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The Development of Android-Based Multistage Fitness Test Software to Measuring Vo2 Max

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Abstract

This study aims to produce an on-field test software, android-based multistage fitness test, that is valid and reliable, to determine the feasibility level of android-based multistage fitness test software based on experts' judgments; also to determine the effectiveness level of android-based multistage fitness test software. This research is a development by following Borg & Gall design. Validity test using t paired sample t-test. Results of the study: 1) a product of android-based multistage fitness test software that serves to guide the course of the multistage fitness test in Indonesian with automatic recording of results, 2) a tester is able to supervise 7 test participants in a single test, 3) the results of the assessment of media experts, material experts and practitioners, the product is considered feasible with the average percentage of 70% (Good), 4) The effectiveness test results show that the correlation value is 0.995 and the sig value. (2-tailed) of 0.145 (p> 0.05). It can be concluded that there is no difference between the results of Android-based Multistage Fitness Test Software with the results of manual Multistage Fitness Test. Android-based Multistage Fitness Test Software to measure VO2 Max is feasible to use.

How to Cite

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INTRODUCTION

Sports achievement is determined by many factors such as biology, psychology, environment, and supporting factor. Biology or physical factor is a determining factor which is very important for an athlete in reaching achievements. Basic Components in biology factor such as strength, endurance, speed, flexibility, agility, coordination, balance, accuracy, reaction and muscular strength (Mugiyono Hartono et al, 2017). One of the supporting factors of athletic achievement is Aerobic endurance or Volume Oxygen Maximal (VO2 Max). VO2 Max is the maximum ability in breathing, draining, and consumption of oxygen (Sharkey, 2011).

VO2 Max is the ability of the cardiovascular system in supplying oxygen to all parts of the body in a long period during the activities, so it means it is very important for the athlete for having VO2 Max (Ario Debian and Cerika Rismayanthi, 2016). VO2 Max is describing the effectiveness of body level to get oxygen then deliver it to muscles and other cells and consume it to get energy while body removes residual metabolism that can inhibit physical activity at the same time (Hari Adi Rahmad, 2016). VO2 Max increases with work intensity depend on the maximum level. The consumption of maximum oxygen is very variation in each individual and can be increased with suitable exercises (Nafis Ali Khasan et al, 2013).

The consumption of VO2 Max can be said as the total of maximal oxygen that the body can absorb during physical activity intensively until the body feels exhaustion. The value of VO2 Max in each individual depends on the cardiovascular condition, respiration, hematology, and exercise ability. The testing of VO2 Max value can be used to analyze the effects of a physical exercise program. An individual that has good fitness also has higher VO2 Max value that can do the activity stronger than they that have bad fitness (Intan Watulingas et al, 2013).

To know the value of VO2 Max, people needs measurement called testing. The testing of VO2 Max can be done in the laboratory or in the field. Laboratory testing needs expensive cost because it needs sophisticated instruments and trained tester. The laboratory testing is also not effective for the large group. Therefore, we need a work in developing simple field testing to give accurate VO2 Max value. The field testing that can be done is Cooper test, Balke test and multistage fitness test (Fitriani Dewi et al, 2017).

The multistage fitness test is a popular field testing that can be used to measure VO2 Max by predicting maximum oxygen absorption (Paradisis et al, 2014). Multistage fitness test can be said as a popular field testing and measurement for children and teenager in the world. Multistage fitness test also has very good utility because the implementation needs inexpensive cost and the testing is flexible because it can be done indoor, outdoor, or in the small field and it can test a large group in one testing (G.R. Tomkinson et al, 2016). Multistage fitness test needs minimal types of equipment and tester and this test is easy to be implemented. The populations of testing give a result that can be repeated and aerobic capacity can be predicted. Therefore, multistage fitness test is becoming a field test that can be used by women athlete, their trainer and supporting scientists (Cooper et al, 2004). The multistage fitness test is accurate to predict VO2 Max and can give useful information about people's fitness in monitoring athlete and determining intensity optimal exercises (Paradisis et al, 2014). Multistage fitness test is considered as a valuable testing in evaluating matching competition and guiding exercise program. Multistage fitness test can show appropriate using with aerobic fitness athlete, so this testing needs consideration in selecting talent and the development (Castagna et al, 2010).

The weakness of the manual multistage fitness test, it needs many people as a tester and the results of the test need processing in order to V02 Max value can be predicted. Runner or testee cannot immediately know the result of VO2 Max value after the test finished. The implementation in Indonesia uses a guiding cassette contains recordings (audio CD) in English that can be connected with load speaker and the tester should control process of multistage fitness test which can happen mistake calculation caused by human error so it can make the inaccurate result (Moch Insan Gumelar et al, 2017).

Nowadays, the development of technology creates new measurement application of VO2 Max based android but the available application still uses English language that is difficult to be understood by many people and testing can be for individual only. Besides, there has been no multistage fitness test software based android that released in Indonesia.

The previous research by Moch Insan Gumelar, Hamidie Ronald, Suginiyati Ugelta in the journal entitled, "Pengembangan Software Aerobic Capacity dengan menggunakan Bleep Test Berbasis Aplikasi Android" (2017). The application of aerobic capacity-based android can be used to guide the process of field Bleep test or Multiple Fitness Test and can test more than 1000 people in one testing. This application also uses animation runner indicator which is easy for the user, this speed animation will get faster in line

with the increasing level. After testing is finished, the result of aerobic capacity or VO2 Max testee can be known immediately. The previous research by Elrangga Piliang (2017) in the thesis entitled, "Pengembangan Software Aplikasi EP-515 Tes Daya Tahan Aerobik Berbasis Android". This software is digital measurement (calculator) to measure aerobic endurance. It contains field test to measure aerobic endurance. The previous research by Fajar Agni Fauzan, Agus Rusdian, and Yati Ruhayati (2016) in the journal entitled, "Pengembangan Software Bleep Tes Tim untuk Mengukur VO2 Max". This software has function as a computerized application that will guide the process of Bleep Test or Multiple Fitness Test that produces a more effective recording and can be used as the mediator between tester and testee. The implementation can be done by many people or in a group. A laptop that has installed this software is connected with the load speaker then the user press start button and the recording will start automatically. The result of the test can be saved in the format of Microsoft Word and PDF and it can be printed.

The differences between this research and the previous researches can be stated in the following.

The setting of the research.

The subject of the research.

This research uses the newest research norms and the researcher adds VO2 Max norms on the menu.

This research is completed with international standardization of VO2 Max of some sports in Indonesia.

METHOD

The present research can be classified as research and development (R&D). This research method is used to produce a product and the product should be tested to know the effectiveness. This research adapts Borg & Gall model. There are 10 steps of this research based on Borg & Gall model; 1. Research and information collecting data, 2. Planning, 3. Develop a preliminary form of a product, 4. Preliminary field testing, 5. Main product revision, 6. Main field testing, 7. Revision the result of main field testing, 8. Operational field testing, 9. Final product revision, 10. Dissemination and implementation.

The effectiveness testing uses t paired sample t-test. Preliminary field testing of this research carries 15 fifth graders of elementary school and main field testing carries 30 fifth graders of elementary school as the sample. The technique of data analysis uses quantitative and qualitative data.

The result validation testing is by physical fitness expert, IT expert, and practitioners, who check the compatibility and usability of the software product with VO2 Max analysis data needs. There are 15 graders of elementary school as the sample in the preliminary field test. The test uses multistage fitness test based android. The students are lined up to get ready in testing and they fill the self-data, then the user or tester clicks the start button. After all samples have finished, the user or tester clicks the stop button and the results of VO2 Max can be known. There are 30 fifth graders of elementary as samples in main field testing. The testing is done in two cycles test. The first uses manual multistage fitness test and the second uses multistage fitness test based android. The testing is done to know the differences both of them. The effectiveness testing is the result of software testing. The result of software testing is the result of multistage fitness test software with automatically recording.

RESULT AND DISCUSSION

The result research: The multistage fitness test software android based has the function for guiding field testing multistage fitness test with Indonesia language. The tester can observe 7 runners or testee in one testing. The results of testing by physical fitness expert, IT expert, and practitioners show that the product is proper with percentage 70% (good), preliminary field testing shows percentage 84.36% (very good), main field testing shows percentage 86.48% (very good). It can be concluded that multistage fitness test software is proper to be used. The results of effectiveness testing show that there are correlation value 0.995 and sig. value (2-tailed) of 0.145 ($p>0.05$), there is no significant difference between the results of manual and digital (Android-based).

Multistage fitness test software can be used for guiding multistage fitness test by using Android. This software uses the same regulation with the multistage fitness test that created by many experts. This software shows level information, feedback, cumulative distance, the name of a runner in order to testee can adjust the speed and the rhythm.

Multistage fitness test software are created to give result tests to know the estimation of VO2 Max value automatically. The advantages of using this software is the user only needs to input data of testee such as name, age, and gender and the user clicks the start button and multistage fitness test is running. If testee does not follow step with beep sound in 2 times continuously, the testee is disqualified and the user

only clicks number/ name of the testee to stop it and clicks the stop button to finish the testing. Then, the results appear automatically and it can be saved and accessed at any time.

There are norms menu that contain multistage fitness test newest norms for women and men and international standardization of some sports. Multistage fitness test software android-based can be installed on android version minimal 4.1 Jelly Bean released on June 2012. Besides, the automatic recording will reduce mistake calculation in the resulting recording.

CONCLUSION

It can be concluded that the result of manual multiple fitness test is not different with multiple fitness test software android-based to measure VO2 Max and this software is proper to be used. The researcher hopes that trainers and athletes can use multistage fitness test software for increasing athlete performance.

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