DEVELOPMENT OF MULTIMEDIA'S LEARNING APPLICATION ON HORTICULTURE AND CROPS SUBJECT AT SMK PPN LEMANG ANDROID-BASED

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ABSTRACT

SMK PPN Lembang *is one of the schools which have subjects of horticulture and crops as a lesson to be learned by students.Currently, the lesson still using conventional methods. It had an impact when teacher gives assignments or exams, total of 57 students (44%) from 130 students have a grades under standard. Students also experience difficulty when holding the practice because students didn't get any pre training in the classroom.*

Based on problems that have been described, one of the ways to helping students to understand the subjects is to develop a media as learning support tools. Learning media was formed into an android-based applications and apply the CAI (Computer Assisted Instruction). The method was adapted from luther sutopo consisting of concept, design, collecting material, assembly, testing and distribution.

The results of the research is Development of Multimedia Learning Application On Horticulture and Crops Subject at SMK PPN Lembang *Android-Based. Based on the results of testing by pretest and postest, students progress increase from the average value of 75.5 to 80. Total of 79% from 52 students said that after using the applications, they start to understand the subject much better. Based on the results of the research and testing, it can be inferred that the application can help students of Class XI* SMK PPN Lembang *in learning the subject.*

Keywords : *Android, CAI, Horticulture And Food Plants, Learning Media, Multimedia.*

1. Introduction

1.1 Background

Horticulture is the science that studies the cultivated crops. Cultivation is an activity planned maintenance of biological resources is done on a farm for taken his crop. One of the crops that are cultivated food plants. Food crop is a plant which can be consumed as energy intake for the human body. SMK PPN Lembang *has 4 class majoring in farms that have subjects of horticulture and plants as compulsory subjects are studied by students. Teaching and learning of each chapter is done 2 weeks in the classroom for theory and 2 weeks of practice field. The material used by the pupils come from a module made by the teacher education curriculum based on unit level* (KTSP) *years 2016 consisting of 11 syllabus.*

Based on the results of observation in SMK PPN Lembang*, the study conducted by the teacher are still conventional in nature, namely by giving the material by using the method of lectures and practice. Oral interviews have been conducted with teachers of horticultural subjects named Sari Dewi Kania, SP. According to the teacher's question, obstacles experienced from students when learning i.e. they are less understanding content material due to a lack of information in the module. Students also experience difficulty when holding the practice field because students don't get the pre training in the classroom. Data collection with the dissemination of the questionnaire has been carried out to 60 students of Class XI as a measure of how familiar their subjects in horticulture and food crops. Based on the results of a questionnaire that can be seen in Appendix E, as many as 32 students with a percentage of 53% claimed to have difficulty in learning lessons. As many as 46 77% percentage of students admitted to the modules provided less complete so it is difficult to understand. Students often feel saturated at the moment given the material or assignments from the teacher. It had an impact when teacher gives assignments or exam subjects in horticulture and food crops. The value of the data can be seen in Appendix D, 44% of students have a value under the school standards KKM graduation value of 76 or more.*

Based on problems that have been described, one of the ways in helping students to understand the subjects is to build a learning medium as a means of learning conventional pedukung. Based on the results of the kuisoner which can be seen in Appendix E, students who have android-based phones as much as 85%, as many as 10% and IOS are not android or IOS as much as 5%. Android-based applications was chosen because most of the students have mobile android and learning media is not only used in the

classroom but rather will be brought by students when a field practice is taking place. Learning methods that are used in this application is a tutorial, simulation and evaluation. Learning methods were selected because of the learning media is able to display the tutorial learning, simulation exercises and practices reserved continue evaluation. Based on the description, the researchers will conduct a study with the title the development of multimedia applications on android-based learning subjects in horticulture and food crops in SMK PPN Lembang.

1.2 Problem Identification

Based on the background of the problems that have been described previously, then it can be identified as follows:

1. *44% or 57 students have a value under the criteria of minimal ketuntasan (KKM).*
2. *Learning methods are still lectures.*
3. *Students do not get the pre training in class so having trouble doing the practice field.*

1.3 Goal and purpose

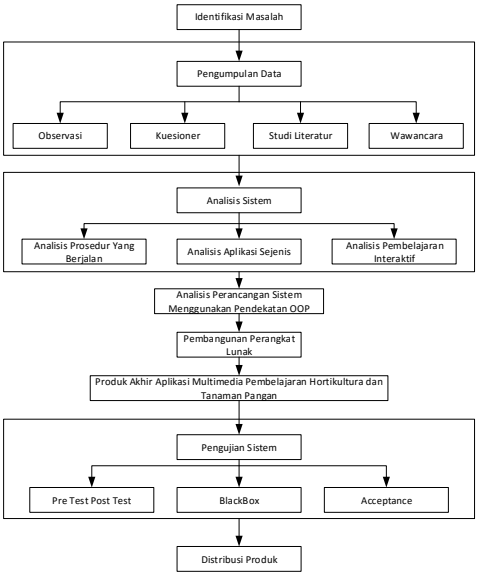
The intent of the research done that is to build the Android-based learning multimedia applications on the subjects of horticulture and food crops in SMK PPN Lembang.

The purpose of this study is as follows:

1. Assist students in increasing the value of Horticultural subjects and food crops.
2. Facilitate students by way of providing an interesting learning media.
3. Help students by providing pre simulation before doing the practice field.

1.4 Research Methodology

Research methodology used in this study has several stages including problem identification, data collection, software development and system testing. The following is a description of research methods used:



Picture 1. Research Methodology

1.5 Horticulture

The word derives from the latin horticulture, namely the hortus gardens and colere, meaning to grow (especially microorganisms) on an artificial medium. Literally, it means the study of horticulture cultivation of garden plants. However, in general the experts defined as the study of horticulture budi power plant sayura, fruits, flowers, or ornamental plants. People who are experts on horticulture (horticulture experts) is known as a horticulturist.

1.6 Crops

Food is defined as everything that is sourced from a source of biodiversity and water, whether processed or not processed. Foodstuff destined for human consumption as food or beverage, including food additives, food, raw materials and other materials used in the process of preparation, processing and or the manufacture of food or drink. Food commodities must contain nutrients which consists of carbohydrates, proteins, lemat, vitamins, and minerals that are beneficial for growth and human health. Cultivation of plant groups that belong to this group include commodity food crops, horticultural crops, ornamental nontanaman and other plants producing raw material products that meet food restrictions.

1.7 Computer-Assisted Instruction

Computer-based learning or media CAI (Computer-Assisted Instruction) is media of learning that utilizes a computer to aid in learning, or it is used include the presentation of the information content of the subject matter, exercise, or both. Learning media CAI allows in presenting a tutorial for understanding, as well as practice or simulation to implementation.

CAI (Computer Assisted Instruction) is a system of delivery of the subject matter which the mikroposesor based lesson designed and programmed into the system. In this mode, the computer can display of learning, using a variety of media types (text, images, sounds, video), provides a learning atmosphere, activities and quizzes or by providing the interaction of students, evaluating students ' answers, providing feedback and determine the appropriate follow-up activities so that students can actively interact.

Computer-based learning or media CAI (Computer-Assisted Instruction) is media of learning that utilize the computer as a tool in learning. Computer-based learning media provide learning that is interactive with the use of images, audio, video, text and animation.

1.8 Multimedia

Multimedia is a means of (media) which contained a mix of (a combination of) the various forms of element information, such as text, graphics, animation, video, interactive and sound as support to

achieve its goal, namely to convey information. Multimedia word itself comes from the word multi (Latin) which means a lot and katamedia (Latin) which means something that is used to convey something. [7]

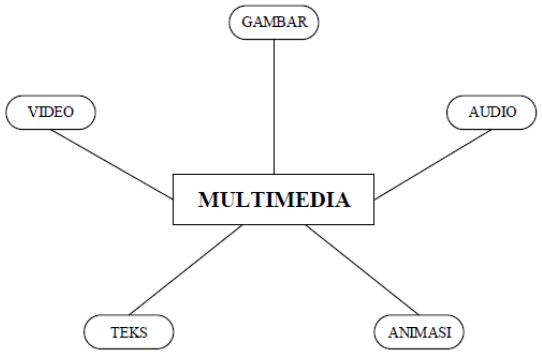
According to Vaughan (2004), is a multimedia mombinasiteks, art, sounds, pictures, animations and videos are delivered with a computer or manipulated digitally and can be delivered or in a control interactively. [8]

Taken from the word multimedia multi media. Multi means many and media means media or intermediaries. Multimedia is a combination of several elements, namely text, graphics, sound, video and animation are delivered with a computer or manipulated digitally and can be delivered or in a control interactively.

There are three types of multimedia, namely:

1. *Interactive Multimedia*
   Users can control what and when elements of multimedia will be delivered or displayed
2. *The Hyperactive Multimedia*
   Multimedia types in structure of the elements associated with a user that can be mengarahkanya. It can be said that this type of multimedia has a lot of links (link) connecting the multimedia elements that exist.
3. *linear Multimedia*
   Users just be spectators and enjoy multimedia products served from beginning to end.

The following are the elements that formed the multimedia that can be seen in Figure 2.



Picture 2. Multimedia

2. CONTENT of the STUDY

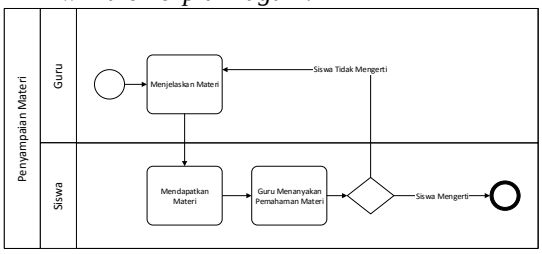
2.1 Analysis of the running Procedures

The procedure of learning and teaching subjects in horticulture and food crops that are running is divided into three parts, namely the procedure of delivery of the material, practical implementation of the procedure and the procedure of the exam.

1. Procedure for submission of Materials

Here are the steps of implementing the delivery of material progress, namely:

1. *The teacher explains material.*
2. *Students get material*
3. *If students understand then the teacher finished explaining.*
4. *If students do not understand the teacher will then explain again.*

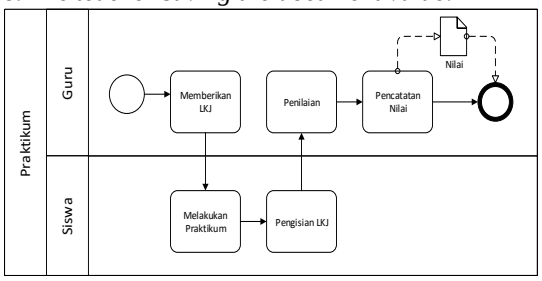


Gambar 3. Procedure For Submission Of Materials

2. *Practical Implementation Procedure*

Here is the practical implementation of the measures in progress are:

1. The teacher gives a worksheet to students.
2. The students carry out practical work.
3. charging students doing worksheets.
4. The teacher conducts the assessment.
5. The teacher conducts the logging value.
6. The teacher saving the document value.

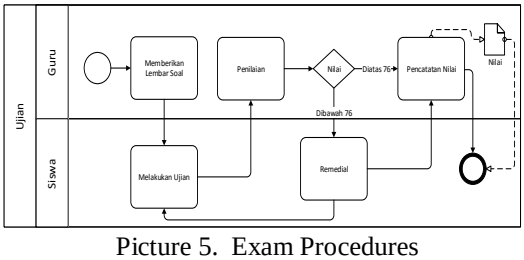


Picture 4. Practical Implementation Procedure

3. *Test Procedure*

Here is the practical implementation of the measures in progress are:

1. The teacher gives the sheet a matter to students.
2. The students carry out the test.
3. The teacher conducts the assessment.
4. If the value is above 76 then finished exams.
5. If the value of the under 76 then students doing remedial.

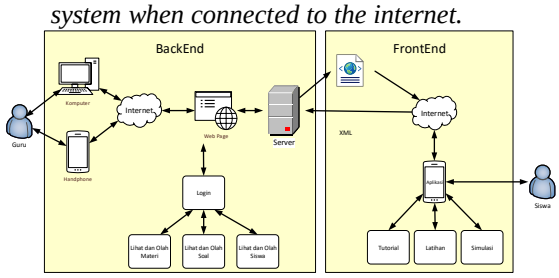


Picture 5. Exam Procedures

2.2 Analysis of interactive learning that is built

The system to be built is the application of food crop horticulture and learning-based mobile which can be operated by using the Android platform. The system will have two interfaces i.e. a FrontEnd and a BackEnd. Here is the workflow system in General:

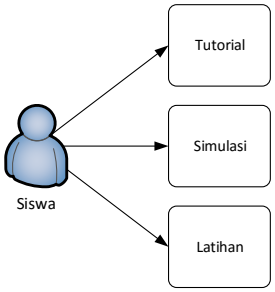
1. *Teacher (administrator) can perform a login, performed as well as sports material and reserved online using the help of a computer or the like.*
2. *Smartphone get material, exercises and questions that have been available from the system when connected to the internet.*



Picture 6. System Architecture

There are three features that are present in the media, namely learning tutorials, simulations and exercises. Tutorials (guidance) is used to help students learn the material so that students can learn independently, simulation is used as guide practices will be undertaken by students and exercises used to evaluate how students understand the material master.

The following is an overview of the features of the public can be used by students:



Picture 7. Main Feature Of The Application

1.3 Analysis of the Interactive Multimedia

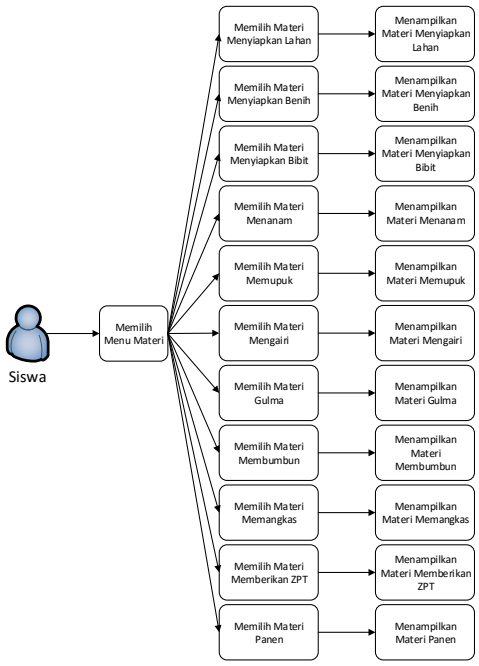
Application study horticulture and food crop uses model simulation and learning exercises.

Model learning tutorials present information in the form of guidance so that students can perform learning independently.

The model simulated learning present information in the form of grooves. The learning material is studied in accordance with the wishes of the user. Multimedia learning applications in horticulture and food crops there are six simulations that can be seen, namely plant simulation, simulation, simulation, the contend irrigate simulation simulation of crop, the granting of zpt and simulation harvest.

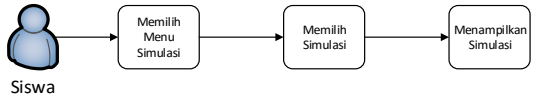
Model workout serves the subject matter to be used as practice questions with accompanied feedback by which the system can save the wrong answers and report value.

1. *Delivery of the material Flow is the student has entered into the application and then select menu material.*



Picture 8. The Mechanism Of Delivery Of Material

2. *Delivery Flow simulation is a student has entered the application then choose the menu of the material. The system will display a list of the simulation and the students choose the desired simulation.*



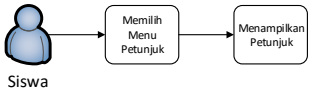
Picture 9. Mechanism Simulation

3. *Exercise Flow problem is students choose exercise, then displays the problems based on the multiple choice question with the orders and instructions on how to process.*



Picture 10. Practice Problem

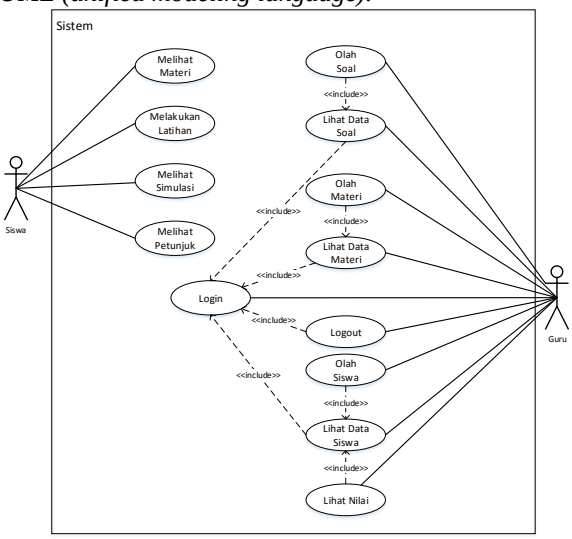
4. *Instructions Flow is students choose the menu instructions, then displays showing application usage instructions.*



Picture 11. Mechanism Of The Instructions

1.4 Functional Analysis

A functional needs analysis is the analysis of the needs of the application being built. On the construction of learning applications food crop horticulture and modelled using object-based modelling that can be described using diagrams of UML (unified modeling language).



Picture 12. Use Case Diagram

The following is an explanation of the usecase diagram application multimedia learning horticulture and food crops that have been described:

1. identification of Actors

Identification of the actors is a description of each actor multimedia application study horticulture and food crops as in table 1:

Table 1. Identification Of Actors

No	Aktor	Deskripsi
1	Siswa	Merupakan orang yang menggunakan atau mengoprasikan aplikasi multimedia pembelajaran hortikultura dan tanaman pangan.
2	Guru	Merupakan orang yang menginputkan materi dan latihan soal pada aplikasi multimedia pembelajaran hortikultura dan tanaman pangan.

2. Identification Of Usecase

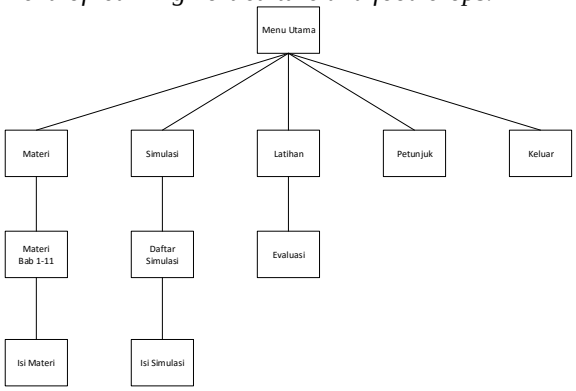
Identification of Usecase descriptions there is in each learning multimedia applications usecase horticulture and food crops as in table 2:

Tabel 2.Identifikasi Use Case

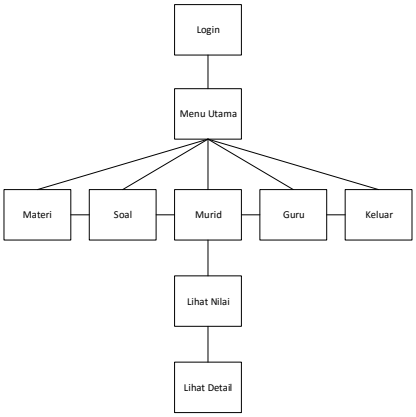
No	Use Case	Description
1	Melihat Materi	Display data that contains material about horticulture and food crops.
2	Melakukan Latihan	Describes reserved the exercise material in horticulture and food plants
3	Melihat Petunjuk	Display usage instructions application of learning
4	Melihat Simulasi	Displays a list of the simulation consists of a simulation of the plant, irrigate, fertilize, prune, zpt and harvest.
5	Login	The access rights of teachers in the opening page of the reserved and materials.
6	Lihat Data Materi	Display the data material
7	Lihat Data Soal	Data display problem
8	Lihat Data Siswa	Display the data students
9	Olah Soal	Change the data problem
10	Olah Materi	Change the data material
11	Olah Siswa	Student data change
12	Lihat Nilai	Displays The Value Of The Students
13	Logout	Change the data problem

2.5 Menu Structure

Menu structure is a common form design program aims to help users in completing a task. Here is the design of the structure of the applications menu of learning horticulture and food crops.



Picture 13. Struktur Menu FrotEnd



Picture 14. Struktur Menu BackEnd

2.6 Testing The System

In this study the testing done to the system i.e., functionally testing (alpha) and beta. The methods used in testing the alpha is a black box testing focuses on the functional requirements of the system to be built and at the beta stage is carried out an assessment of the user against the software.

2.6.1 *BlackBox* Testing

Black box testing testing that is done just observe the results of execution through test data and functional checks of the software. Black box testing to evaluate only from the outside appearance and functionality. The stages of the black box testing is done on the application of the media study horticulture and food crops there is a black box testing scenarios, case and test results as well as the black box black box testing conclusion.

Scenario testing exposed the sequence and it is tested in a test conducted on the application. Scenario testing is carried out against two aspects, namely the aspects of functionality and key aspects of the input data.

Based on the results of testing a black box has done with cases that have been tested, then it can be inferred that in the application of the media study horticulture and food crops it can run well and there are no errors in the process.

2.6.2 *Acceptance* Testing

Beta testing is testing that is conducted with the aim to find out the extent to which the quality of the learning media applications horticulture and food crops as well as find out if the system has been built in accordance with the original purpose of the building of the system.

Acceptance testing is carried out objectively where applications are tested directly to some users. Where the user will be given a questionnaire along with the application. The number of sample using the given scale kuisoner slovin. From the results of the questionnaire will be made calculations for later assessment conclusions to be drawn from the users towards media applications learning horticulture and food crops by using the likert scale.

Calculation of the sample retrieval :

Formula : $n = \frac{N}{1+Ne^2}$

Description:

n : *sample*

N : *population (80)*

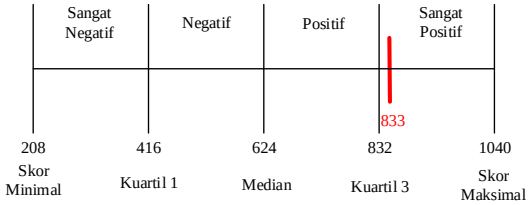
e : *limits of tolerance (8%)*

Then : $n = \frac{80}{1+80(8\%)^2}$

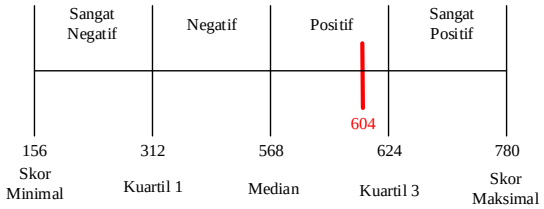
: $n = 52$

The number of samples of the kuisoner are given to the students as much as 52 kuisoner

The results of the calculation of the kuisoner are as follows



Picture 17. Calculation of the Likert Goal 1



Picture 18. Calculation of the Likert Goal 2

In addition to kuisoner, interviews were also conducted against the teacher in question directly with the subjects and the application that will be used. From the results of the interview will be used as a reference in conclusion and suggestions to the developers. The questions asked are as follows:

1. What is your opinion of these learning media applications?
2. How do you feel about the ease of use of these systems?
3. Whether the material contained in the application is in compliance with the learning material?
4. What are the disadvantages and advantages of learning media horticulture and food crops as a suggestion for future development?

Based on the percentage of answers each user against the questions asked on the beta test can be drawn the conclusion that Scout already learning application interface both appealing and easily understood and operated. with the founding of mobile based applications so it can be used whenever and wherever. Overall this application can help students and teachers in the teaching and learning activities as well as the students strongly agree with application development in the period ahead.

2.6.3 Pengujian *Pretest* dan *PostTest*

Comparison of pretest and posttest test was used to compare the values of student prior to using the application and value of the students after using the application.

Pretest and posttest testing scenario done by providing practice reserved for students are available in the multimedia application that was made. Practice problem done 2 times with a span of 1 week. Practice problem 1 (pre test) is performed when the application is given to students for the first time, while the practice problem 2 (post test) done after the students use the application during 1 week. Practice problem consists of 10 questions with answer choice 4.

Table 3. Hasil Pengujian *PreTest* dan *PostTest*

No	NISN	Name	Cumulative Value Of Deuteronomy	The value of Practice problem 1 (Pre Test)	The value of Practice problem 2 (Post Test)
1	2014005164	Aan Kurniasih	90	80	90
2	2014005166	Adinda Wati	70	70	70
3	2014005172	Ahmad Rizal	70	90	80
4	2014005175	Alan Husein	80	70	80
5	2014005178	Arighi Adzaeni A	81	70	70
6	2014005181	Arsyi	61	50	70
7	2014005184	Diki Solihin	81	80	80
8	2014005195	Farhan Fahrurozi	56	60	60
9	2014005198	Imam Taufik	78	80	80
10	2014005213	Indri Milania	56	50	70
11	2014005218	Irfan Rangga	74	70	80
12	2014005220	Naida Nurlatifah	75	80	80
13	2014005227	Nanda Pebriyani Yolanda	94	100	90
14	2014005234	Naufal Sidai	73	80	80
15	2014005247	Naufal Muhammad Sidqi	91	90	100
16	2014005265	Panji Juliandi	96	90	90
17	2014005267	Reza Muhammad	80	80	90
18	2014005271	Riki Subagja	75	70	80
19	2014005272	Shidiq Tauhid	91	80	90
20	2014005282	Syandi Septian	75	70	80
Rata-Rata			**77**	**75.5**	**80.5**

Based on the processing of data is carried out by teachers of subjects in horticulture and food plants after application of learning, then obtained a recapitulation of values can be seen in table 3.Based on the processing of data is carried out by teachers of subjects in horticulture and food plants after application of learning, then obtained a recapitulation of values can be seen in table 4.

Table 4. Rekapitulasi Nilai

Data	Maksimum	Minimum	Average
Nilai *Pre test*	100	50	75.5
Nilai *Post Test*	100	60	85.5

Based on the results of testing the pre test and post test that was done with cases that have been tested, then it can be inferred that the value portion of the students after using media study horticulture and food crops increased from before.

3. COVER

3.1. Conclusion

After doing the analysis, design, and testing, then a conclusion can be obtained as follows:

1. multimedia learning applications That can assist students in increasing the value of horticultural subjects and food crops.
2. multimedia application this learning can enhance the learning interest of students by providing interesting learning.
3. multimedia learning Applications is able to display simulated that will be praktikan by the students when the practice field.

3.2. Advice

Multimedia learning applications for the development of horticulture and food plants in the period ahead, there are some suggestions that may be made, inter alia:

1. The application is decorated so that the more interactive it again.
2. The application is packaged better yet so that the application can be run not only on the android operating system only.
3. the need for the addition of the learning media simulation on horticulture and food crops.
4. Placement of buttons on the application fixed.

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