

# Development of Mobile Learning of Hospital Statistics Based on Android to Understanding of Health Information Systems Courses in Health Polytechnic of Health Ministry of Health of Malang

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**Abstract:** *One medical record competency and health information is health statistics to produce quality information and estimates (forecasting) as a basis for planning and decision making in the field of health services. Based on a survey of 10 students, namely a lack of understanding of hospital statistics material. The aim of the study was to design the application of learning modules to facilitate students' learning comprehension in the Health Information Systems course in the Medical Record DIII Study Program and Health Information. The design of the study uses the Research and Development method and the evaluation of research with the Quasi experimental Non Equivalent Pretest Posttest Design. The population of 210 students, a sample of 30 people. The application is created using Android Studio software and application interface design using the Edraw application. The results after the use of the hospital statistics learning module application, students experienced an increase in the average achievement score, namely from 30.17 to 72.17. The results of statistical tests with independent t-test show the value of Sig. (2-tailed) = 0,000 which means a significant value is smaller than 0.05, H1 is accepted. It can be concluded that the application of the hospital statistics module can help students understand and improve learning understanding of hospital statistical material. For other researchers who want to do similar research, it is expected to be able to develop the application of this learning module by adding items that do not exist in the application that has been made.*

**Keywords:** Learning, Learning Module, Hospital Statistics, Android

## 1. Introduction

The rapid development of Science and Technology (IPTEK) now encourages all aspects of life to also participate in change, including in the fields of health and education. According to Mukhtar and Iskandar (2010), the world of education is currently demanded to be more adaptive to technological developments. Various learning approaches through computer based media or Computer Based Instruction (CBI) such as drill and practice, simulations, tutorials, and games<sup>[1]</sup>. According to Fauzi (2013) one of the development of learning media from information and communication technology is multimedia<sup>[2]</sup>. The use of computer technology to support learning activities is expected to help solve learning problems. According to Turban et al. In Suyanto (2004) multimedia is a combination of at least two input and output media from data<sup>[3]</sup>. This media can be audio, animation, video, text, graphics and images. According to the Minister of Health Regulation of the Republic of Indonesia Number 55 of 2013 concerning the Implementation of Medical Recorder Works, medical recorders have the authority mentioned in Article 13, namely collecting, validating and verifying data according to hospital statistics<sup>[4]</sup>. Based on Minister of Health Decree No. 377 of 2007, one of the medical record competencies and health information is Medical records capable of using health statistics to produce quality information and estimates (forecasting) as a basis for planning and decision making in the field of health services. Based on the law stated that a medical recorder must be able to perform and be competent in terms of hospital statistics<sup>[5]</sup>. To support this, there is a need for learning media to improve the understanding of prospective medical recorders and health information.

In the DIII Medical Recorder study program and Health Information at the Ministry of Health Malang Polytechnic there are Health Information Systems (SIK) courses. Students feel difficulties and often complain in the Health Information System course material, especially in hospital statistics material because they lack understanding of some materials such as inpatient daily census to the calculation of inpatient daily census indicators. Based on a survey of 10 third-level students who have taken the Health Information System course, which is hospital statistics, using questions and interviews, it was found that 3 students stated their understanding and 7 students stated that they did not understand the material regarding hospital statistics because students were still difficulty in understanding the concept. Therefore it is necessary to develop an interactive learning method with learning modules that are interesting and can be used by students to improve their understanding of hospital statistical material in the Health Information Systems course. One such method is an Android-based learning module that can be easily understood and practical because it is accessed via a Smartphone.

The learning module is proven to be successful in its use to improve student learning outcomes. Based on the research conducted by RestiYektyastuti and JaslinIkhsan (2016) on the Development of Android-Based Learning Media in Solubility Materials to Improve Academic Performance of High School Students, it shows that the results of validation and product trials show that media is suitable for use in chemistry learning in high school solubility material<sup>[6]</sup> The results of field trials conducted on 1 experimental class showed that learning media had an influence on improving the academic performance of high school students in the

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form of learning motivation and cognitive learning outcomes.

From the survey, a learning media in the form of an Android-based module is needed that is easy to understand and practical by students so that students' understanding of hospital statistics material will increase. One way that can be done is to take advantage of technological developments namely Android-based smartphones because it is a mobile device and is commonly used. Android system besides being an operating system that can accommodate various types of applications, in its development can also be used as a learning media. In this case the researcher is interested in developing a learning media in the form of an android-based module at the Malang Ministry of Health Polytechnic, especially in the Medical Record DIII Study Program and Health Information that can be used and accessed by students to support the learning process and improve learning understanding.

## 2. Experimental Work

The design of this study is research and development (Research and Development). Borg and Gall (in Sugiyono, 2011: 9) states that research and development (research and development / R & D), is a research method used to develop or validate products used in education and learning<sup>[7]</sup>. While according to Sugiyono (2011: 407) said that the method of research and development or in English Research and Development is a research method used to produce certain products, and test the effectiveness of these products<sup>[7]</sup>. The development procedure of the study was a procedural model modified from the Borg & Gall development model and carried out only until the seventh stage.

This study used the Quasi Experiment research method. In this study using a Non Equivalent Pre test Post test with a quantitative approach. The design of this study was carried out by means of pre-test and post-test activities in the experimental group with the control group to compare the results of the assessment of the two groups. This research was conducted at the Malang Ministry of Health Polytechnic with the objectives of level 1 and level 2 students of DIIIMedical Record Study Program and Health Information. The variables studied were Smartistic applications (Hospital Statistics Learning Application). The population in this study were DIII Medical Record and Level 2 Health Information Study Program students with 210 students. The sampling technique used in the research is Purposive sampling technique. Researchers use this technique because of a consideration in taking a representative sample of a population that is class 1A and class 2A. As stated by Baley in Mahmud (2011) which states that for studies that use statistical data analysis, the minimum sample size is 30<sup>[8]</sup>.

Processing the above variables using several research instruments, including Computers, Google Form Questionnaires, Stationery, and Smartphones. Data collection in this study uses questionnaires that are on the google form. This questionnaire is in the form of a multiple choice question which serves to determine the average student's understanding of hospital statistical material in the SIK course.

Data analysis for the process of preparing the learning module of hospital statistics on Android-based SIK 2 courses in this study is from the process of collecting data, compiling the material using an android-based application, and consulting. In this study the data analysis test was carried out by the Independent T-Test. Independent T-Test is a comparative test or a different test to find out whether there are significant mean or mean differences between the two free groups with scale / interval data. Two free groups mean the data source comes from a different subject (Hidayat, 2016)<sup>[9]</sup>. Independent T-Test was carried out in this study because it tested different two samples to find out the differences in the average results of the material understanding of hospital statistics when the Pre test and Post test in the use of android-based hospital statistics learning module in the experimental group and control group . The entire calculation process is carried out with the SPSS version 23 computer program.

## 3. Result and Discussion

Identification of the needs of the learning module application system about android-based hospital statistics. The results of a preliminary study to level 3 students of the Medical Recorder D-III Study Program and the Health Polytechnic Health Information in Malang found that 10 students from 30% of students stated that they understood and 70% of students said they did not understand and still lacked mastery of hospital statistics.

Based on this phenomenon, it is necessary to develop an interactive learning method with learning modules that are interesting and can be used by students to improve their understanding of hospital statistical material in the Health Information Systems course. One such method is an Android-based learning module that can be easily understood and practical because it is accessed via a Smartphone. To support the running of the application, researchers use research and development methods or in their English Research and Development in analyzing system requirements. The stages of research and development are:

- 1) *Research and information collecting*, The stage includes: preliminary studies, field observations, interviews involving 10 students of Level 3 PMIK D-III Study Program and preparation to formulate a research framework and collect hospital statistical material.
- 2) *Planning*. This stage is the stage of preparing a research plan which includes, formulating objectives, application design, and module preparation and needs analysis. Needs analysis includes several stages of needs, including:

### a) *Analysis of data requirements*

Data needed for making applications in the form of material and questions about hospital statistics. The material is obtained from several reference sources and lecture handouts. While reference questions are obtained from the questions made directly by the researcher with reference to the RPS of SIK courses and the questions that have been tested and some questions that have been tested in the hospital statistics race. The researcher

consulted the material and questions that had been prepared to the lecturer.

**b) Analysis of user requirements**

Analysis of user needs is based on the results of the preliminary survey, so that the need for learning media such as learning modules. One such method is an Android-based learning module that can be easily understood and practical because it is accessed via a Smartphone.

**c) Analysis of system requirements**

The learning module application for hospital statistics is made using hardware and software. Here are the needs of hardware and software systems:

**Table 1: Hardware Requirement Instrument**

Hardware Name	Hardware Specifications
<b>Laptop</b>	Laptop with specifications: a) Intel core i5 processor b) 6 GB RAM c) Intel VGA HD graphics 5500 d) d. Windows 10 pro 64 bit

**Table 2 Software Requirement Instrument**

Software Name	Software Functions
Android Studio	To form coding and layout
Edraw	To make the initial interface design and icon

- 1) *Develop preliminary form of product*, which is developing the initial form of the product to be produced, included in this step is product testing by experts and practitioners.
- 2) *Main product revision*, which is to make improvements to the initial product produced based on the results of the initial trial. This improvement was carried out in accordance with the results shown in the limited trials, so that the main products (models) were obtained which were ready to be tested more widely.
- 3) *Main field testing*, which is a field test involving one batch of *DIII Medical Record Study Program and Health Information level 1 and level 2*, with a sample of 30 level 1 students and 30 level 2 students. Field trials using the *Quasi experiment method with research design Non Equivalent Pretest Posttest Design*
- 4) *Operational product revision*, which is to make improvements / improvements to the results of field trials.

Make a learning module application about android-based hospital statistics.

**a) Design Interface**

Design interface is directly related to the user (user). Therefore, a good interface design will make it easier for users to operate the system to be developed. In the design of the interface design also includes making icons, logos, and application designs that are made in Photoshop. Application design learning modules include:

**• Application Icon**

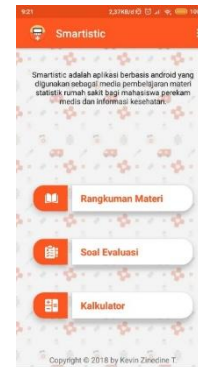
Application Icon is a graphic that shows the Smartistic application (learning module of hospital statistics) to users on a smartphone.



**Figure 1 Smartistic Icon Application**

**• Home**

The Home Menu is the main Menu of the Smartistic application (hospital statistics learning module) based on Android. The Home menu displays several main menus such as menus about applications, material menus. Evaluation question menu, calculator menu



**Figure 2 Home Smartistic**

**• About Application**

The menu about the application contains a brief explanation of the Smartistic application (hospital statistics learning module).



**Figure 3: About Application Smartistic**

**• Subject**

Menu that contains subject related to hospital statistics. The Material menu consists of several sub-menus such as introductory material for hospital statistics, inpatient census, hospital service indicators, jhonson barber charts.



Figure 4: Subject Smartistic

**b) Evaluation Questions**

Menu containing questions for evaluating material about hospital statistics. The quiz menu is divided into 5 quiz sub menus which consist of 4 material evaluation quiz sub menus and 1 evaluation sub-menu quiz for the entire material.



Figure 5: Evaluation Questions Smartistic

**c) Calculator**

Menu calculator for calculating hospital indicators such as BOR, ALOS, TOI, BTO, NDR, and GDR. By inputting data in the form of available beds, Period, Number of days of treatment, Number of lengths of treatment, Patients out alive, Patients out dead <48 hours, Patients out dead > 48 hours.

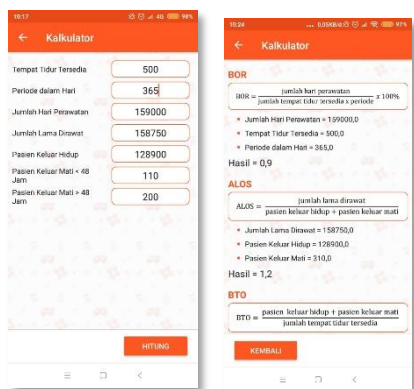


Figure 6: Calculator Smartistic

**1) Coding**

The design that has been designed is then translated into code to implement the program logic. Encoding this application is done using the Android Studio application.

**2) Data Flow Diagram**

Data Flow Diagrams are diagrams that use notations to describe the flow of system data, which is very helpful for understanding systems logically, structured and clear. DFD is a tool in describing or explaining systems that are running logically. Next is the Data Flow Smartistic Application Diagram:

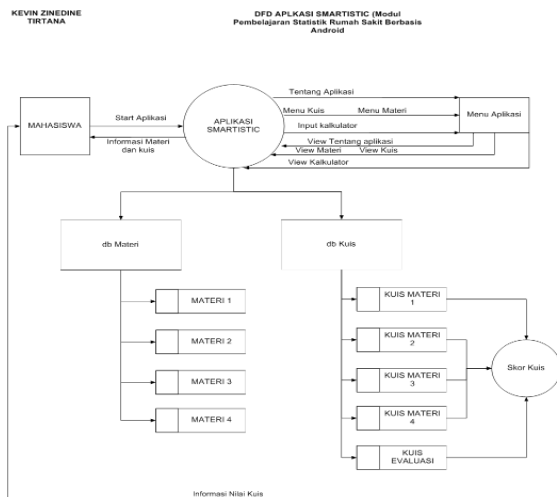


Figure 7 DFD Smartistic

**3) Test the learning module application system about android-based hospital statistics**

The next step is to test the application of Android-based Hospital Statistics learning modules using blackbox testing. In the application testing process an application assessment is made in the form of a test case to assess all functions in the learning module application that has been made whether it is running according to. Function evaluation is carried out provided that the check mark [√] in the "1" rating column if it is as expected and gives a check mark [√] in the "0" rating column if it is not as expected. Blackbox test results obtained based on expert validation of 59, with detailed testing per component as follows:

- Home menu as many as 9 test cases regarding the Home menu
- About the Application Menu 4 test cases regarding the About Application menu
- Material Menu as many as 24 test cases regarding the Material menu
- Question Evaluation Menu as many as 14 test cases regarding the Evaluation Problem menu
- Calculator menu as many as 8 test cases regarding the Calculator menu

Based on the details that have been explained, the following calculations are obtained:

$$\text{Application Validation} = \frac{\sum \text{points}}{\sum \text{test case}} \times 100\%$$

$$\text{Application Validation} = \frac{59}{59} \times 100\% = 100\%$$

The results of the APK feasibility calculation show that the application is in accordance with the expected and feasible to be implemented.

#### 4) Knowing the results of the level of understanding of students before the implementation of the learning module application on android-based hospital

According to Utari (2011), understanding is the ability to understand instructions or problems, interpret and restate in their own words.

To find out the difference in the meaningful value of learning comprehension in the hospital statistical material, it is necessary to do a pre-test and post-test. Pre test was conducted for students' knowledge before the application of an Android-based learning module application, and was held on January 5, 2019. The implementation of the Pre test was conducted by providing multiple choice questions about the material introducing hospital statistics, inpatient census, hospital service indicators, barber jhonson charts. The number of questions provided was 20 items and worked for 60 minutes. Students work on Hospital Statistics on the google form link that has been provided using a Smartphone or laptop connected to the internet network. After students work on the problem then submitted to the google form. Pre Test questions that have been submitted by students will be sent automatically to the google drive account as long as the question is made and automatically the question is processed on the google drive until a value appears. The score for each question with the correct answer is 5 and the question with the wrong answer is 0.

#### 5) Implement the learning module application on android-based hospital statistics

At the implementation stage, researchers introduce applications to students. This application is called Smartistic and can be used as a media for learning and training in hospital statistics. Researchers also mentioned the minimum specifications of smartphones that must be there, namely the Android Jellybean OS, 512MB RAM, 50MB free hard disk space, 1 GHz processor and a link to download the Smartistic application. Furthermore, students can use the application as a learning medium. To determine the duration of application usage by students, at the final stage of the specified study time, the researcher will give several questions in the form of a questionnaire

#### 6) Knowing the results of the level of understanding of students after the implementation of the learning module application on android-based hospital statistics

Post test was conducted to find out the understanding of students after learning using the Android-based learning module application. Post test is carried out on January 20, 2019. The post test implementation mechanism is the same as the pre test by giving multiple choice questions about the material introducing hospital statistics, inpatient census, hospital service indicators, jhonson barber charts. The number of questions provided was 20 items and worked for 60 minutes. Students work on Hospital Statistics on the google form link that has been provided using a Smartphone or laptop connected to the internet network. After students work on the problem then submitted to the google form. Pre Test questions that have been submitted by students will be sent automatically to the google drive account as long as the question is made and automatically the question is processed on the google drive until a value

appears. The score for each question with the correct answer is 5 and the question with the wrong answer is 0.

#### 7) Comparing differences in the results of students' level of understanding before and after implementation

**Table 1:** Results of Independent T-test at Pretest and Post test

Implementation	Total Respondents	Mean	Independent T-Test
Pre Test	30	30,17	0,000
Post Test	30	72,17	

From the results of the Independent T-Test above, it shows a significant value = 0,000. This value is smaller than 0.05 so H1 is accepted which indicates there are significant differences in the value of the application of the Module Application to learning understanding before and after the use of an Android-based learning module.

## 4. Conclusions

From the various explanations described in this report, a number of things can be concluded as follows:

- To support the running of the application, researchers use research and development methods or in their English Research and Development in analyzing system requirements
- Making application learning modules for hospital statistics is designed using interface design and coding. The initial interface design was designed using Edraw, while the application logic encoding used Android Studio.
- Testing applications using the blackbox test. Of the 59 test cases made, all functions can run as expected so the percentage reaches 100%. Based on the test results the application is feasible to use
- The results of the level of student understanding before the implementation of the learning module application on android-based hospital statistics showed the highest value achieved was 50; The lowest value achieved is 10; The average score is 30.17
- The minimum smartphone specifications that must be fulfilled are OS Android Jellybean, 512 MB RAM, 50 MB free hard disk space, 1 GHz processor and a link to download the Smartistic application.
- The results of the level of student understanding before the implementation of the learning module application on android-based hospital statistics showed that the highest value achieved was 85; The lowest value achieved is 60; and the average achievement value is 72.17
- The test results using the SPSS application obtain the Sig. (2-tailed) = 0,000 which means a significant value is smaller than 0.05, H1 is accepted. This shows a significant difference in the value of the application of the Module Application to the understanding of learning material in hospital statistics before and after the use of an Android-based learning module.

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