

## THE DEVELOPMENT OF WEB-BASED PHYSICAL FITNESS INSTRUMENT TO MEASURE MAXIMUM OXYGEN VOLUME (VO<sub>2</sub>Max)

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### Abstract

This research was conducted to develop a Web-Based physical fitness instrument to measure the students' maximum oxygen volume (VO<sub>2</sub>Max). The research method used was ADDIE model. The research subjects were 148 students of Pendidikan Jasmani study program year 2023. The research instrument used was Bleep Test. The technique of data analysis used was the Mean. The result of the study indicates that the Web-Based physical fitness instrument validity was 3.81 with interval score  $3 \leq RV < 4$ . It can be concluded that the Web-Based physical fitness instrument is valid and feasible to be used.

keywords: Physical fitness instrument, Web-Based, VO<sub>2</sub>Max

### Abstrak

Tujuan penelitian ini adalah mengembangkan Instrumen Kebugaran Jasmani Berbasis Web untuk Mengukur Volume Oksigen Maksimal (VO<sub>2</sub>Max) mahasiswa. Metode penelitian menggunakan Model ADDIE. Subjek penelitian dalam penelitian ini berjumlah 148 Mahasiswa Prodi Penjas Angkatan 2023. Alat pengumpul data menggunakan *Bleep Test*. Teknik analisis data yang digunakan yaitu rata-rata (Mean). Hasil penelitian menunjukkan bahwa validitas instrumen kebugaran jasmani berbasis web sebesar 3,81 dengan interval skor  $3 \leq RV < 4$  dapat disimpulkan bahwa instrumen kebugaran jasmani berbasis web adalah valid dan layak digunakan.

*Kata kunci : Instrumen Kebugaran Jasmani Berbasis Web, VO<sub>2</sub>Max*

## INTRODUCTION

The maximum capacity aerobic (Vo<sub>2</sub>Max) is the best indicator of the maximum aerobic power. according to (Iyakrus, 2016), the level of aerobic endurance (VO<sub>2</sub>Max) is the success key of a person's life especially in living life for example in students' activity in learning physical practice in the field. There are three important things in aerobic endurance level (VO<sub>2</sub>Max) such as: a) the level of aerobic endurance (VO<sub>2</sub>Max), in terms of muscle part, bone, and fat, b) the level of aerobic endurance (VO<sub>2</sub>Max) about the organ functions and cardiovascular efficiency system, blood vessel, and respiration, c) the level of aerobic endurance (VO<sub>2</sub>Max) muscle response, with the regard of flexibility, strength, speed, and resistance.

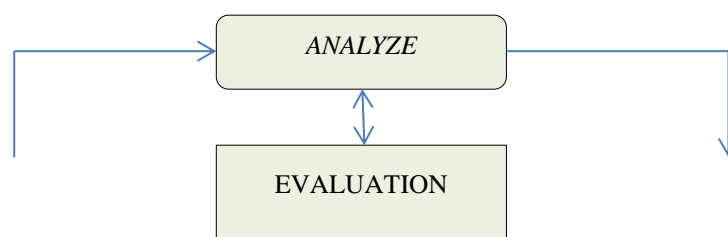
The Bleep Test can be used to identify human cardiovascular endurance. The bleep test is a physical fitness instrument to measure cardiovascular endurance. The test procedure is by running back and forth over a distance of 20 meters accompanied by a cue from the tape recorder. The researcher did observation on September 2023 during the admission period for new physical education students at IKIP PGRI Pontianak. The researcher interviewed the organizing committee resulting in information that the implementation is still conducted manually, especially in data entry and test result determination. This is due to the lack of data input system for conducting Bleep test, which makes the committee's work in reporting test results take a little longer. In addition, approximately 250 to 300 prospective students were taking the physical test.

The related previous study conducted by (Purba, 2020) about the development of a Bleep Test instrument using microcontroller-based sensors focuses on its test implementation in helping the tester to determine the levels and feedback. Based on this context then the researcher tried to develop an instrument that focused on processing the Bleep Test data result, thereby accelerating the data retrieval and test result processing.

## METHOD

The research method used is Research and Development (R&D) with ADDIE (analysis-design-development-implementation-evaluation). The model was developed by Dick and Carry. According to Mulyatiningsih (2011), the ADDIE model is considered a more rational and comprehensive model compared to others. The model also can be used for various developments including the development of physical fitness instruments.

The steps in developing the Web-based physical fitness instruments for measuring VO<sub>2</sub>Max with the ADDIE model can be described as follows:



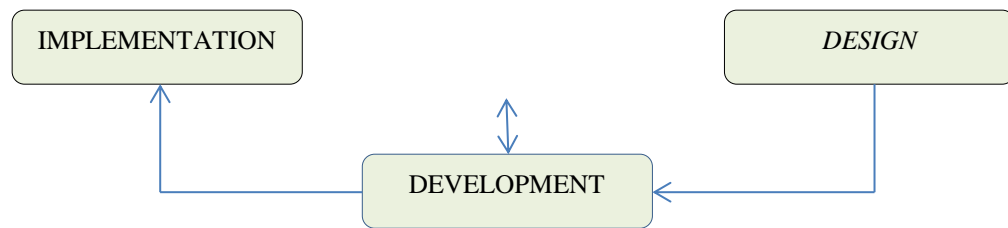


Figure 1 The Flow of Development through ADDIE

The following is the explanation of the procedure ADDIE model in the development research of Web-based physical fitness instruments in measuring VO<sub>2</sub>Max:

1. *Analyse*

The analysis phase encompasses the curriculum and students' characteristics analysis. The curriculum analysis was conducted by reviewing the curriculum used by the Physical Education and Recreation study program at IKIP PGRI Pontianak. It was carried out to ensure that the Web-based physical fitness instruments development aligns with the references used. Next, the researcher will review the literature from various sources to design the Web-based physical fitness instruments.

2. *Design*

In this phase, the researcher designed the developed Web-based physical fitness instrument for measuring VO<sub>2</sub>Max in the form of an initial design that was in line with the analysis carried out before. In this phase, the researcher also arranged the instruments used to assess the developed physical fitness instruments.

3. *Development*

The development phase is the product realization that is ready to be implemented. The development of the physical fitness instrument aligned with the design and after that the physical fitness instrument was validated by the material expert and media expert until the instrument was announced as valid. In the process of validation, the validator used an instrument arranged by the researcher in the previous phase and has been validated by an instrument expert. The validator was asked to give an assessment of the physical fitness instruments developed based

on the items in the assessment sheets and to give feedback and suggestions. The validation is conducted until the physical fitness instrument is declared appropriate to be implemented in the learning process. The result of the validation was analyzed and followed up by revising the teaching material according to the critiques and suggestions from the validators. This process is conducted to get the validity scores on the developed instrument.

#### 4. *Implementation*

In this phase, the researcher carried out a limited implementation to the designated class for the research. In this phase, the researcher did the product trials and analyzed the data. In class, the lecturer uses developed physical fitness instruments in the teaching and learning process. After the learning session is complete, the students take the physical fitness test provided to assess their physical fitness level. The result of the physical fitness test was used to evaluate the quality and effectiveness of the developed teaching materials.

Additionally, the lecturers and students are asked to give feedback and suggestions to the developed teaching materials as guidance to be revised. After distributing the questionnaire and conducting physical fitness tests for the students, then the researcher analyzed the data. The initial analysis is based on the responses from the questionnaire. The analysis is carried out to assess the validity of the developed physical fitness test.

#### 5. *Evaluation*

In this phase, the researcher revises the physical fitness instrument developed based on feedback and suggestions received from response questionnaires or field notes. It aims to ensure that the physical fitness instrument is truly appropriate and can be used by the physical education and sports science program on a broader scale.

The research subjects or validators in this study are two experts such as Dr. Muhammad Suhairi, M.Pd., as a learning material expert, and Chandra Lemana, S.Kom, M.Pd., as a media expert. Additionally, 30 students from the second-semester physical education and sports science (*penjaskesrek*) program in

class B (morning), serve as the small group trial subjects, while all 148 second-semester *penjaskesrek* students act as the large group subjects.

## FINDING AND DISCUSSION

The data analysis for the development of the Web-based physical fitness instrument is conducted to determine the instrument's validity by analyzing the data obtained from the development and implementation stages. The validity analysis of the Web-based physical fitness instrument is carried out by examining the validation results provided by the validators.

### 1. The Validity of the Web-Based Physical Fitness Instrument

The validator's assessment of the Web-based physical fitness instrument is based on several evaluation categories: material relevance, material accuracy, material support, material currency, and media. The validation results from both validators are presented in the table below:

**Table 1**  
**Physical Fitness Instrument Validation Results**

No	Aspects	Indicators	Validator		RV	RT
1	Content	material relevance	4	4	4	3,87
		Feasibility	4	4	4	
	material support	4	3	3,5		
	material currency	4	4	4		
2	Media	design and appearance	4	4	4	3,75
		Benefit	3	4	3,5	
Total Mean						3,81

Based on the data in Table 1.1 above, the average total validity score is 3.81. This score is then used to determine the validity category of the teaching material by matching it with the teaching material validity categories.

**Table 2**  
**Validity Categories of the Web-Based Physical Fitness Instrument**

Average Total Validity	Interval Score	Validity Category
<b>3,81</b>	$3 \leq RV < 4$	<b>Valid</b>

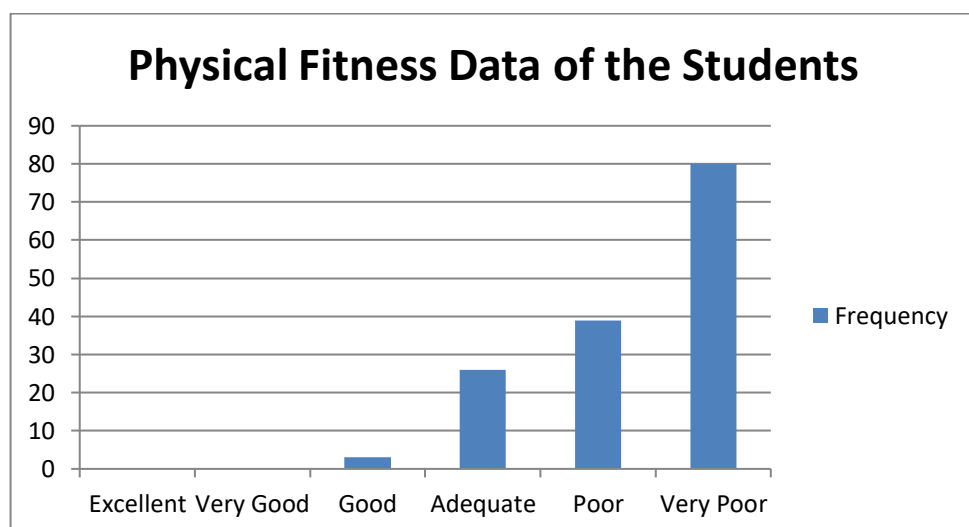
Based on the results above, it can be concluded that the developed Web-based physical fitness instrument resulting the Valid category.

## 2. Physical Fitness Level

The research data description provides an overview of the VO2Max levels of second-semester physical education students at IKIP PGRI Pontianak with a total 145 students. The data presents the distribution of VO2max levels among the physical education students using the Bleep Test as follows:

**Table 3**  
**Distribusi Frekuensi Kemampuan VO2Max Mahasiswa Penjas IKIP PGRI Pontianak**

No	Classification	Score	Frequency	Percentage
1	Excellent	>52.4	0	0 %
2	Very Good	46.5 – 52.4	0	0 %
3	Good	42.5 – 46.4	3	2,02 %
4	Adequate	36.5 – 42.4	26	17,6 %
5	Poor	33.0 – 36.4	39	26,4 %
6	Very Poor	< 33.0	80	54,05 %



### Graphic 1 Physical Fitness Data of the Students

Based on Table 1.3 and Figure 1.2, it shows that the VO2Max levels of physical education students at IKIP PGRI Pontianak are as follows: in the "Very Excellent" category, there are 0 students (0%); in the "Excellent" category, there are 0 students (0%); in the "Good" category, there are 3 students (2.02%); in the "Adequate" category, there are 26 students (17.6%); in the "Poor" category, there are 39 students (26.4%); and in the "Very Poor" category, there are 80 students (54.05%).

The fitness instrument developed in this study meets the valid criteria. This is based on the validity analysis of the Web-based physical fitness instrument, which shows an average total validation score of 3.87. Based on this result, it can be concluded that the instrument is "Valid." However, further adjustments, improvements, and refinements are needed to ensure that the developed web-based physical fitness instrument can be used effectively by teachers, coaches, and sports enthusiasts.

In addition, this study also examines the levels of students' physical fitness by using the instrument developed by the researcher. After conducting the study, the results were obtained that several factors play a role in determining a person's VO2Max, which various elements can influence. Sadly (2015) states that factors affecting VO2Max include age, exercise, and the altitude of one's place of residence. These factors are influential due to the environment and physical activities carried out daily, as well as the terrain traversed. In line with this, Kaprawi (2016) concluded that activities routinely performed in extreme environments (up and down) at high altitudes can improve a person's physical endurance (VO2Max).

### **CONCLUSION**

Based on the results of the study, it can be concluded that:

1. The validity of the web-based physical fitness instrument to measure VO<sub>2</sub>Max in physical education students at IKIP PGRI Pontianak falls into the "Valid" category.
2. The physical fitness levels of students at IKIP PGRI Pontianak are as follows: in the "Very Excellent" category, 0 students (0%), in the "Excellent" category, 0 students (0%), in the "Good" category, 3 students (2.02%), in the "Adequate" category, 26 students (17.6%), in the "Poor" category, 39 students (26.4%), and in the "Very Poor" category, 80 students (54.05%).

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