



## The Use of Android-Based E-module in Teaching Pastry & Bakery Product for Vocational School Students Majoring in Culinary Arts

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### Abstract

The learning media used by teachers during online learning are not in accordance with the needs of students, so it is hard for them to understand the material and it makes learning outcomes are not optimal. Therefore, the students of class XII majoring in Culinary Arts at State Vocational High School 1 Jambu need a learning media that can be used independently and can improve the students' learning outcomes. This study aimed to develop an android-based e-module for pastry & bakery product learning, which was analyzed in terms of the feasibility, practicality, and effectiveness of the e-module.

The research method used was R&D with the ADDIE model. The data collection technique used was a feasibility test questionnaire by media and content experts, a practicality test questionnaire by users, and a pre-test and post-test by students. The data analysis was the mean, reproducibility coefficient (Rc) and the scalability coefficient (Sc), N-Gain difference test and t-test.

The results showed that the pastry & bakery e-module was feasible, practical, effective and significant in improving student learning outcomes, especially the results of croissant learning material.

The conclusion of this study is the use of e-module in teaching pastry & bakery product can improve students' learning outcomes especially for croissant results. The novelty of this study is the development of an e-module on pastry & bakery subjects based on an android application.

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## INTRODUCTION

The teaching and learning process can be successful if all the components or indicators can be appropriately implemented. Teacher plays a vital role in teaching and learning process. The teaching methods and teaching materials used must also be adjusted to the students' needs to be more optimal. Ideally, with the development of the 21st century, teachers must also use technology in learning. Based on the score of class XII Mid-term Test in the culinary arts department of State Vocational High School 1 Jambu, 40% students did not pass the KKM due to the decreased level of students' understanding in pastry & bakery products subject at school. This is due to several factors, including the COVID-19 pandemic.

The teaching and learning process is replaced with an online system. Students are required to be more independent in learning. So that the level of student understanding of the learning material decreases, as for other factors, that is teaching materials used by the teacher.

Ideally, the teacher creates teaching materials such as modules which have contents that suit the students' needs. The problem during the COVID-19 pandemic is that students must study independently at home by looking for learning resources from the internet. However, this impacts students who have difficulty distinguishing the suitability of the learning material. According to the Ministry of National Education (2008), the main implication of independent learning activities is the need for optimizing learning resources by providing more significant opportunities for students to control their learning activities.

Therefore, teaching materials are needed as the primary learning source. According to Jones & Healing (2010), using digital technology is a concrete solution to make the learning process continues even though the teacher and students are not in the exact location. 21st-century teachers should be more creative and innovative to use technology to support learning. However, at this time, there are still many teachers who use conventional media in the form of printed modules. This module is considered less

interactive and exciting, so it impacts the lack of student motivation in learning. Therefore, it is necessary to have more interactive module as a teaching material that can increase students' interest learning.

One of the teaching materials that can be used is using e-module. An electronic module (e-module) can be defined as a form/tool for presenting self-study materials that are systematically arranged to achieve specific learning objectives. Pastry learning is considered more difficult so it requires media to learn it setyaningsih (2020). It is usually presented in an electronic format equipped with video tutorials, animations, and audio presentations to enrich the learning experience, Fatmawati (2021).

E-module can be also used in electronic devices in the form of android smartphone, which is very familiar for students and almost all students own it. According to WuWen-Chunm & Pengyeng-Hong (2016), in their research, there is a positive correlation between learning using smartphones and the characteristics and habits of students that allow them to learn without being limited by time and space. Meanwhile, Alrasheedi (2015) revealed that mobile learning makes learning more engaging, increases productivity, and has internet access. It gives efficiency for the users in the learning process.

Smeets & Bus (2014) also revealed that electronic books with multimedia features could enrich the book reading experience if used properly. According to Rohman (2020), learning media can be used to convey information/messages from the sources to recipients of information whose messages are in print or audio-visual to create understanding and experience for the recipient.

This study develops an electronic module (E-module) packaged in an android-based application. It is expected to be a useful learning media to attract students' interest in learning Pastry & Bakery Product as well as to be a learning solution make it more interesting and interactive. This E-Module is supposed to be able to deliver learning material more systematic and it is equipped with features such as audio-visual, video, and practice questions that are useful as a self-evaluation tool. Lee (2012) stated that the

android system that supports development is expected to produce representative mobile learning-based media.

There are researches relevant to this study, they were conducted by Purnama (2020), Ruffi (2015), Pusparini (2016), Hendra (2019), and Jazuli (2017), concluded that e-modules could increase student motivation in learning and can facilitate the students' understanding process. The difference between this research and those previous studies is that this research develops teaching materials in the form of an Android-based e-module on Pastry & Bakery Products. Meanwhile, the previous researches have developed an e-module with another model.

**METHODS**

This study is a research and development (R&D) with a quantitative research approach, which aims to develop a new product or to

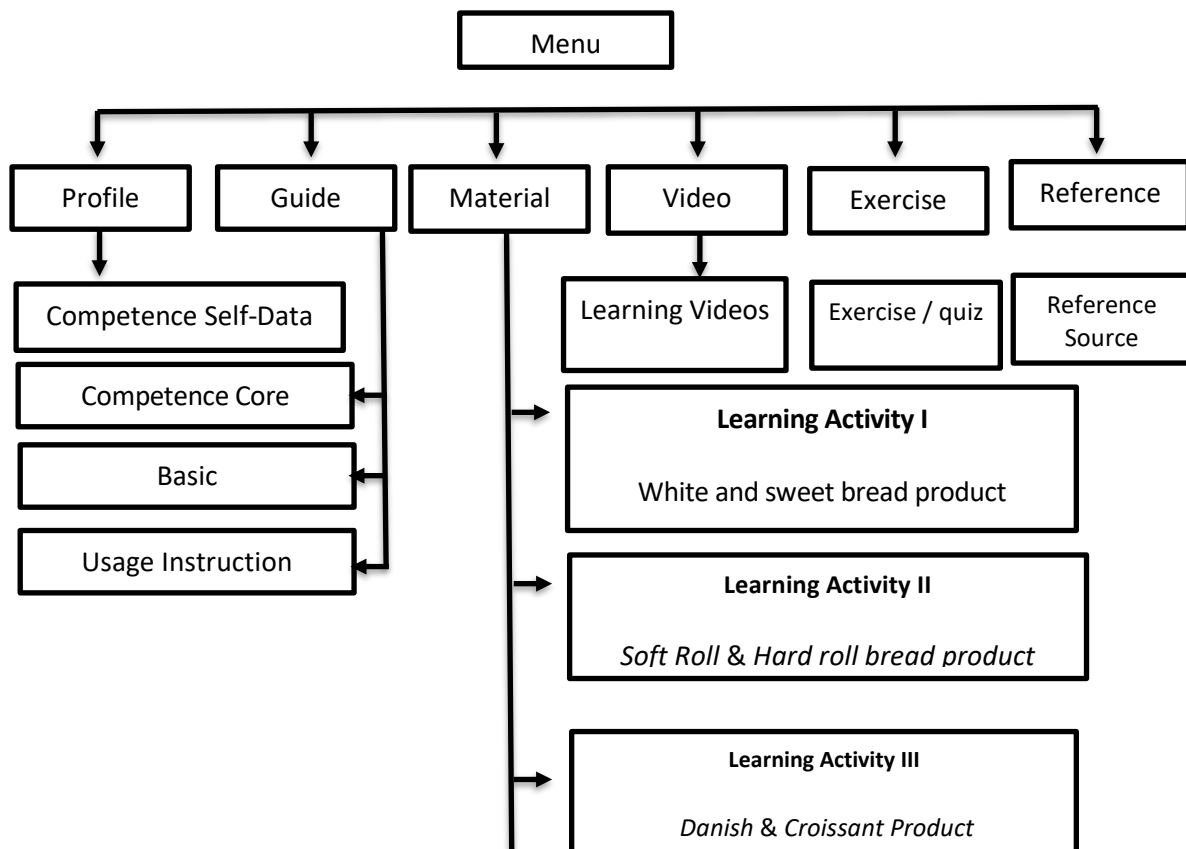
improve an existing one. The design used in this study was the ADDIE model with the Analysis, Design, Development, Implementation, and Evaluation stages. The subjects of this study were students of class XII majoring in culinary arts, State Vocational High School 1 Jambu.

1. Analysis

The analysis stage was carried out through several steps: Analyzing teaching materials, user characteristics, facilities, and infrastructure; and analyzing the curriculum used to determine the instructional competencies (IC) and Basic Competencies (BC) that would be included in the e-module.

2. Design

The media design stage consists of making the overall media design, such as materials, backgrounds, images, audio, and videos that were included in the development of e-module products. The following is the design of the e-module.



3. Development

The development of the e-module was carried out after compiling the design. The next

step was to prepare the material, to make the basic layout/design, to collect the material as e-module content, then to create an Android-based e-

module application program. After the product preparation process was complete, the next step was to determine the steps for conducting field trials. Prior to the implementation of the product trial, it was validated by media and content experts.

#### 4. Implementation

The next stage was the implementation by testing. The e-module product trial was conducted on class XII students, Department of Culinary Arts at State Vocational High School 1 Jambu. Each student was given a link to download the e-module. The steps taken were gave a pre-test to the two respondents, then gave a treatment to the experimental class in the form of an e-module of pastry & bakery products. In contrast, the control class was not given any treatment after giving a post-test with the same questions and comparing the results of the control and experiment classes.

#### 5. Evaluation

The final revision of the digital module was carried out in 2 stages, they were formative evaluation and summative evaluation. The formative evaluation is related to the feasibility and practicality test of the e-module. The summative evaluation is related to the experimental design and the e-module effectiveness test. The data obtained were then analyzed to determine the shortcomings of the research model to be made. The data from the evaluation were in the form of suggestions and questionnaires.

This research was conducted by treating the experimental group and providing a control group as a comparison. Both groups were given a special pre-test and post-test. The research was conducted using a questionnaire given to users (teachers and students). The data collection techniques used a feasibility, practicality, and effectiveness questionnaire of e-module. Media and content experts carry out the validation stage to determine the feasibility of the e-module. After knowing the feasibility results from the media and content experts, they were tested to determine the level of practicality of the e-module using a questionnaire given to teachers and students. In the e-module effectiveness test, the experimental class was treated with the pastry & bakery product

e-module while the control class was not. After that, the experimental and control classes filled out formative tests to determine how effective the e-module was.

## RESULTS AND DISCUSSION

This the R&D (Research & Development) study produced learning media in the form of an e-module of pastry & bakery products based on an android application. The e-module development model used stages that refer to the ADDIE concept (Analysis, Design, Development, Implementation, and Evaluation). The following are the results of the stages that refer to the ADDIE concept:

### 1. Analysis

The analysis stage of the e-module development process was as follows: (1) analysis of teaching materials, the teaching materials used are still using conventional media, and it is necessary to use learning media that are used as independent guidelines; the selected learning media is e-module. (2) analysis of user/student characteristics based on the results of observations made, factors causing students to lack understanding of pastry & bakery product material because: a) Learning media does not attract students' attention, b) There is no interactive e-module so that it can increase students' reading interest, c) Learning tools are still in the form of printed books and cannot be used anytime and anywhere. Therefore, with the e-module developed based on Android, it is hoped that it can help solve the declining student competence in pastry & bakery products. (3) Curriculum analysis is used to determine instructional competencies, including the analysis of CC (Core Competencies) and BC (Basic Competencies).

### 2. Design

The planning stage (Design) was carried out to design the e-module. This stage produces several product design components such as; the main menu display, instructions, concept maps, learning activities, and bibliography.

### 3. Development

The development stage is to see how feasible the android application-based e-module

has been designed. As a follow-up to the design that has been done. At the design stage, the following development steps were carried out: (1) Development of an e-module for pastry & bakery product subjects based on an android application (2) Validation of content experts, media experts, and user validation (teachers and students) (3) Revision of E-module after being validated by the media experts and content experts, revisions were made according to improvements.

#### 4. Implementation

This stage is the application of an Android-based e-module at State Vocational High School 1 Jambu with the respondents of class XII students majoring in Culinary Arts. Student responses to the assessment sheet as the effectiveness test of the e-module.

#### 5. Evaluation

The evaluation stage is carried out in 2 types, they are formative and summative evaluations. Formative evaluation was carried out by the media experts and content experts to validate the e-module; this formative assessment was used to ensure that the expected goals could be achieved and to revise learning media in the form of an Android-based e-module. At the same time, the summative assessment leads to a decision on the achievement of an Android-based e-module statement to improve student competence/learning outcomes.

#### Feasibility Test Results

This stage was carried out to determine the feasibility of the developed e-module. The following are the results of the feasibility test done by the media experts and content experts:

**Table 1.** Overall Scoring Results on Each Aspect from Media Experts

No	Aspect	Validator		Average	Category
		Media Expert 1	Media Expert 2		
1	Screen design feasibility	3.80	3.60	3.70	Worthy
2	User convenience	4.75	3.75	4.25	Very Worthy
3	Consistency	4.00	4.66	4.33	Very Worthy
4	Graphic	3.66	3.66	3.66	Worthy
5	Benefit	4.00	3.33	3.66	Worthy
	$\bar{x}$ Average of all experts			3.92	Worthy

Based on the table above results, it is known that the average score of all media experts is 3.92 with the criteria of "Eligible" thus, the

android-based e-module on pastry & bakery product subjects is declared feasible to use.

**Table 2.** Overall Scoring Results on Every Aspect from Content Expert

No	Aspect	Validator		Average	Category
		Content expert 1	Content expert 2		
1	Content Feasibility	4,16	4,00	4,08	Worthy
2	Language	4,20	4,20	4,20	Worthy
3	Presentation	4,50	4,33	4,41	Very Worthy
	$\bar{x}$ Average			4,23	Very Worthy

The results of the content expert's assessment showed an average score of 4.23 with the criteria "Very feasible." The results of the validation by the media and content experts could be concluded that the android-based e-module is

valid and can be used as teaching material for pastry & bakery products.

#### E-module Practicality Test

This stage was carried out to determine the practicality of the developed e-module. The

practicality test was carried out by validating user responses (teachers and students) related to the practicality of an Android-based e-module. It was conducted by three teachers of the culinary arts department (TBG) and students of TBG 1 and TBG 2 at State Vocational High School 1 Jambu

and was determined by the scores of the reproducibility coefficient (Rc) and the scalability coefficient (Sc) based on a predetermined score. Data on the practicality of the e-module can be seen in the following table:

**Table 3.** Data Analysis of Practicality Test by Teachers and Students

Validator	Indicator	Score kr	Score Ks
Teacher	Interest	0.92	0.83
	Learning		
	Material		
	Language		
Student	Benefit	0.90	0.76
	Interest		
	Learning		
	Material		
$\bar{x}$ Average score	Language	0.91	0.79
	Benefit		

The average reproducibility coefficient data or Rc = 0.91 indicates that the android-based e-module learning media for pastry & bakery product lessons and culinary skills developed is considered "very practical" because it meets the requirements for a Rc value above 0.9. It is also confirmed in the scalability test or Sc = 0.79; this number also meets the requirements, which is above 0.60.

**Data Analysis Prerequisite Test**

The data analysis requirements need to be tested to determine whether the data analysis used for testing the data in this study can be continued. Several data analysis techniques need to be tested for needs analysis, such as the effectiveness test

analysis (t-test), which requires that the data come from a normally distributed population and that the groups being compared are homogeneous. Therefore, the effectiveness test (t-test) needs to be tested for normality and homogeneity of the data.

The normality test is a test to find out whether a data distribution is normal or not by looking at the probability  $\alpha > 0.05$  with a significant level of 0.05. The data is normally distributed if the significant score is  $> 0.05$ . If the significant score is  $< 0.05$ , then the data is not normally distributed. Data normality test was carried out using IBM SPSS Statistics 26 software. The following results from the normality test are shown in Table 7.7

**Table 4.** E-module Normality Test

Class		One sample kolmogrov smirnov test	Sig. Shapiro-Wilk
Pre-test	Experiment	0.107	0.079
	Control	0.097	0.758
Post-test	Experiment	0.099	0.186
	Control	0.102	0.604

Source: Calculation Results (2022)

Based on table 7.7, the normality test results for the effectiveness of the pastry & bakery

product e-module have a significance score (sig.) as in the table above for the pre-test and post-test

normality tests in the experimental class and control class; the score shows sig. > 0.05, it can be concluded that the data is normally distributed.

A homogeneity test is used to determine whether or not the sample variants are taken. The level of significance used in the homogeneity test

is 0.05. The criterion for the homogeneity test of variances is if the value of sig. 0.05, the data is homogeneous, whereas if the value of sig. 0.05, then the data is not homogeneous. The following are the results of the homogeneity test of the pre-test and post-test questionnaires.

**Table 5.** Pre-test Homogeneity Test Results

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.
Pre-test	Based on Mean	0.529	1	62	0.470
	Based on Median	0.550	1	62	0.461
	Based on Median and with adjusted df	0.550	1	61.646	0.461
	Based on trimmed mean	0.557	1	62	0.458

Source: Calculation Result 2022

**Table 6.** Post-test Homogeneity Test Result

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.
Posttest	Based on Mean	1.372	1	62	0.246
	Based on Median	1.394	1	62	0.242
	Based on Median and with adjusted df	1.394	1	57.557	0.243
	Based on trimmed mean	1.382	1	62	0.244

Source: Calculation Result 2022

Based on table 4.8 and table 4.9, the homogeneity test of pre-test and post-test showed a significance value > 0.05 with a sig-Based on a Mean pre-test value of 0.470 and a post-test of 0.246. It can be concluded that the data is homogeneous or has the same variance.

**E-module Effectiveness Test**

The data analysis was to test the instrument using validity and reliability tests, then to test the prerequisites before testing the effectiveness of student learning outcomes using normality and data homogeneity tests. Furthermore, to test the effectiveness of student learning outcomes using the N-Gain score test and the independent sample T-test. The results of the e-module effectiveness N-gain test can be seen in the following table:

**Table 7.** Test of N-gain Percent Effectiveness of E-module Experiment and Control class

Descriptive Statistics				
	N	Minimum	Maximum	Mean
Experiment				
N-gain percent	31	51.61	100.00	78.1415
Control				
N-gain percent	33	6.25	13.04	5.7397

**Table 8.** Interpretation of n-gain Score

Percentage %	Meaning
<40	Not Effective
40-55	Less Effective
56-75	Quite Effective
>76	Effective

Source: Hake, R. R 1998

Based on the calculation results of the N-Gain score test, it shows that the average N-gain score for the experimental class is 78.1415 or 78%, with a maximum N-gain score of 100% and a minimum of 51.61%, while for the control class, it is 5.7397 or 5.7% with a maximum value of 13 % and a minimum of 6%. Interpretation of the effectiveness of n-gain, it can be concluded that the experimental class n-gain score is 78%, and the control class score is 5.7%. It means that the application of the android-based pastry & bakery product e-module is effectively used to improve student competence.

#### T-Test

The T-test was used to determine whether there was a significant difference between the post-test scores in the experimental class and the control class. This test was carried out on the post-test learning outcomes of the experimental class and post-test in the control class. The results of the independent sample T-test can be seen in the attached table of the results of the independent sample T-test. Based on calculations using SPSS, the following results were obtained;

**Table 9.** The T-test results for the control class and the experimental class

Data	Levene statistic	T-test	Significance Level
Result	0.062	17.359	0.000

Based on the output table above, it is known that the significance score (sig) on Levene's Test for Equality of Variances is 0.062 > 0.05, so it can be concluded that the variance of the N-gain data (%) for the experimental class and control class is the same or homogeneous.

#### DISCUSSION

The final product of this development research is an android-based e-module of pastry & bakery products. Media and content experts further validated the process of making this e-module to determine the feasibility of the e-module; media and content experts validated the feasibility of the developed pastry & bakery product e-module. The average score of the media expert assessment is 3.92, with the Screen Design Feasibility indicator getting a score of 3.70 with the "Decent" criteria. The user convenience indicator got a score of 4.25 with the "very feasible" criteria, the consistency indicator got a score of 4.33 with the "very feasible" criteria, the graphic indicator scored 3.66 with the "very feasible" criteria, and the usability indicator scored 3.66 with the "decent" criteria.

The content expert validation stage is the average score of the e-module feasibility assessment based on the Content Feasibility aspect, which got a score of 4.08 with the "Eligible" criteria. The Linguistic aspect with a score of 4.20 gets the "adequate" criteria, and the Presentation aspect got a score of 4.41 with the criteria of "Very Eligible." The average of all aspects in the material validity test obtained a score of 4.23 with the criteria "Very feasible."

Suparman (2014) explained that a good module is a module that aims to motivate students to grow interest and independence in learning. In principle, this e-module is based on reference to the characteristics of the module, including self-instructional, which is capable of self-learning. This means that without teacher assistance, the module can also be studied by students without relying on certain parties, with self-explanatory power. The module is compiled with simple language to present the content of the material, self-contained, which contains the entire



learning material. The e-module is designed according to the user's characteristics and abilities to organize the learning process.

The developed android-based e-module is also categorized as practical after a biserial point correlation analysis is carried out and then continued using the reproducibility and scalability coefficients. The calculation results of the average Kr obtained are 0.91 and Ks 0.79. These results conclude that using an android-based e-module is practical based on the criteria set by Usman (2008:99), namely  $Kr > 0.90$  and  $ks > 0,6$ . These results follow the opinion of Nieveen et al. (2006); namely, the level of practicality of teaching materials can be measured under the objectives of development and ease of use in learning activities.

The effectiveness of using the e-module can be seen from the results of filling out pre-test and post-test questionnaires that students have filled out. Before testing the effectiveness, it is necessary to test for normality and homogeneity. It was done to determine the normality and homogeneity of the questionnaire. After that, the N-gain test was carried out to determine the practicality of the e-module. The results of N-gain test are declared practical with a score of 0.7848 for the TBG1 class, and 0.7499 for the TBG 2 class. If the N-gain value  $> 0.7$ , then it has a high category.

The results of this study agree with the research produced by Alfian (2022). That e-module can effectively improve student learning outcomes. Then the research conducted by Yunendar (2016) stated that the e-module based on the android smartphone showed an increase in graduation by 10% better than before using the e-module.

## CONCLUSION

The android-based pastry & bakery product e-module was developed using the ADDIE development model (Analyze, Design, Development, Implementation, Evaluation). The developed e-module is suitable for use in learning pastry & bakery products. Based on the validation of media experts, it got an average score of 3.92 with the criteria "Eligible," while the assessment

by content experts got an average score of 4.23 with the criteria "Very Worthy." The practical results assessed by teachers and students are very practical; therefore, the pastry & bakery product e-module can support students in learning anywhere and anytime. As for the effectiveness value, the e-module is declared effective based on the effectiveness test in the form of an N-gain test based on an assessment questionnaire given to 2 classes: The class of the TBG 1 as the experimental class and the class of TBG 2 as the control class.

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