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Revolutionizing assessment: Innovations in website-based test and measurement applications

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Abstract: The success of information cannot be separated from the use of online media. Website is one of the online media that is widely used by organizations to provide information quickly. Unfortunately, there are currently not many websites that directly provide information and can analyze and monitor users. This study aims to develop a physical test and measurement website to provide information and results of biological monitoring of athletes directly. This research used a method of ten stages of research and development (R & D). The result of this study showed that more than 90% of users rated website design, validity, ease of access, and functionality as accessible and excellent. Analyzing test results and measurements also positively impacts satisfaction using the test and measurement website developed by Surabaya State University. This study concludes that although improvements need to be made to this website, but overall this physical test and measurement website facilitates the assessment of test results and physical measurements, which can be seen directly by coaches: athletes, managers, to parents who are given access. Coaches, athletes, and parent organizations must be able to adapt to the use of technology, such as the Web, to support long-term athlete development processes and performance. Following the needs of athletes, identifying athlete achievements from test results and measurements will be easier because test and measurement norms can also be adjusted to the history of test results and measurements.
Keywords: website, technology, tests, measurements.

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INTRODUCTION

Technology has become an important part in supporting human mobility (Boas, 2017) The era of Society 5.0 has indeed become an era of unification of humans and technology, technology has become a need that must be met by everyone (Rahmawati et al., 2021) One field that cannot be separated from technology is sports. The number of world record breakers today is inseparable from the use of technology in the process of sports training achievements in a sport.

Technology in 2030 is predicted that it will have a significant impact on the performance of athletes, the sports community and club managers (Frevel et al., 2022) For an athlete, technology will make it easier for them to improve their performance through direct evaluation of the training performance they do (Arnăutu & Hanţiu, 2020). Athletes really need a training monitoring that will later provide data about the progress of the training they do. In addition, the results of this monitoring will later provide an insight for athletes in meeting the needs of the recovery process and preparation for the training to be carried out. Several researchers in Indonesia have also succeeded in making technology that supports athletes' performance such as Indria (Herman et al., 2021), et al (Pramono et al., 2023)(Pramono et al., 2023)

Technology is used by athletes mainly when training and also competing for purposes as a performance analysis of physiological and biomechanical parameters (Li et al., 2016) This technology is done to see the performance of athletes and also more importantly to prevent the risk of injury. Advances in technology have allowed individual-numbered remote athletes, sports teams, and physicians to monitor player movements (Loader et al., 2012), (Loader et al., 2012) (Tanisawa et al.,

2020), training loads (Tanisawa et al., 2020)(Mooney et al., 2011; Varley et al., 2012)and biometric markers (Foster et al., 2010; Noonan et al., 2012) in an effort to maximize performance and minimize injuries (Li et al., 2016)(Le Noury et al., 2022)(Le Noury et al., 2022) Peter et al have developed technology to improve cognitive-perception skills and motor skills. Even Tauba ((Tauba & HB, 2021)) in his journal succeeded in creating effective technology in seeing the dribbling speed ability of futsal players, and Supriyono (Supriyono, 2018) also developed a web application to measure passing-control, shooting, gastric passing, juggilng, heading, admin counter menu.

Injuries and failure of athletes to perform optimally are caused by errors in evaluating test results and performance measurements. This problem is caused by trainers and managers who lack knowledge of procedures for conducting tests and measurements, in addition to the wrong use of norms on tar and measurement types. In addition, tests and measurements are used in talent search efforts for young athletes by coaches and managers (Ali, 2011; Lidor et al., 2009)

The problem today is that not many coaches or even managers of a sports club understand tests and measurements. From the results of the implementation of the community service program (KLUB Sport prestasi in East Java) received the results of the tests carried out, but the test results were not specifically in accordance with the needs of their sports. The similarity of test items and measurements in sports results from tests and measurements is less than optimal because they are not in accordance with the needs of athlete profiles in sports. Basically they still use traditional processes in tests and measurements. The purpose of this study is to determine the understanding of coaches and managers in the use of web technology in sports test and measurement patterns which will then be developed by the Website program which will later help in the presentation of test results and measurements carried out while providing a more optimal picture in the selection of tests and measurements that are more suitable for their sport.

The choice of web-based applications in this development has its own advantages including the web can be widely accessed by teams of coaches, managers and players and can access in all situations, besides that the web can facilitate the dissemination of information to all parties who need the latter web has interesting features such as videos and images, so that tests can be carried out efficiently. In addition, the website is used as a medium of communication between the organization and its members(Hur et al., 2007) (Gonzalez et al., 2015), (Gonzalez et al., 2015) (Chiu &; Won, 2016(Chiu & Won, 2016; Mcclung et al., 2012) Websites are also the most likely media to provide coaches with the latest information about sports developments, as in research(Pope et al., 2015) that psychology websites are used as media to share information about psychology for athletes

METHOD

This research was research and development (R&D). The results of learning product design were tested, evaluated and refined in practice to be standardized, effective, efficient and quality products were produced, based on test norms and sports measurements. Among the various research and development models that exist, the model proposed by Borg and Gall is a model that specifically guides research and development in the field of sports. The model proposed by Borg and Galli is better known as the ten-step model (See Figure 1). To see the usefulness of the products that have been made, questionnaire data was used in data collection to determine the understanding and interaction of trainers in using web technology for tests and measurements. 60 respondents consisting of students, coaches, managers, athletes and also a team of test and measurement experts participated in this study.

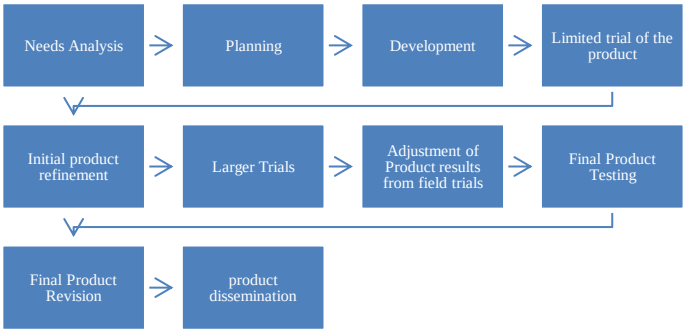

Figure 1. Stages in the research (RnD) of Borg and Hall

RESULT AND DISCUSSION

Needs analysis was an important stage in the research and development of web tests and measurements. At this stage, researchers get data on the necessary test items and in accordance with the sport. Coaches and management need tests and measurements that match the needs of their athletes. From this needs analysis will later provide benefits from test items and measurements needed by trainers and managers. Therefore, Surabaya State University developed a test and measurement web to make it easier for coaches and managers to carry out tests and measurements on their respective athletes. In planning stage, the researcher describes the stages of the program making process. The initial stages that are carried out are what is needed in this web creation process, such as standard device that can be used to do coding, how much budget is needed and other needs. Then the researcher also determines the time limit in working on the web application, this was done in relation to the stages that must be met when using the Borg and Gall method. The last thing that determines the achievement of making web applications was who will make the program, in this case, the researchers invited experts who have skills in developing web applications.

Development was a stage that determines the product could be used properly according to the needs of trainers and managers. This stage has a long time because researchers and web program development must be meticulous in formulating coding that is adjusted to test items and descriptions of test results automatically. The results of the development of the test and measurement web application presented in Figure 2-5.

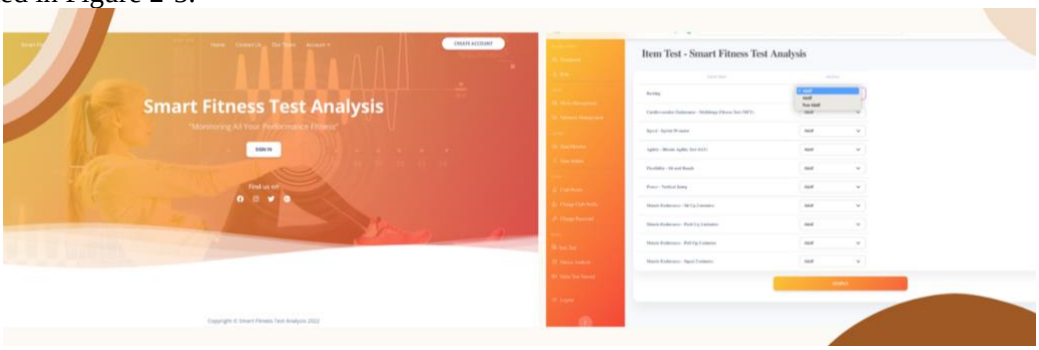

Figure 2. Main view of the sports test and measurement web application

Figure 2 shows the appearance of the developed website. It can be observed that this display is minimal using a small combination of colors and an organized menu easily and simply. The reason researchers use this method is to simplify the operational process and application for trainers, where trainers are located in an area that does not allow getting a strong internet network. It was in line with the results of the previous study (Pasaribu &; Sunarya, 2020) that with this framework significantly reduces the time, resources, effort required to develop and manage web applications.

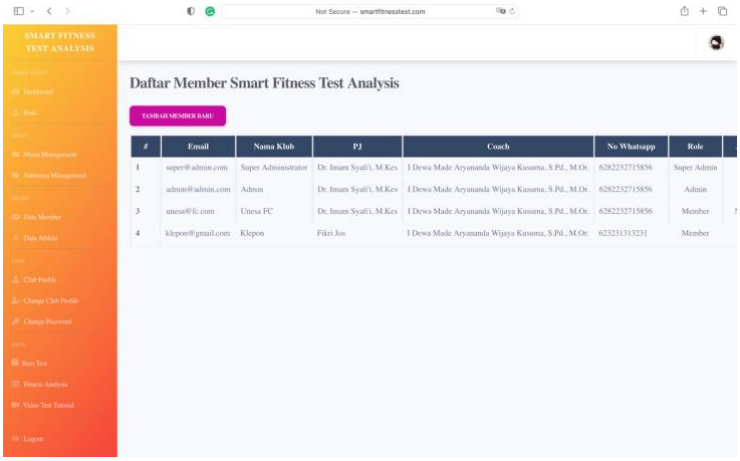

Figure 3. Menu view of trainers and managers using the web application

Figure 3 shows a menu for filling in the data manager. This is needed to provide access for users who are trainers. The app will distinguish users who are athletes and coaches. So the display on the accounts of coaches and athletes will be different.

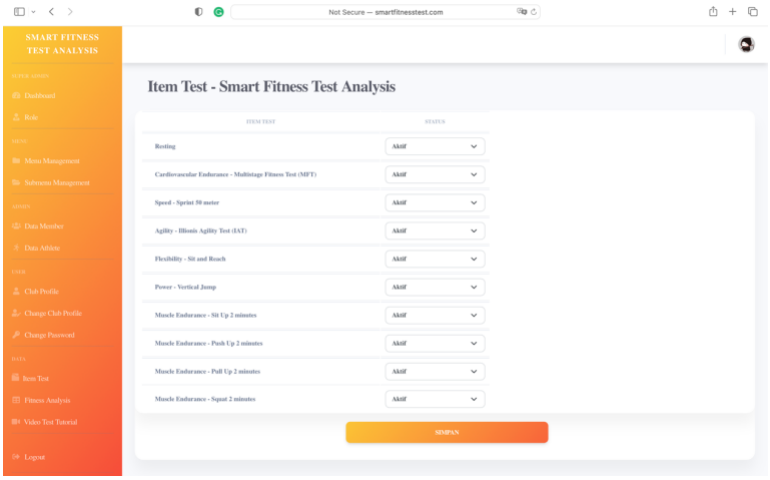

Figure 4. Test item data

Figure 4 is a display menu devoted to coaches in terms of selection of physical test items to be given to athletes. This menu can also be changed or added by coaches who certainly adjust to the needs of the sports they have.

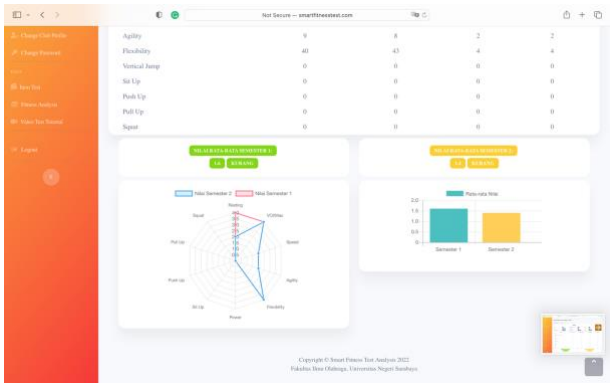

Figure 5. Display menu of test and measurement analysis results

Figure 5 is an example of the results of tests and measurements that have been carried out. A simple and easy to understand interface by athletes and coaches will be the main attraction. This menu was equipped with direct recommendations and also recommendations given by the coach himself to athletes. The history of the tests and measurements carried out were analyzed at the end of the year to provide an overview of the athlete's physical development, so that later the coach was able to compile an exercise program based on the results of fitness analysis from several tests that have been carried out during the year.

A limited product trial was an initial assessment of the developed product. This trial was carried out on a group of sports coaching students who have the capacity to conduct sports tests and measurements on athletes. 10 sports coaching students participated in this limited trial. The instruments used in this limited test can be seen in Table 1.

Table 1. Limited trial questionnaire

Category	Number of questions
Application Functions	4 item
Accessibility	4 item
Web Design	4 item
Suitability	4 item
Validity of analysis results	4 Item
Total	20 Item

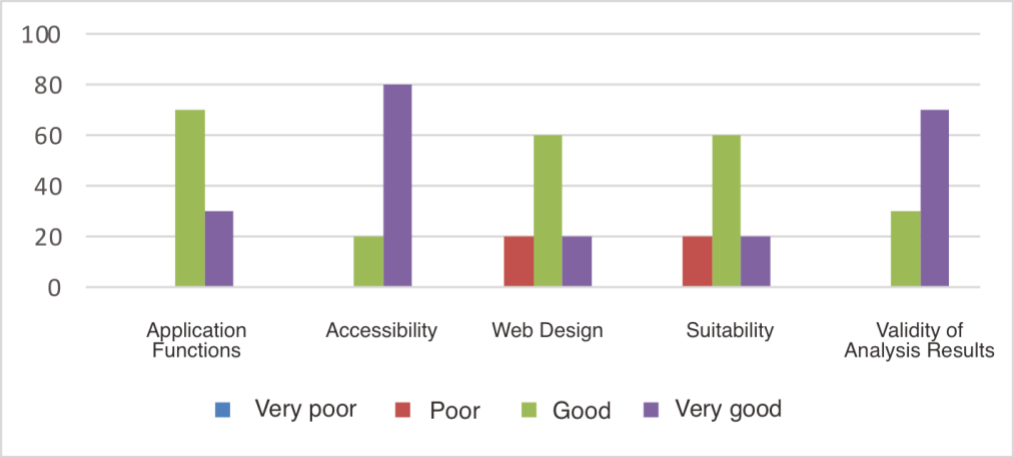

Figure 6. Limited trial results

At the initial product refinement stage, researchers focus on limited trial results. In limited trials, there were inputs from respondents that the application design was not attractive, there needed to be additional graphics that would give the impression of being attractive and easy to read by coaches, managers, and athletes. There were suggestions on the test items provided by the tool developer that still lacking or there were some test items that should be added such as balance exercises, agility, and others. From these results, researchers focus on improving the application in accordance with the suggestions that has been obtained. Wider field trial was the second phase of research and development of web-based test and measurement applications, in which a larger number of samples participate in testing. In this study the number of samples were 20 respondents.

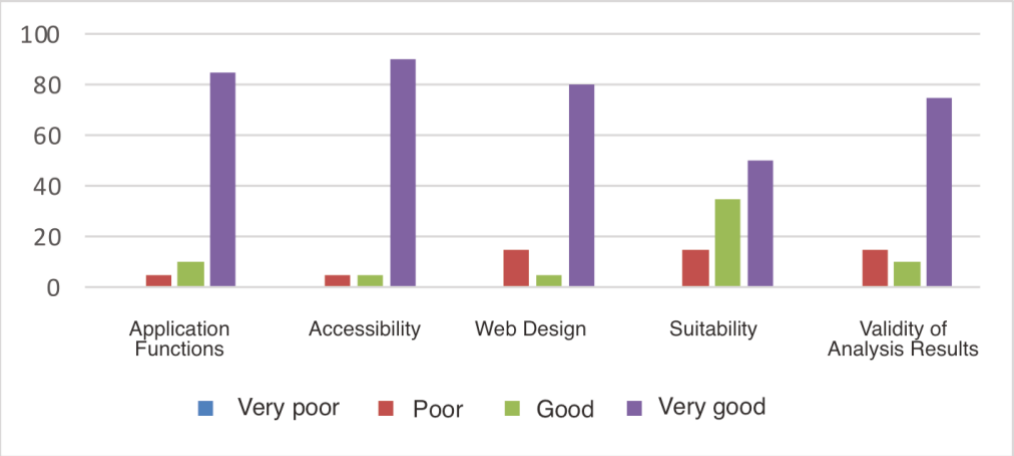

Figure 7. Larger Trial Results

Adjustment of product results from field trials with many samples gave positive results, where improvements made in the first test results gave high satisfaction in the performance of the test web application and physical measurements of athletes. Even though there was still a part that still the most important part to be improved, was the suitability of needs for each sport. This section still requires more literacy so that it could be displayed on the web menu. The respondents assessed the updated web application suggested special menu that would display specific sports and simultaneously display appropriate tests and measurements. Another positive thing was that users were very satisfied with the test results and measurements that could be printed immediately so that both coaches, athletes, and managers could immediately make these results as material for physical evaluation.

Final product trial was the end of the test and measurement website development stage. The final product trial involved 30 experts consisting of coaches, athletes, and managers in assessing the test and measurement website.

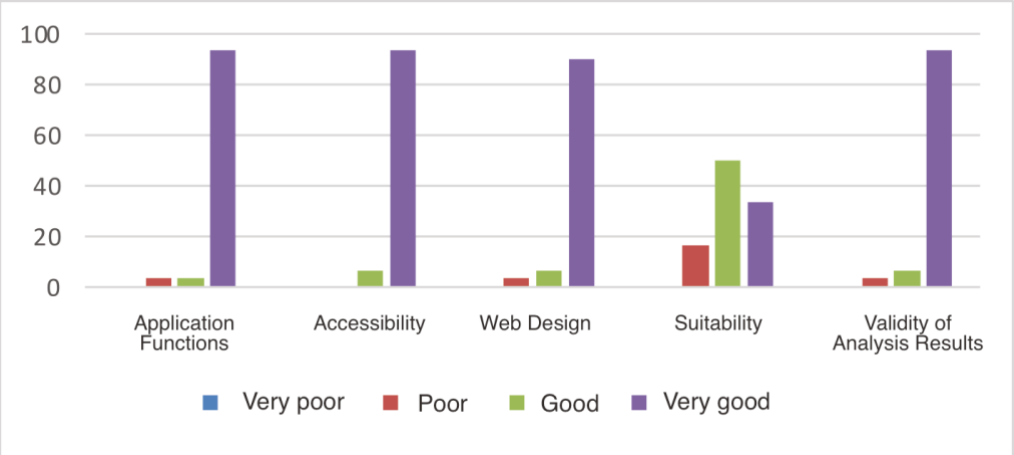

Figure 8. Final trial results

After the last trial that has been carried out, the next step is product improvement in final product revisions. At this stage, researchers focused on the accuracy of the product because there were the last product test results, the appraiser finds that there is a formula that could not evaluate the results of tests and measurements. So that this was the focus of the researcher to be resolved immediately. The researcher successfully completed coding on the formulation of the description of the results of the assessment, test, and measurement. As for suitability, it was implemented in the following year because this is in accordance with the researcher's focus on developing test wes and physical measurements of athletes. To adjust based on the type of sport, further tests will be carried out with the profiles of sports athletes in Indonesia. Overall, the application could work well so that it was ready to be implemented in sports training in Indonesia.

Web that provides test and measurement information has been widely developed on various web platforms. This developer aims to make it easier for coaches, athletes, and managers to use it as a reference in explaining implementation procedures to explaining test results and athletes' physical measurements. This web technology will have a significant impact on the world of sports, especially will provide color in the training process of an athlete (Jacobsson et al., 2020) Coaches, athletes and managers must understand the latest technological developments (Mali, 2020) This is a challenge for coaches so that the training process is always updated and based on sports science.

Web development carried out by Surabaya State University provides a difference from existing websites. The analysis menu of test results is one of the advantages of developing this application. This web development in addition to providing convenience for coaches, athletes, and managers in conducting tests and measurements also provides important information related to the implementation of tests and measurements which will then be given direct results related to the results of tests and measurements that have been done. According to previous studies, exercise and health technologies can increase the level of awareness of personal physical activity and thus, increase motivation (Kari et al., 2017; Wang et al., 2016) With this application, the results of the athlete's training process will always be monitored so that it can become its own motivation for athletes. Sports steakholders, especially coaches, athletes and managers, consider technology as a method in changing sports into a sports industry (Frevel et al., 2022) With technology, it is expected that the management of athlete coaching management is much more structured and also well monitored. Technology such as web tests and measurements have advantages in these efforts, where this technology was developed to make it easier for them to perform tests and measurements accurately and the results obtained can be directly seen by athletes, coaches, managers and even parents to monitor the progress of athletes' performance.

The usefulness of the sports web is measured in 5 aspects such as the quality of information provided, the quality of measurement, the quality of design, the quality of the measurement system, the usefulness (Chiu & Won, 2016). From the results of the last product trial, the web test and measurement product developed by Surabaya State University has high scores on 5 aspects of sports web assessment. The information provided by the web has a value of 95% very good, design quality 90%, the quality of measurements obtained by raters gives a very satisfied percentage value of 95%, only in the quality of the measurement system which has a value of 80%, this is because there are still test and measurement

items that have not been displayed in accordance with the interests of sports. Even though the quality value of the measurement system is low, the raters until the end of the closing of the assessment process they still access the website to identify the test results and physical measurements they do, this indicates that the web site created has high quality (Hur et al., 2011; Y. Suh et al., 2013; Y. I. Suh & Pedersen, 2010).

The design appraisal received a very satisfied satisfaction score of 90% from the raters. This test and measurement web site is designed to be very interactive and informative for users. Trainers and managers who are users will be given ease in using the website because of the interactive design. In addition, to facilitate use, information on test and measurement images is provided in the form of video tutorials that are directly accessible. With the principle of a simple website model but providing color diversity, it attracts users to use the sports test and measurement website. (Flavián et al., 2006; Janda et al., 2002; Moshagen & Thielsch, 2010; van der Heijden, 2003) explained the visual aesthetics of a simple website with a diversity of colors is a key factor on the website. The test and measurement website developed is different from other sports websites. This website not only provides education and convenience in providing descriptions of test results and measurements, but users will immediately be given the results of the tests and measurements that have been carried out, so that later coaches are able to know the physical development or performance of their athletes and can also plan programs needed to improve performance for their athletes (Skarbalius et al., 2019).

This research found that the need for web tests and measurements is urgently needed by the sports community. The need for this web is not only on the composition of the web that only provides information about tests and measurements, but a web that is able to provide descriptions and evaluation results of the implementation of tests and physical measurements that have been carried out. To provide informative results, the provision of video tutorials in providing initial information for trainers and managers in tests and measurements provides satisfaction for users to carry out tests and measurements accurately.

CONCLUSION

The development of website-based physical tests and measurements is very satisfying in the categories of design, validity, ease of access, and function and the analysis menu of test results is a distinct advantage in this application. The website provides a convenience in terms of application operations because all types of devices can easily operate the website. With this website, users will easily analyze test results and physical condition measurements. Furthermore, coaches will evaluate the results of existing tests and measurements with training results every day, week, or month to see the development of athletes' performance. The website application in this study can be accepted and operationalized by the trainer team because the developer offers operational convenience from the website. The website by prioritizing operational dryness that does not use a high internet quota load also makes the reason why this website is easy to operate and easy to use in areas that still use a less strong internet network.

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