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Development of Test Learning Resources and Physical Fitness Measurement Based on Mobile Learning

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Abstract

This research aims to study how the learning planning and implementation of Physical Education, Sports, and Health learning can be used as evaluation material to improve Physical Education, Sports, and Health learning in schools. This research is action research with qualitative and quantitative descriptive methods using models from Kemmis and Mc. Taggart consists of one cycle or a round of activities which include: -1) Planning (plan), (2) Action (action), (3) Observation (observing), (4) Reflection (reflecting), and planning revision will be carried out cycle. Data processing is done by reducing data, presenting data, and making conclusions. The study results indicate that the planning and implementation aspects of academic supervision improve performance in developing learning devices and in the implementation aspects. From the results of the study, there were the findings of teacher performance not following the action in the field, such as the brakes that still copied paste from fellow teachers, the facilities were inadequate and had sports outside the school because the school was still new and did not have sports facilities, the clock of the faded subjects in SMK only 2 hours of lessons run out on a trip from school to the sport. The conclusion in this study is that after being done through the filling of teacher performance appraisal instruments given to physical education teachers, it can be obtained from cycle I to cycle II the results of better teacher educators after being given assistance and supervision.

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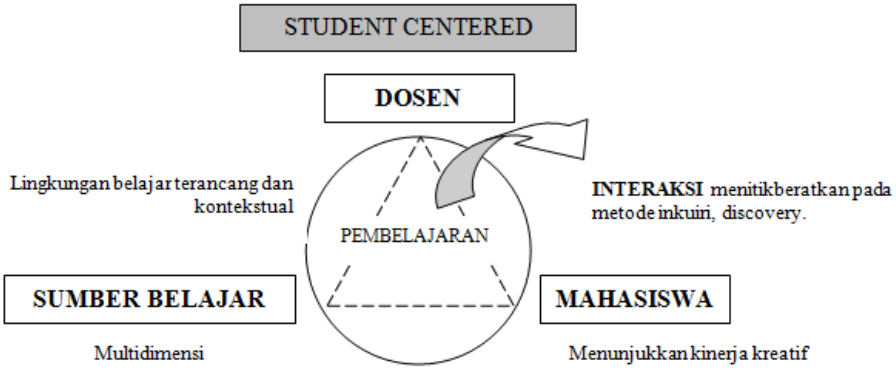
INTRODUCTION

Education is carried out in schools and colleges with its time, keeps changing. The advancement of information and communication technology (ICT) is one of the factors of change in the education system in Indonesia (Sitoayu et al., 2021; Aini &

Kemala., 2022). Technology has a very important role in the educational process and also provides direction in the development of the world of education (Panggraita et al.; 2022; Hasyim et al., 2020). In the history of educational development, information technology is part of the media used to convey the message of knowledge to people, starting from the printing technology of several centuries ago, such as printed books, to telecommunications media such as sound recorded on cassettes, videos, televisions, CD and learning via the internet (e-learning) (Aswara, 2019).

Learning resources are a component in the learning process that has an important role in achieving learning objectives. As stated in the 2003 National Education System Law which states that learning is a process of interaction between educators, students and learning resources in a particular learning environment (KKNI, 2012).



Picture 1 Instructional Interaction Process

Littlejohn et al., (2008) state that, learning resources are fundamental to good quality education; print-based resources are well established as an integral part of teaching across all sectors of education and their use has evolved over a long period, especially in conventional, didactic modes of teaching.

Learning resources have an important role in achieving quality education. Learning resources in the form of print technology have been an integral part of the education system for a long time to achieve educational goals, especially in conventional education systems (Leba et al., 2013; Cidra et al., 2018).

Mobile learning (m-learning) is a hot issue that has developed in the development of teaching materials since the 2000s. Mobile learning makes use of mobile devices such as smartphones (including the cell phone class) to support learning (Sophonhiranrak, 2021). Make it easier to access learning resources and make learning resources more attractive. Mobile learning has a high degree of flexibility in terms of ease of access (Fan & Song, 2020). Material prepared by educators to facilitate independent learning for students can be packaged in text, audio and video on one smartphone device. Thus the process of transferring knowledge through interaction between students and learning resources

becomes easier.

M-learning is learning that utilizes information and communication technology. m-learning provides easy access to material by enriching various learning sources with attractive visualization of material. Following are the definitions of several experts related to m-learning (Gary, 2011). (Lin, Hsia, & Hwang, 2022) said that mobile learning is "... any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of learning opportunities offered by mobile technologies." similar to Lai et al., 2022 definition that mobile learning is "... any educational provision where the sole or dominant technologies are handheld or palmtop devices." (Lin et al., 2022) tried to define mobile learning by the size of the mobile device: "Mobile learning should be restricted to learning on devices which a lady can carry in her hand-bag or a gentle-man can carry in his pocket." (Chang et al., 2021) defined mobile learning as "the acquisition of any knowledge and skill through using mobile technology, anywhere, anytime, that results in an alteration in behaviour".

The definition of mobile learning can be divided into definitions that emphasize mobility (Sharples et al., 2009), access (Parsons & Ryu, 2006), closeness (Kynaslahti, 2003), storativity (Cheon, Lee, Crooks, & Song, 2012), space and time (Kukulska-Hulme et al., 2009), comfort (Kynaslahti, 2003), and contextual (Kearney et al., 2012). According to Sharples et al. (2009), mobile learning includes the characteristics of mobility in physical, conceptual, and social spaces. The relationship between the learning context and the context of beings is unique to mobile learning because learning can occur in an independent, formal, or socializing context (Frohberg et al., 2009).

Today's educators are increasingly using their phones for learning, as they believe devices help them communicate with students and offer access to motivating, engaging Internet resources, digital learning, and content creation. However, they continue to struggle with balancing an effective pedagogical approach with "device distractability" and equitable access (Purcell et al., 2013). In another study, educators jointly redesigned their learning materials by paying attention to (a) assessing the use of mobile phones in teaching, (b) pedagogical approaches, (c) content creation, (d) app evaluation, and (e) impact on learning (Herro et al., 2013). Mobile learning allows teachers and students to access information anytime and anywhere without limits (Kukulska-Hulme et al., 2009; Danish & Hmelo-Silver, 2020). The research synthesis revealed many pedagogical advantages of mobile learning for teachers in education, among others, pre-service: connectivity and collaboration, reverse classroom models, mobility in physical classrooms, backchannel conversations, engaging with content on mobile devices, mobile learning in student teaching, performance evaluation, and participation in professional learning

communities (Baran, 2014).

Mobile learning creates promising learning opportunities with collaborative, contextual, customizable and teacher personalized mobile devices. An interview by Aubusson et al. (2009) with eight teachers, teacher developers, and teacher advisors in Australia and the UK revealed that educators consider mobile technology useful for enhancing learning. Uzunboylu and Özdamlı's (2011) perceptual scale of mobile learning conducted, by teachers, revealed a positive perception of m-learning (n = 467). Another survey with teachers revealed that the iPad. The research results showed that student acceptance of m-learning was quite good. In other cases, they are subject to normal, and the perimeter control of the means of positive movement does not exceed the number of mobile devices in question (Cheon et al., 2012). Help them access learning material, collaborate in online forums, and access email. Ciampa's (2014) case study of teachers' perceptions of how mobile devices motivate students reveals "six key aspects of a successful (mobile) learning system as a challenge, control, curiosity, recognition, cooperation and competition".

Test and measurement subjects are one of the subjects that must be taken by students of the sports education study program. With a load of 3 credits, of course, this course has a level of difficulty that is not exactly easy. This course covers theoretical and practical skills. There are many types of sports tests and measurements, one of which is a test and measurement of a person's physical fitness. Physical fitness tests and measurements are one of the materials taught in the subject of sports tests and measurements. Tests and measurements of physical fitness can be divided into several components which are divided into two aspects of physical fitness, namely: (1) physical fitness related to health, including (a) cardiovascular and lung endurance, (b) muscle strength, (c) muscle endurance, (d) flexibility, and (e) body composition. (2) physical fitness related to skills, namely: (a) speed, (b) power, (c) balance, (d) agility, (e) coordination, and (f) speed of reaction (Widiastuti, 2011).

Learning resources that have been used so far are printed technology (books) and some have used physical fitness e-learning (interactive multimedia) using computer assistance. The learning resources available for the time being are quite adequate, but by taking advantage of technological developments, at least researchers are trying to continue to increase learning opportunities that are more flexible and are not limited by certain time and space. Therefore, the authors try to continue to develop forms of learning resources that are easier to access, one of which is to use of mobile learning.

Learning resources based on m-learning were chosen with the consideration that the more easily people get a smartphone device at a price that is more affordable than the price of a computer or laptop. The level of flexibility in access to learning resources is getting higher. As well as smartphone devices that already

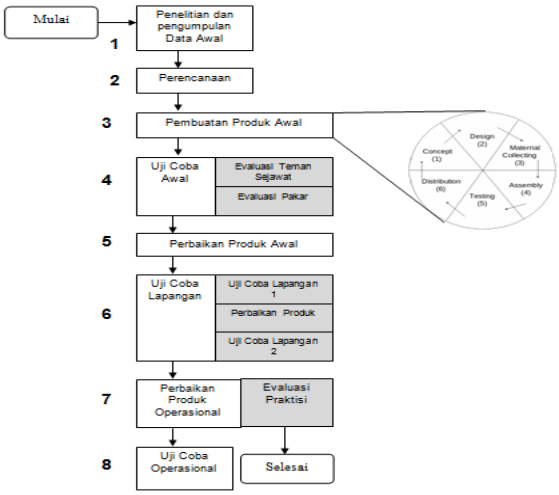
have applications that support the development of this learning resource, namely So! Aware Java (already installed on the majority of Android phones).

METHODS

This study uses a research and development approach. While The development model used is the Research & Development (R & D) development model from Borg and Gall which consists of ten steps, among others (Borg & Gall, 1983): (1) Conduct research and information gathering (literature review, subject observation, preparation of main reports problems), (2) Planning (defining skills, formulating objectives, determining teaching sequences, and testing small-scale trials), (3) Developing initial product forms (preparing teaching materials, preparing handbooks, and evaluation equipment), (4) Conducting field tests start-up (using 6-12 subjects), (5) Revise the main product (according to suggestions from the preliminary field test results), (6) Carry out the main field test (with 30-100 subjects, (7) Make product revisions (based on suggestions and results of main field trials), (8) Field testing with 40-200 subjects, (9) Revision of the final product, (10) Making reports on products in journals, working with publishers g can do commercial distribution.

Meanwhile, to develop learning resources, in the third step Borg and Gall, used a multimedia development model by Sutopo consisting of concept, design, material collecting, assembly, testing, and distribution.

This learning resource for physical fitness tests and measurements was developed using Borg and Gall's development steps and Sutopo's multimedia product development design steps. At each stage of this research and development, there are design steps whose explanation is described and modified according to the actual research objectives and conditions. The following is a model development plan.



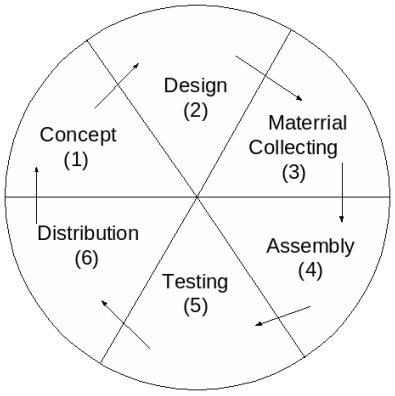
Picture 2 Research and Development Design

The flow described above is the one that the researcher has modified. The flow used is

adjusted to the actual field conditions. Taking into account the availability of time and funds, some steps will be modified but not out of the selected channel. This flow is the flow of research and development by Borg and Gall and is combined with multimedia development by Sutopo. The following is a description of each model development plan:

1. Conduct research and data collection for preliminary research or needs analysis on 30 students who have taken the Theory and Practice courses, sports tests and measurement.
2. Development planning is carried out by determining objectives, limiting the scope, and preparing a trial plan.
3. Develop initial products, which are then evaluated by 1 media expert, 1 sports test and measurement expert, 1 learning expert and make product revisions.
4. Small group trial, using 10 student subjects who have participated in Courses Theory and Practice of sports tests and measurements.
5. Product revisions (according to the results of the analysis in small group trials).
6. Field trials (large groups) using 30 student subjects who have taken the Theory and Practice courses, sports tests and measurements. If in the research suggested by Borg and Gall, at this stage a large-scale (macro) trial is needed, which includes at least 30 or more subjects in 200 schools, but in this study, considering time and cost, it will be carried out limited to one place. namely in the Department of Physical Education and Health, the State University of Malang with several respondents of 30 or more.
7. Make product revisions according to the results of large group trials.
8. Conduct operational trials to determine product effectiveness.

As for the design of mobile learning-based learning resources development products quoted from Sutopo with six stages of multimedia product development, namely concept, design, material collecting, assembly, testing, and distribution (Sutopo, 2003). The following is an explanation of each stage:



Picture 3 Multimedia Development Procedure

Here is an explanation of each step:

1. Concept. At this stage, the researcher

determines the product development goals and identifies the user (target client). The main purpose of developing mobile learning tests and physical fitness measurements is to increase learning literacy for students. In addition, this mobile learning provides easy access to test material and physical fitness measurements, enabling students to learn without being hindered by space and time. This product is intentionally adjusted to the lifestyle of students who are getting closer to mobile phones because the final product of the development of mobile learning will be used by students.

2. Design. The design of this physical fitness mobile learning product is packaged in the form of a soft file in the H * .apk format. This mobile learning product is equipped with interesting text, images and animation. The product design uses the ispring suite presentation and android application.
3. Material Collecting. At the stage of collecting materials for the manufacture of this product, the researcher collected the materials needed, including test materials and measurements of physical fitness in the form of textbooks, the ispring suite presentation application, android applications, and images that were deliberately designed by the form of the test (illustration image), program and flowchart. besides that, a smartphone is needed for initial trials.
4. Assembly. In the assembly stage (manufacture) at this stage, the material in the form of text will be combined with images and animation with the help of the ispring suite presentation application. then will be exported in the form of soft file H * .apk "using your application.
5. Testing. After the product is successfully opened using a smartphone. It will be operated, during operation will observe the various obstacles and shortcomings that arise and plan their repairs.

Distribution. After it is operated and shows good results, the product will be saved in the soft file * .apk format on the smartphone SD card. Thus it will be easier to distribute.

FINDINGS AND DISCUSSION

The results of this study are divided into three parts, the results of needs analysis, product development and product effectiveness. Each of the findings is presented in the following sections.

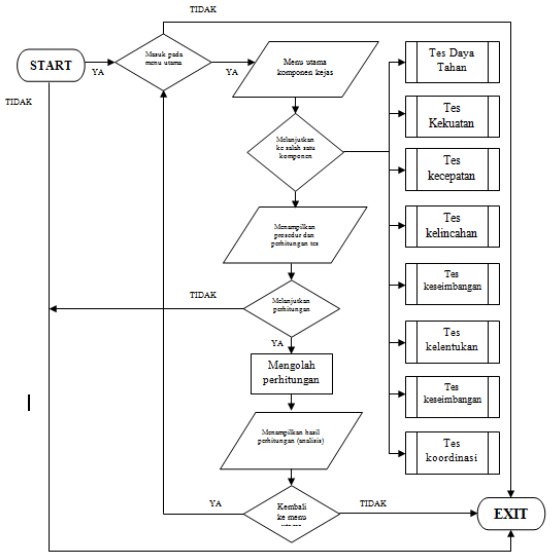
Needs Analysis Results

From the results of the needs analysis, several important points make the key to the need for development to take place. Among others; (1) out of 35 students 100% of students get sports test and measurement subjects, (2) out of 35 students 100% of students still have not mastered test material and physical fitness measurement, (3) out of 35 students 100% stated that the lecturers had not used learning resources based on mobile learning, (4) of 35 students 86% of students have cellphones with the Android operating system (smartphone), (5) of 35 students 100% agree that Android smartphones have the potential to be used as a learning resource, (6) out of 35 students 100% agree If there is a development of learning resources for tests and measurements of physical fitness based on mobile learning, (7) 100% of 35 students stated that they were willing to use mobile learning-based test learning resources and physical fitness measurements.

Product Development Results

The results of the development of learning resources are based on tests and measurements of physical fitness. This mobile learning is a product in the form of soft file format * .apk which is installed on an android smartphone. This learning resource includes text, pictures and script analysis of physical fitness scores. The process of product preparation begins with preparing material maps and data! Low diagrams (DFD). Data flow diagrams are working systems of developed applications. The following DFD physical fitness applications were developed.

Picture 4 DFD of Application



Based on the material map and DFD developed, the researcher began to collect related materials arranged in the form of a content script and then combined them according to the design made in the form of a storyboard. The product is then converted to a .apk format application that can be installed on mobile phones with the Android operating system. Here are some screenshot applications that were developed:

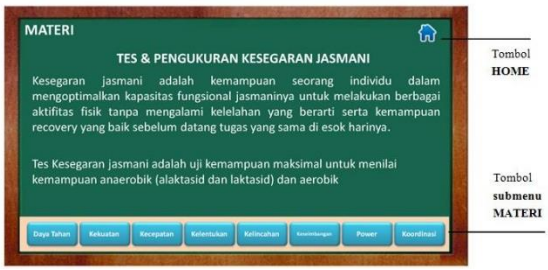
Picture 5 Intro display when the application is opened with the skip button

Picture 6 Main menu display (Home)

In the intro display, there is a "skip" navigation button on the bottom right. The navigation serves to skip the intro and directly enter the main menu page. The main menu page consists of four menus namely, "INSTRUCTIONS", "MATERIALS", "QUIZ" and "PROFILE". To enter and see each of the main menus, you only need to touch once (one-touch) on each menu icon.

The display above is the display when selecting the "INSTRUCTION" menu, on that page, there are three main navigation buttons, namely: (1) FAQ button, instructions submenu to minimize the display of the instructions submenu (2) Scroll button there are three scroll functions as shown in the picture, which serves to raise and lower the display. (3) Home button is located on the top right to return to the main menu.

Picture 7 The instructions menu includes navigation information in the application



Picture 8 displays the material menu with respective submenus

The display in the image above is the display when selecting the "MATERIAL" menu, there is test information and physical fitness measurements at the start of the "MATERIAL" menu display. In the material menu, 8 material submenus are consisting of components, physical fitness, among others, endurance, strength, speed, flexibility, agility, balance, power, and coordination. The eight submenus that are located at the bottom are also navigation buttons in the contents of their respective submenus. To select it only uses one touch.

The strength submenu is presented in the form of a FAQ, which is a collection of materials consisting of 1) hand-squeezing strength, 2) back muscle extensor strength, 3) leg muscle extensor strength, 4) shoulder muscle pulling strength, 5) shoulder muscle pushing force, 7) abdominal muscle strength, 8) arm muscle strength. If the FAQ is selected will bring up the material in it. To operate it by one touch to display and or tap to hide again. Use the scroll and HOME button as in the previous section.

Picture 9 displays the strength submenu

Product Validation and Effectiveness

This section explains the feasibility of products by experts and the results of operational trials to see product effectiveness. The feasibility of the product is carried out using expert testing to provide assessment and input so that it meets the theoretical and empirical feasible criteria. Based on the data and responses that have been collected from learning technology experts, test and measurement experts, and physical education learning experts, there are several parts of the product that need to be revised. This is done to further optimize the benefits of development for students.

Evaluation of the development results of learning resources, tests and measurements of physical fitness based on mobile learning by learning technology experts are as follows:

1. The font size on the manual menu, profile and all material menus are still too small so it needs to be changed.
2. Frames for text and images on the intro menu and all menus in the material can

still be expanded.

3. The font used should be an easy-to-read font like "Arial"
4. Images are replaced with high resolution so they are not blurry.
5. The exit button does not work.

Evaluation of the results of developing test learning resources and physical fitness measurements by test and measurement experts is as follows: 1) The clarity of the moves on all menus is too low, making legibility difficult; 2) The instructions for use should be accompanied by a brief description and a description of the user's subject; 3) There should be more than one type of quiz provided. Evaluation of the results of developing test learning resources and measurements of physical fitness based on mobile learning by physical education learning experts is no revision.

The results of the small group trial. Learning sources, tests and measurements of physical fitness based on mobile learning obtained a score of 3.26, which means that the average is good with a percentage of 81.09 with the valid category so that it can be continued to large group trials. The results of the large group trial. Learning source tests and physical fitness measurements based on mobile learning obtained a score of 3.57, which means that the average is very good with a percentage of 87.96 with a valid category so that the product can be used. The following shows the results of the product feasibility data analysis from the experts:

1. Validation of Learning Technology Experts

Based on the results of the evaluation of learning technology experts, it is known that the maximum total score (LX) is 608 and the total score obtained (LXI) is 555. Thus, the percentage is 89.34%. Based on the results of the analysis that has been carried out on the responses/assessments of instructional technology experts, the result is 89.34%, of the specified criteria and it can be said that the learning resource for tests and measurements of physical fitness based on mobile learning meet the VALID criteria (80% - 100%).) so that it can be used and practised in the implementation of tests and measurements of physical fitness.

2. Expert validation of tests and measurements of physical fitness

Based on the results of the expert evaluation analysis of sports tests and measurements, it is known that the maximum total score (LX) is 288 and the total score obtained (LXI) is 255. Thus, the percentage is 89.44%. Based on the results of the analysis that has been carried out on the responses/assessments of sports test and measurement experts, the result is 89.44%, of the specified criteria and it can be said that the mobile learning-based test and physical fitness measurement learning resources meet the VALID criteria (80% - 100%) so that it can be used and practised in the implementation of tests and measurements of physical fitness.

3. Expert Validation of Physical Education Learning

Based on the results of the evaluation of the learning expert's analysis, it is known that the maximum total score (LX) is 48 and the total score obtained (LXI) is 44. Thus, the percentage is 91.67%. Based on the results of the analysis that has been carried out on the assessment responses from learning experts, the result is 91.67%, of the specified criteria and it can be said that the learning resource for tests and measurements of physical fitness based on mobile learning meet the VALID criteria (80% - 100%) so that can be used and practised in the implementation of tests and measurements of physical fitness.

4. Data to increase understanding of tests and measurements of physical fitness

To find out the effectiveness of the product in the form of learning resources for tests and measurements of physical fitness based on mobile learning which is tested to students whether they have succeeded or not, then there is data that must be collected, namely data about students' cognitive abilities in mastering physical fitness test and measurement material. This data collection was carried out after the large group test field trials 2. The data collected on the efficiency of this product was carried out by comparing the average cognitive scores of students who used conventional book learning resources with students using test learning resources and physical fitness measurements based on mobile learning. The following will present the data in brief:

1) Cognitive Value Data

Cognitive value data from subjects in large group trials can be seen in the following table:

Textbook Subject	Score	Score	Mobile Learning Subject
1	65	70	1
2	100	70	2
3	75	95	3
4	100	90	4
5	90	55	5
6	90	95	6
7	85	70	7
8	80	75	8
9	80	80	9
10	65	100	10
11	75	90	11
12	55	70	12
13	75	90	13
14	65	75	14
15	60	50	15
Score Average	77.33	78.33	Score Average

Based on the cognitive value data table above, the average value of respondents using textbooks is 77.33, while respondents who use mobile

learning are 78.33, thus it can be concluded that respondents using mobile learning tests and physical fitness measurements have a better value than those using textbooks.

Discussion

This study develops and tests the application of learning resources based on mobile learning in the physical education department at the university. One of the subjects that has an important role in the department is sports tests and measurements. In this expensive course, students are required to have a good understanding of each material as well as have the skills to carry out tests and exercise measurements. with limited meeting time based on the results of the study environment analysis and needs analysis, it was found that students had difficulty understanding the material within the limited time and available learning resources, so they stated that they needed more flexible learning resources to be accessed anytime and anywhere.

Mobile learning test applications and sports measurements are made through the stages of planning, development, and testing to implementation in the hope of being able to overcome student learning problems and improve their learning outcomes.

At the product creation stage, researchers collaborate with learning technology experts and also apk builder. Products that have been used as mobile learning applications have been validated by experts consisting of test and measurement material experts, learning technology experts, and learning experts. the three experts stated that this product was suitable for use, however, in this study the experts were only involved in content validation. Experts have not been involved in the learning process to observe product acceptance by students.

However, at the trial stage and product application, satisfactory results were obtained with positive student responses to this mobile learning application and the average student learning outcomes using this application had better grades compared to other classes.

however, the implementation of the use of this application still cannot be controlled more optimally, because the developed mobile learning application is not able to record the activities carried out by students as long as they use the application. other than that, the app only serves as a learning resource with simple two-way communication. The developed mobile learning application has not been able to provide feedback on learning outcomes to students and also does not have a real-time test result in the analysis program needed to facilitate the process of analyzing test results and measuring sports.

CONCLUSION

Based on the data obtained, from the results of field trials and discussion of research results it can be concluded that: (1) With the existence of learning resources for testing and measurement based on mobile learning,

students can study and carry out physical fitness tests and measurements effectively and efficiently. (2) With this mobile learning-based test and measurement learning resource, students can master the theoretical and practical material of tests and physical fitness measurements quickly and correctly.

The product development process starting from planning, material collection, and preparation to limited testing has been carried out according to existing procedures, however, during the product design preparation process, researchers need the role of experts so that the products developed are more accurate and effective. Although in the description of the development step it is not mentioned that it must involve experts, in reality, the product planning requires experts, in this case, consultative needs. Whereas at the product development stage (collecting and echoing materials), researchers communicate intensively with fellow application developers because researchers use third-party services to develop application systems that contain content developed by researchers. During the development process, some materials are not compatible with the application used, for example, the video format

Although the product has been developed, there are several limitations that this research and development has, including; (1) The application product of mobile learning-based physical fitness tests and measurements is still limited to Android-based smartphones with a minimum operating system version of 3.5 (gingerbread). (2) This mobile learning-based learning resource application product test and physical fitness measurement still cannot analyze test and measurement data. (3) Field trials of this research were only carried out in one place with a limited sample. (4) The developed learning resources are limited to learning resources for test material and physical fitness measurements from a large number of materials in sports test and measurement subjects.

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