based vertical jump test tools on coaches and athletes of PB Pusri Palembang and Ranau Gymnastic Club, the purpose of this study was to determine the effectiveness of digital-based vertical jump test tools to measure power in coaches and athletes of PB Pusri Palembang and Ranau Gymnastic Club.

METHODS

Type of Research

In this study the authors used descriptive quantitative research, According to ((Purba et al., 2021) this type of descriptive quantitative research is a research method carried out with the main objective of creating a picture or description of an objective situation that has to do with the problem to be studied. The method used in this research is a survey, while the data collection technique is to conduct direct tests and use questionnaires / questionnaires. This research is a type of quantitative descriptive research, because it aims to find out the results of the questionnaire and the results of data on the effectiveness of the use of digital-based vertical jump test tools on coaches and athletes of PB Pusri Palembang and Ranau Gymnastic Club.

Population and Sample

The population in this study were all athletes in the Badminton Association (PB) Pusri Palembang which amounted to 34 athletes, and athletes Ranau Gymnastic Club which amounted to 25 athletes. In this study, the sample was 10 athletes of PB Pusri Palembang and 10 athletes of Ranau Gymnastic Club. This research sample is a product user, namely athletes, sampling this research based on certain considerations or purposive sampling. The sample was selected among the population according to the researcher's wishes, so that the sample could represent the desired population characteristics. With inclusion criteria: a. For male athletes, b. Athletes and coaches who are willing to be involved in this study, c. Athletes who are always active / present in the training program. So the sample in this study amounted to 1 PB Pusri Palembang Coach, 1 Ranau Gymnastic Club Coach, 10 PB Pusri Palembang athletes and 10 Ranau Gymnastic Club athletes, so the total sample amounted to 22 people.

Place and Time of Research

The place of this research was held at PB Pusri Palembang, Address Jl. May Zen, Kalidoni, Kec. Kalidoni, Palembang City, South Sumatra, 30118. While at Ranau Gymnastic Club located at Ranau Conoco Phillips Gymnastics Building, Jakabaring Sport City (JSC) 15 Ulu, Seberang Ulu 1 District, Palembang City, South Sumatra, 30267. The details of the research time started from March 31 to April 30, 2023.

Data Collection Techniques

The data collection method is a very important stage in a study, the data collected is the main material that becomes the core of the research object (Sastypratiwi & Nyoto, 2020). The subject of research remains to collect data, process data and draw conclusions regarding the effectiveness of using a digital-based vertical jump test tool. In this study as a whole using data collection techniques by conducting tests, documentation, and questionnaires.

Data Analysis Technique

Data analysis technique is a method taken to obtain or analyze the data obtained. The data obtained in the form of data on the results of the vertical jump test manually and the vertical jump test digitally, after which it is processed with a descriptive approach and the data analysis is processed using the percentage error formula manually calculated.

RESULTS AND DISCUSSIONS

The vertical jump test is done in two ways, the first is done manually using chalk powder and the second test is done using a digital device. The vertical jump test is also carried out with 6 opportunities to do the jump test, 3 times the opportunity to jump manually and 3 times the opportunity to jump using a digital-based vertical jump tool. From these results it will be recorded and seen how effective the use of the digital-based vertical jump test tool is. Then the researcher has prepared a questionnaire sheet containing several kinds of questions for coaches and athletes of PB Pusri Palembang and Ranau Gymnastic Club, so that later the respondents will provide responses related to the tools that have been tested.

Table 1. Results of the Vertical Jump Tool Effectiveness Test

No.	Peserta Tes	Tes Vertical Jump		Nilai Error	% Error
		Manual	Digital		
1.	MKA (rgc)	64 cm	63 cm	1	1,5
2.	MAPA(rgc)	67 cm	66 cm	1	1,4
3.	AT (rgc)	73 cm	72 cm	1	1,3
4.	CM (rgc)	74 cm	72 cm	2	2,7
5.	MDF (rgc)	66 cm	62 cm	4	6
6.	SB (rgc)	53 cm	52 cm	1	1,8
7.	AG (rgc)	45 cm	45 cm	0	0
8.	R (rgc)	64 cm	62 cm	2	3,1
9.	A (rgc)	60 cm	57 cm	3	5
10.	MA (rgc)	66 cm	65 cm	1	1,5
11.	H (pb)	60 cm	56 cm	4	6,6
12.	KKF (pb)	75 cm	71 cm	4	5,3
13.	AIH (pb)	51 cm	48 cm	3	5,8
14.	HAN (pb)	56 cm	54 cm	2	3,5
15.	RRR (pb)	59 cm	58 cm	1	1,6
16.	MKA (pb)	47 cm	46 cm	1	2,1
17.	ASW (pb)	41 cm	37 cm	4	9,7
18.	DZ (pb)	31 cm	29 cm	2	6,4
19.	DR (pb)	23 cm	22 cm	1	4,3
20.	SPY (pb)	41 cm	38 cm	3	7,3
Jumlah				41	76,9

Menghitung *error*:

Error = Selisih nilai kriteria (tes manual) - Nilai menggunakan digital

Persentase *error* = $\frac{\text{tes manual} - \text{tes secara digital}}{\text{tes manual}} \times 100\%$

Rata-rata % *error* lompatan *vertical jump* = $\frac{\text{jumlah persentase error}}{\text{jumlah subjek}}$

$$= \frac{76,9}{20} = 3,84\%$$

Based on the results of the vertical jump test that has been carried out by 20 athletes at PB Pusri Palembang and Ranau Gymnastic Club, it can be seen for the average value of the error results, the vertical jump value is obtained with a percentage error of 76.9% so that the average value of the tool error in the vertical jump test is 3.84%, based on these results it can be stated that this digital-based vertical jump tool is effectively used for athletes PB Pusri Palembang and Ranau Gymnastic Club.

Table 2. Ranau Gymnastic Club Athlete Questionnaire Analysis Results

Resp	Nama	Nomor Item Soal/Skor Hasil Angket										Skor	Skor Max	%	Ktg	%Rata2
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10					
1	MKA	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	
2	MAPA	3	4	4	4	4	4	4	4	4	4	39	40	97,5	L	
3	AT	3	4	4	4	4	4	4	4	3	4	38	40	95	L	
4	CM	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	
5	MDF	4	4	3	4	4	4	4	4	3	4	38	40	95	L	
6	SB	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	97
7	AG	4	4	4	4	4	4	4	3	4	4	39	40	97,5	L	
8	R	4	4	4	4	4	4	4	3	3	4	38	40	95	L	
9	A	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	
10	MA	3	4	4	4	3	3	4	4	3	4	36	40	90	ST L	

Based on the data from the questionnaire analysis on Ranau Gymnastic Club athletes, it was obtained that most of the respondents stated that it was very feasible by 40%, stated that it was feasible by 50%, which stated that it was not feasible by 0% and very unfeasible by 10%, it can be concluded in the questionnaire analysis that the average overall result of the respondents was 97%, with this the effectiveness of using a digital-based vertical jump test tool is declared feasible to use..

Table 3. Results of Questionnaire Analysis of PB Pusri Palembang Athletes

Responden	Nama	Nomor Item Soal/Skor Hasil Angket										Skor	Skor Max	%	Ktg	% Rata2
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10					
1	H	4	4	4	4	4	4	4	4	3	4	39	40	97,5	L	96,75
2	KKF	4	4	4	4	4	4	4	3	4	4	39	40	97,5	L	
3	AIH	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	
4	HAN	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	
5	RRR	4	3	4	4	4	4	4	4	3	4	38	40	95	L	
6	MKA	4	3	4	4	4	4	4	3	4	4	38	40	95	L	
7	ASW	4	4	4	4	4	4	4	4	4	4	40	40	100	SL	
8	DZ	4	3	4	4	4	4	4	4	3	4	38	40	95	L	
9	DR	4	4	4	4	4	4	3	3	4	4	38	40	95	L	
10	SPY	3	3	4	4	4	4	4	4	3	4	37	40	92,5	TL	

Based on the results of the questionnaire analysis on PB Pusri Palembang athletes, it was found that most of the respondents stated that it was very feasible by 30%, stated that it was feasible by 60%, stated that it was not feasible by 10% and was very unfeasible by 0%, it can be concluded in the questionnaire analysis that the average overall result of the respondents was 96.75%, with this the effectiveness of using a digital-based vertical jump test tool is declared feasible to use.

Table 4. Results of Questionnaire Analysis of Ranau Gymnastic Club and PB Pusri Palembang Coaches

Nama	Pelatih	Nomor Item Soal/Skor Hasil Angket										Skor	Skor Max	%	% Rata2	
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10					
BP	Ranau Gymnastic Club	4	4	4	4	4	4	4	4	4	4	4	40	40	100	100
LS	PB Pusri Palembang	4	4	4	4	4	4	4	4	4	4	4	40	40	100	

Based on the results of the questionnaire analysis on the Ranau Gymnastic Club coach and PB Pusri Palembang coach, the results of respondents who stated that it was very feasible 100%, it can be concluded in the questionnaire analysis that the average overall result of the respondents was 100%, with this the effectiveness of using a digital-based vertical jump test tool is declared very feasible and effective to be used for coaches, teachers, athletes and even students in the process of measuring jump height.

Based on the results of the questionnaire (questionnaire) that has been given to 20 respondents with a target target of 10 PB Pusri Palembang athletes and 10 Ranau Gymnastic Club athletes, it is known that the questionnaire analysis on PB Pusri Palembang athletes, obtained most of the respondents stated that it was very feasible by 30%, stated that it was feasible by 60%, which stated that it was not feasible by 10% and very unfit by 0%, it can be concluded in the questionnaire analysis that the average overall result of the respondents was 96, 75%, while the questionnaire analysis on Ranau Gymnastic Club athletes, it was obtained that most of the respondents stated that it was very feasible by 40%, stated that it was feasible by 50%, which stated that it was not feasible by 0% and very unfeasible by 10%, it can be concluded in the questionnaire analysis that the average overall result of the respondents was 97%, overall the average results of questionnaire analysis on PB Pusri Palembang athletes and Ranau Gymnastic Club were 96.875%. Also from the average results of questionnaire analysis on the Ranau Gymnastic Club coach and PB Pusri Palembang coach, the results of respondents who stated very

feasible were 100%. So, from the explanation above, it can be concluded that the use of digital-based vertical jump test equipment is effective to be used for coaches, educators / teachers, athletes and even for students to measure jump height.

The results of this study of digital-based vertical jump tools have provided concrete and accurate results. The results of this study are supported by research (Ranchuk et al., 2019) that is, the results of vertical jump jumps can be measured through appropriate and valid tools. In line with the opinion described above, according to (Prabowo et al., 2020) so that testing is difficult and inaccurate. Surveys conducted on users of vertical jump test instruments show that vertical jump test instruments are generally used less effectively and efficiently, and tend to be inaccurate. All participants in this study agreed with the development of a digital-based vertical jump test instrument, and the results of this study will be taken into consideration to develop a vertical jump test instrument that has a good level of validity and is relatively affordable. Along with the development of technology, humans always want to improve the quality and practicality of the tools that have been developed, therefore digital-based vertical jump test tools are indispensable in the era of technological development that can help and make it easier for humans to carry out activities in life, with the existence of technology all work or activities carried out in the training, development and teaching and learning process can run easier and faster.

(Supriadi et al., 2023) explains that the development of digital-based test tools is a transformation that can be used to support errors that exist if the tool is made or operated manually. Digital vertical jump in measurement has a very small human error value so that it can be said that the use of digital vertical jump is effective in test and measurement exams (Suwuh, 2024). The accuracy of the tool is unquestionable because it has a sensor to measure a person's jump height. When testing and measuring vertical jumps, where the model stands on a platform designed as a vertical jump testing and measurement instrument, the model makes a vertical jump, the sensor detects the leg jump closest to the sensor, the combined results are combined (Hardiyono et al., 2023).

(Ardianita & Andrijanto, 2022) This test is done by jumping vertically upwards (vertical) using the highest arm reach. The purpose of the test is to measure the explosive power/power of the leg muscles upwards. Digital Vertical Jump to measure muscle explosive power. This tool is used to measure the level of explosive power of the leg muscles (Ares, 2024). (Rachmalia et al., 2022) revealed that vertical jump has benefits in measuring leg explosive power (power) the legs can be used to perform explosive movements in jumping. (Nursantiko et al., 2022) explains that the vertical jump media test tool is used to measure an athlete's leg power ability. There are applications in the field of technology that can help the learning process properly and appropriately. Technological advances in learning in the form of application-based media are media that can be used. Application-based media are devices that can be used and adjusted to the desired function (Nanda et al., 2024).

(Taroreh et al., 2022) said that the Portable Box Jump training model to increase vertical jump contains various variations of Portable Box Jump training to increase vertical jump, for volleyball players the ability to jump vertically is very dominant to have. However, in the training process, there will definitely be boredom so that the Portable Box Jump is an alternative training media so that it is more varied. (Telew et al., 2024) test to do a vertical jump is by standing on a digital vertical jump tool, then taking a squat position before jumping after hearing the command from the tool. The numbers that appear on the tool indicate the explosive power of the teste's leg muscles in centimeters (cm). (Priyoko & Januarto, 2022) said that in this method, plyometric standing jump training has an effective impact on increasing vertical jump than plyometric box jump training.

CONCLUSION

Based on the results and discussion of the research that has been described, it can be concluded that this digital vertical jump test tool is effectively used to measure power. This can be proven by the results of test scores on PB Pusri Palembang Athletes and Ranau Gymnastic Club Athletes with a vertical jump test error value of 3.84% so that the effectiveness of the tool is 96.16%, based on this value the digital vertical jump test tool is effectively used on Trainers and Athletes PB Pusri Palembang and Ranau Gymnastic Club. The study has limitations regarding the sample used is only limited to PB Pusri Palembang Athletes and Ranau Gymnastic Club Athletes, further recommendations are expected to include a larger sample using more complex data analysis. Although it has limitations, the results of the

study are expected to be able to be a reference for increasing vertical jump in athletes, especially in the training program at PB Pusri Palembang Athletes and Ranau Gymnastic Club Athletes

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