

Design of an Integrated Test Battery Application to Detect Physical Fitness

Imran Akhmad¹, Suharjo², Amirsyah Putra Lubis³

imran@unimed.ac.id¹, suharjo@unimed.ac.id², amirsyahputra@unimed.ac.id

Sport Coaching Education, Faculty of Sport Science, Universitas Negeri Medan, Indonesia, 20221¹, Physical Education, Health And Recreation, Faculty of Sport Science, Universitas Negeri Medan, Indonesia, 20221², Sports Science, Faculty of Sport Science, Universitas Negeri Medan, Indonesia, 20221³

Abstract. Given the central role of science and technology in sports, it is time for research to be able to produce appropriate technology products to help sports players implement them in sports activities and can even improve athlete performance and advance the sport of a nation. The rapid development of technology today makes science and technology in the field of sports at the global level more advanced, especially the results of research on the use of appropriate technology intended for the benefit of the people, especially meeting the needs for convenience and effectiveness. This research aims to produce test hardware products and integrated Physical Fitness application software as follows: (1) Produce digital fitness test hardware products and (2) produce integrated digital fitness test battery administration software and (3) partnership cooperation with DUDI to obtain commercial value through the application of a business plan for industrial feasibility test results.

Keywords: Physical Fitness- Battery Test- Application.

1 Introduction

The development of science and technology in the field of sports that is increasingly advanced, especially the impact of research results on the use of appropriate technology intended for sports activities will contribute greatly to the development of Indonesian sports achievements and can compete at the international level. The use of digital applications and various digital tools used to help test and measure physical fitness and one way to detect the level of physical fitness is by testing and measuring through fitness test instruments.

A fitness test instrument is a collection of several types of tests accumulated into one score through a test battery. Today's test and measurement trends require adhering to the principles of transparency and accountability so that test methods must be precise, fast and accurate. The fact is that in general the implementation of tests is still carried out manually and there is often a level of error, lack of transparency and the results are not objective [1]. The most strategic solution to avoid the problem and subjectivity of the test is that it is appropriate for a

technology-based measurement test [2]. In addition to the frequent occurrence of this lack of transparency, it is also difficult to analyze data because it has to use manual calculations and requires a lot of personnel and the time is relatively long to get results from the implementation of physical fitness tests [3], [4].

The basic problems that occur in the implementation of fitness tests are testers (managers) and testes (test takers). Problems faced by test managers include; requires a lot of test personnel, requires a lot of data input personnel, requires a team to analyze test result data that is not small), difficulty in controlling each individual tester, and sometimes takes days to announce test results [5]. While the problems faced by the test include: there is a difference in the score carried out by the tester with the teste's personal calculation, and there is suspicion of the test results because the assessment process has to wait a long time [6], [7]. One solution to avoid bias and test subjectivity is that it is appropriate for information technology-based measurement tests. In addition to the frequent occurrence of non-transparency, there are also difficulties in analyzing data because they have to use manual calculations and require a lot of personnel and time.

The current era of the Industrial Revolution 4.0 demands that all activities tend to be digitized because it will facilitate the implementation of tests and be more accurate and require a shorter time. Considering that the fitness test battery has several different types of tests, it requires different data analysis techniques so that it will add more work volume and longer time. This underlies the importance of this research carried out as a solution to practical problem solving in the field.

In addition to completing the need for the importance of digital equipment as a physical fitness measurement tool, it is in line with Unimed's mission that lecturer research products must be able to penetrate the industry [8]. Lecturers' research products must be tested in the actual environment and ready to be applied and directed at commercial products recognized by DUDI. This research is one of the studies that applies research products with the aim of building Academic, Business, Government and Community (ABGC) partnership cooperation at Medan State University with the industrial world.

2 Method

This research method uses the Research and Development model of Borg and Gall which consists of 10 steps, namely; (1) research and data collection (2) planning (3) product draft development, (4) field trials, (5) initial product improvement, (6) field trials, (7) perfecting field test products, (8) field implementation tests, (9) final product improvement, and (10) dissemination and implementation [9].

The implementation of the research is divided into 2 parts, namely Stage 1: development of limb ooto explosive power test equipment and flexibility, Stage 2: development of physical fitness test battery administration application software [10]. While in general, the steps of this research are as follows: (1) Pre-Development Stage, namely needs analysis which aims to obtain initial information and the level of product needs. (2) Development Stage, namely; Designing initial drafts, small, large field trials, and final production of digital vertical jump measuring instrument products as well as fitness test battery administration software

applications. and (3) Application Stage, namely; Test Implementation for software-based sports players to see effectiveness and dissemination tests [11], [12].

Data analysis techniques use qualitative and quantitative approaches. A qualitative approach to unearth some information about product fatigue will be refined. The method used is a record of input documentation from pakar and experts. While quantitative data to analyze the level of efficiency and effectiveness of products in users and feasible industries. The method used is a percentage [13].

3 Results and Discussion

The initial product of the physical fitness application is a product that can help in the process of assessing physical fitness. The working mechanism of the physical fitness application that is designed will be able to determine the level of physical fitness level from sprint, push-up, sit-up, pull-up, and long-distance running test items [14]. Physical fitness application products are assessed by media experts and material experts, then in each stage will be carried out phase I product trials with samples. The results of media validation provide some input.

Table 1. Stage Media Expert Validation I

No	Indicators	Score	Category
1	Display Design	3,5	Good
2	Display Text	3	Enough
3	Programming	3,5	Good
4	Test Tutorial Design	3	Enough
5	Test Results	3	Enough
Sum		16	
Average		3,2	
Product Quality Categories		Enough	

Assessment from media experts on physical fitness application products, display design and programming which received a score of 3.5 with the good category, while from the display test indicators, test tutorial design and test results got a score of 3 with sufficient category. The results of the assessment of physical fitness applications that get a score of 3.2 and are still categorized are sufficient so that it is necessary to improve the product so that later it can be tested to users.

Table 2. Validation of Expert Assessment Stage Measurement Test I

No	Indicators	Score	Category
1	Implementation Drawings	3,5	Good
2	Implementation Mechanism	3,5	Good
3	Test Item Explanation	3,5	Good
4	Test Norms	3,7	Good
Sum		14,2	
Average		3,55	
Product Quality Categories		Good	

Material expert assessment on physical fitness applications from the four indicators that show the assessment results from the implementation picture, implementation mechanism, and explanation of test items get a score of 3.5 and the test norm explanation indicator gets a score of 3.7 in the good category. The results of the assessment of indicators from the physical fitness application with an average score of 3.55 and are categorized as good and need improvement to improve the product so that it is even better.

There are several improvements from stage I validation and product improvements will later be carried out for stage II validation by experts. The results of phase II validation are:

Table 3. Stage Media Expert Assessment II

No	Indicators	Score	Category
1	Display Design	4,5	Excellent
2	Display Text	4,3	Excellent
3	Programming	4,5	Excellent
4	Test Tutorial Design	4	Good
5	Test Results	4,2	Good
Sum		21,5	
Average		4,3	
Product Quality Categories		Excellent	

Validation of media experts phase II above on physical fitness applications where display design indicators, display text and programming received scores of 4.5 and 4.3 with very good categories, while tutorial designs and test results with scores of 4 and 4.2 with good categories. The results of the assessment of physical fitness applications with an average score of 4.3 are categorized as very good and then the product can be tested sample.

Table 4. Validation of Expert Assessment of Stage Material II

No	Indicators	Score	Category
1	Implementation Drawings	4,3	Excellent
2	Implementation Mechanism	4,4	Excellent
3	Test Item Explanation	4,3	Excellent
4	Test Norms	4,5	Excellent
Sum		17,5	
Average		4,37	
Product Quality Categories		Excellent	

Improvements have been made from the next phase I material expert validation with the results of implementation drawings and explanations of test items with an assessment score of 4.3 in the very good category. The implementation mechanism of the score of 4.4 and the norm of the test score of 4.5 with the category is very good. The assessment results of all indicators have an average score of 4.37 in the very good category and are worthy of product trials.

The validation results from the two experts provide input for physical fitness application products that can later be used as physical fitness assessment instruments for FIK Unimed students. These results are the basis for researchers to conduct trials on sampel and the results

of improvements that have been made, physical fitness application products can be used in tests I and II in sempel.

Table 5. Stage Trial I

Indicators	Score	Category
Application Display Aspects	4,07	Good
Aspects of Working Mechanism	3,58	Good
Test Results Aspects	3,67	Good

The results of the initial field trial showed that the physical fitness application received a score of 4.07 for the application aspect, 3.58 for the work mechanism aspect, and 3.67 for the test result aspect with an average score of 3.79 in the "Good" category. Apps in this category are worth using as an app to detect your level of physical fitness. The results on the three indicators show that the overall implementation of phase I trials is still in the "Good" category with improvements to get maximum results in phase II trials.

The results of trial I were improved to refine the results of further research, the results of trial II carried out obtained results:

Table 6. Stage Trial II

Indicators	Score	Category
Application Display Aspects	4,46	Excellent
Aspects of Working Mechanism	4,07	Good
Test Results Aspects	4,36	Excellent

The phase II trial showed that the display aspect of the application received an average score of 4.46 or entered the "Very Good" category in the aspect of work mechanism, 4.07 or entered the "Good" category in the aspect of test results with a score of 4.36 entered the "Very Good" category so that from the overall indicator obtained an overall average score of 4.29 or included in the "Very Good" category and could be implemented and disseminated in the product.

The results of this study show that an innovation development is very important to support a validity in the assessment of physical fitness tests. This research product can also later be a reference material in understanding the implementation of tests and assessing tests for students, students, athletes and the general public to find out their level of physical fitness [15]. The most important thing from this research where this physical fitness application is effective and efficient in its use and utilization in the world of education and the world of sports.

5 Conclusion

The development of research products in the form of physical fitness test equipment applications is something that must be done to support the rapid development of digitalization, so that this research will be a reference in the development of other physical fitness test

products which will all use applications in terms of calculation and correctness of movements carried out by students, athletes and also the general public.

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