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# The Development of an Android-Based Continental Food Appetizer Processing and Presentation of E-Module

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**Abstract**

The 21st century is a century where science and technology develop very quickly and sophisticatedly, therefore in the development of the 21st century, teachers must be able to utilize technology in learning which can form a creative, innovative, and competitive generation. This research aims to test the validity and reliability of the e-module based on expert assessment, test the e-module in improving student learning outcomes, and analyze the improvement of student learning outcomes regarding the use of the e-module. This research model applied ADDIE. The subjects of this research were 35 students of XI grade students in culinary program at SMK Negeri 1 Kudus. The research results showed that the Android-based e-module considered feasible by media experts and material experts with CVR results > 0.75. The use of e-modules in learning depicted an improvement in learning outcomes through the results of the t-test and N-gain test of 76.25%. Based on these results, Android-based e-modules were effectively applied in the learning process to improve student learning outcomes. Meanwhile, the practicality test of e-modules portrayed the percentage of user responses from teachers and students gained 85% and 82% so the e-module learning media was categorized as very practical to use in the learning process. Based on the research results, e-module developed had been declared feasible, practical, and effective to use in processing and serving appetizer dishes learning and could improve student learning outcomes.

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## INTRODUCTION

The 21st century is a time when science and technology are developing very rapidly. In today's digital era, technology is almost in every sector of life. The world of education is required to prepare the next generation who can keep up with the times, and even become actors in the next development process. Education holds a crucial role in various areas of social life. The better the quality of education will greatly influence the creation of superior quality and character of human resources. One indicator of a school's success in making quality students is improving student learning outcomes. The teacher's role is very important in learning because the teacher delivers the teaching methods and materials that are suitable to students' needs. Therefore, in the development of the 21st century, teachers must utilize technology in learning which can form a creative, innovative, and competitive generation.

Based on observations and results carried out at SMK N 1 Kudus, it was found that 35% of participants showed that materials understanding level was decreased due to several factors, one of which is the use of printed modules. Teaching materials used by teachers and students still rely on the delivery of material provided during learning, while the amount of material that must be mastered is not proportional to the number of face-to-face meetings. This condition can make it difficult for students to understand the lesson and caused students' cognitive assessment to be low, it gained 40% compared to the student's psychomotor assessment which reached 60%.

Therefore, more interactive teaching materials are needed to increase students' interest in reading and boost students' enthusiasm for learning since it has become crucial to improve students' learning outcomes. One learning model that is believed to be able to improve student learning outcomes is implementing e-module development in the processing and serving of appetizer dishes.

E-module learning media is digital learning media that is systematically arranged and presented in electronic form so that students can learn independently. The use of e-modules can increase students' interest and motivation in learning. Based on the flexibility of using mobile applications, several educational institutions have begun to develop mobile e-learning applications specifically for students that are tailored to student needs (Alden, 2013). The fact is that learning media on mobile devices, which means learning mobility, can be reached "anywhere" because students move between space, time, and social interactions (Kocakoyun & Bicen, 2017). The use of Android-based e-modules can be an alternative learning support that can be studied independently by students and has an influence and can improve student learning outcomes.

Independent learning or Self-regulated learning (SRL) is used as a framework for e-module development which refers to "an independent learning process where students can transform mental abilities into academic skills" (Zimmerman, 2002). This theory focused on the importance of students being actively involved in their learning, namely with self-direction, self-awareness, self-reflection, and self-motivation (Kowitlawakul, 2017 in Rebecca et al., 2020). The use of e-modules in the learning process is also necessary to support the achievement of learning objectives. The learning process by implementing this e-module aimed to attract students' attention in learning about processing and serving appetizer dishes to optimize student learning outcomes.

## RESEARCH METHODS

### Research Design

This research applied a research and development (R&D) approach to developing Android-based e-module learning media to improve student learning outcomes in learning to process and serve continental food appetizers. ADDIE model consisted of analysis, design, development, and implementation stages. The ADDIE model is an approach that emphasizes an analysis of how each component interacts with each other coordinates according to the existing phases (Sezer, 2013).

### Research Procedure

Procedures are the steps carried out by researchers before conducting research. The steps

taken must be based on appropriate theoretical studies referring to the perspective developed. There are five stages in implementing the development of the ADDIE model. The steps taken in this research are as follows:

1. Analysis Stage

Activities carried out in the analysis stage include analysis of the development of e-module learning media. The analysis stage is carried out through several steps, namely; a. analyzing the initial abilities possessed by students, b. analyzing learning sources and materials, c. analyzing the facilities and infrastructure that support the learning media to be developed, d. analyzing the curriculum, KI, and KD that will be included in the e-module.

2. Design Stage

The design stage consists of creating an overall e-module design which included creating materials, backgrounds, images, and videos that are inserted in the e-module. The steps taken at this stage are; (1) designing an e-module instructional design, namely making the first stage of product design by compiling a flowchart that describes the flow of the e-module, then (2) designing an Android-based e-module

3. Development Stage

The development stage contained activities for realizing the e-module design. At this stage, it was related to creating content and media that was tailored to student needs. The development stage was carried out by developing an Android-based learning e-module. The development phase aimed to produce and validate learning products that have been designed and the steps taken included developing an e-module design which consists of (1) preparing the material concept, (2) creating a basic layout, (3) collecting material as content e-module, (4) preparing videos, (5) creating an e-module application program based on an Android application. The next stage was the e-module validation process carried out by 8 media expert validators and material experts. Then the e-module was tested by e-module users which include teachers and students. At the e-module validation stage, media and material experts carried out assessments that can be used to process improvements to the e-module.

4. Implementation Stage

At this stage, the e-module that has been developed is implemented in a real situation, namely in the classroom. The material presented was based on a developed e-module where students of class XI Culinary Management at SMK Negeri 1 Kudus became the respondents. The two groups were given a pre-test. Then, the researcher gave treatment to the experimental class by using e-modules while in the control class, no treatment was given in the learning process. After that, a post-test was conducted for all group participants with the same questions.

Evaluation

This stage is divided into 2 evaluations, namely formative evaluation and summative evaluation. Formative evaluation related to the feasibility and practicality of e-modules testing. Meanwhile, summative evaluation related to experimental design and testing the effectiveness of e-modules. The data obtained was then analyzed to determine the shortcomings of the e-module being developed. Formative evaluation in this research was carried out by material experts, media experts, and carried out by teachers and students. Meanwhile, summative evaluation was used to determine students' abilities regarding the competencies that being taught, to obtain the effectiveness of the e-module for processing and serving appetizer dishes.

**The steps of the ADDIE model can be seen as follows;**

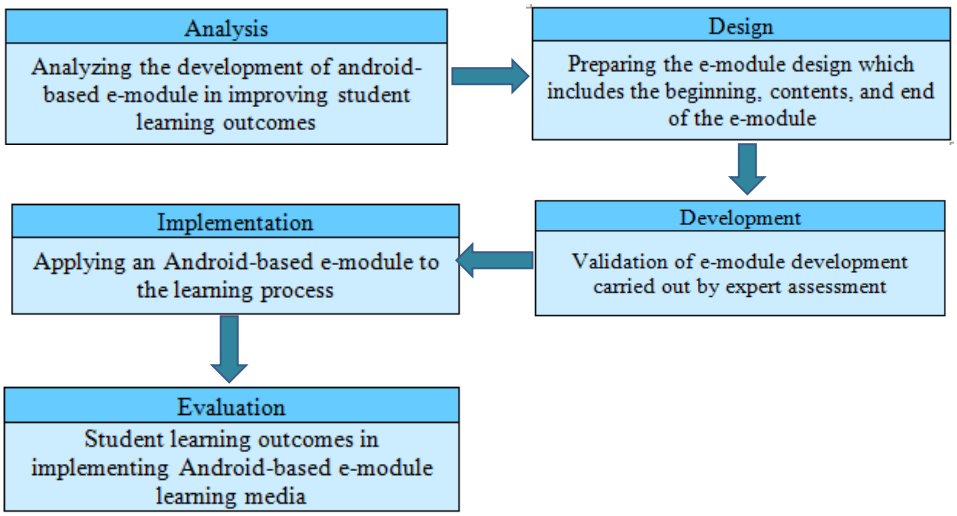



**Figure 1.** Steps for developing an e-module model ADDIE

**Instrument techniques and data collection**

Data collection techniques in this research were observation, questionnaires, and interviews. Meanwhile, the data collection instruments were an e-module feasibility questionnaire, an e-module practicality questionnaire, and an e-module effectiveness questionnaire. The e-module feasibility questionnaire for processing and serving appetizer dishes was carried out by media expert lecturers and material expert teachers to obtain suggestions and criticism from validators regarding the e-module being developed. The e-module practicality questionnaire was given to teachers of continental food processing and serving subjects and class XI students of the Catering Skills Program. The instruments in this research used observation sheets, validation sheets, and student evaluation instruments in learning to process and serve appetizer dishes. Instrument techniques and data collection in this research can be seen in the table below :

| No | Research Steps | Data collection technique | Instrument | Data analysis technique |
|---|---|---|---|---|
| 1 | Preliminary studies | Documentation, observation, and interviews | Questionnaires, observation sheets, and interview sheets | Descriptive Analysis |
| 2 | Feasibility of e-module | Questionnaire by an expert validator | Questionnaire | Validity and content reliability |
| 3 | Practicality of e-modules | Questionnaire | Questionnaire | Descriptive Quantitative |
| 4 | Model effectiveness | Pretest and Posttest Questionnaire | Question of Knowledge Questionnaire | T-test Quantitative descriptive analysis |

## RESULTS AND DISCUSSION

**Implementation of Android-based e-module learning media development.**

At the development stage, creating an Android-based e-module was carried out with the following steps:

The analysis stage included an analysis of Android-based e-module development in improving learning outcomes. Based on the results of observations before the research, it showed that the analysis of media needs included (1) the curriculum used at SMK N 1 Kudus in class XI still used the K13 curriculum except for

classes X and printed module as the main source of delivering material, so students became less active in learning (3) most students' cognitive scores have not reached the standard minimum score (KKM), especially in learning about processing and serving continental food.

The design stage consists of creating the entire e-module including;

a. Making an e-module design that included the beginning, contents, and closing

b. E-module preparation, (1) making the e-module by using the Canva application, (2) navigation settings on the e-module by using a professional PDF application, (3) converting the e-module into an application by using the website 2 Apk builder applications.

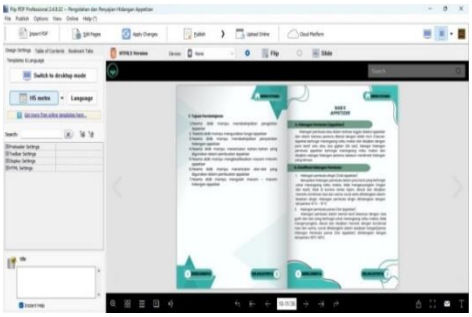
The steps for preparing an e-module can be seen in the following pictures:

1. Making an Android-based e-module was done by using the Canva application

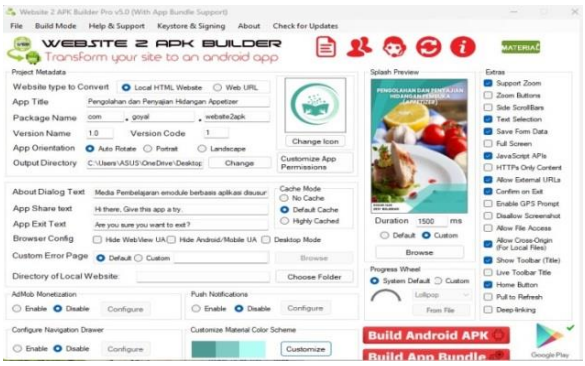

**Figure 2.** The initial appearance of the e-module


**Figure 3.** Main e-module menu

*2.* Navigation settings on the e-module are carried out using a professional PDF application



3. Converting the e-module into an Android application is done by using the 2 APK Builder Pro website application



c. Android-based e-module display



**Figure 4.** Basic e-module competencies

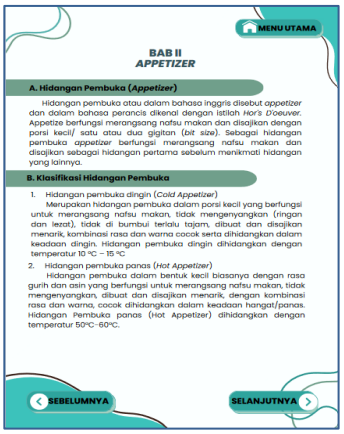
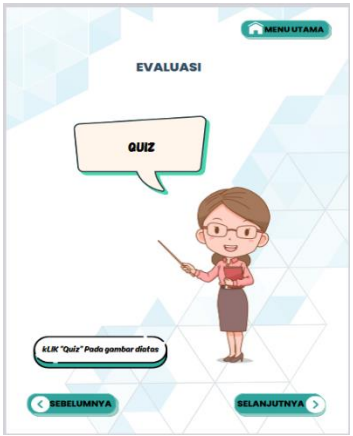


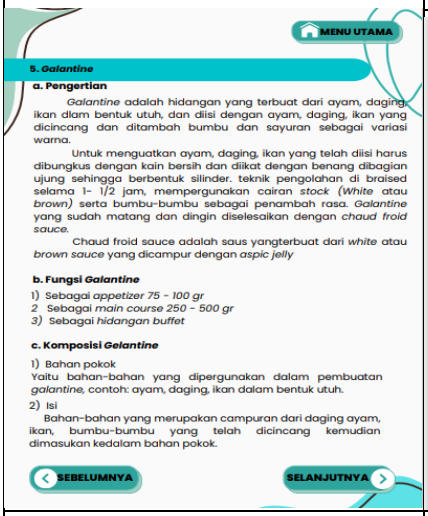
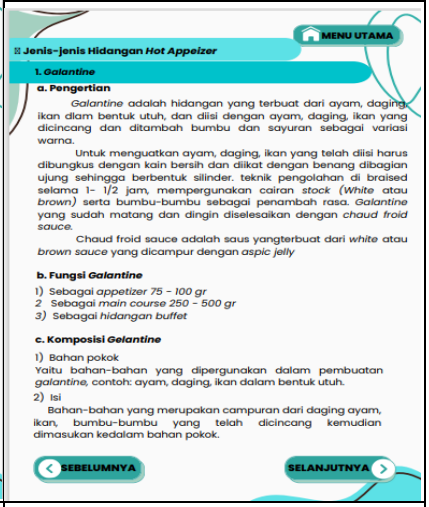
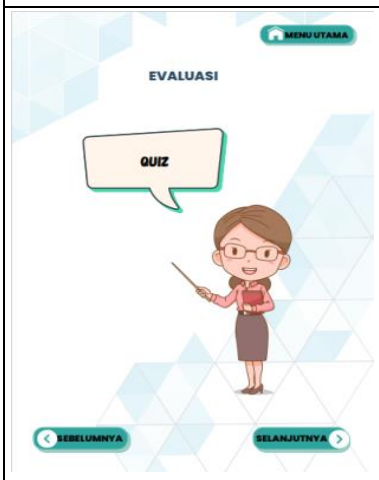
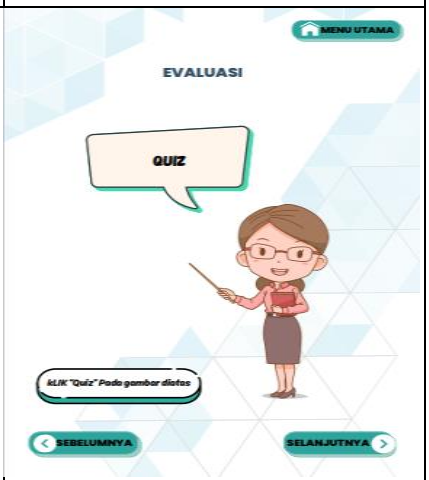

**Figure 5.** Initial display appetizer


**Picture 6.** Image and video display on the e-module




**Picture 7.** Display of quizzes and exercises

Furthermore, in the development of the follow-up was conducted during the design stage including (1) validation of the e-module was carried out by 8 media experts and material experts, (2) Revision of the e-module, the proposed learning media of the e-module was tested and revised based on the suggestions and insight given. To see a comparison of Android-based e-modules before and after revision, see the following table:

| BEFORE REVISION | AFTER REVISION |
|---|---|
|  |  |
| The e-module is not numbered on the cover | Improvement to the cover section is numbered on the e-module |
|  |  |
| There are no sub-materials in the hot appetizer section so it is not easy to understand | There is a sub-material in the hot appetizer section so it is easy to understand |
|  |  |
| The evaluation display does not provide information on accessing the quiz | Complete with information to access the quiz |

| | |
|---|---|
|  |  |
| It is necessary to add learning video resources contained in the e-module | Video sources have been added to the e-module |
|  |  |
| It is necessary to add stages in creating the e-module | There are already stages in preparing an Android-based e-module |

**Feasibility, effectiveness, and practicality of Android-based e-module learning media**

1. Feasibility of e-module

The validity and reliability results of the instrument were obtained from assessments by media expert validators and material experts. A total of 8 media and materials experts assessed the Android-based e-module and whether or not it was suitable for use in learning. Based on the CVR value in the instrument validity test by media experts, the average was 0.98. The material expert instrument validity test with eight expert examiners (consisting of 5 culinary lecturers and three teachers) gained an average of 0.96. The instrument reliability assessment by media and material experts obtained an average of 1.00. Based on this data, expert assessment declared the Android-based e-module was valid and reliable. The e-module learning media feasibility test was obtained from media expert validation. It included 1) initial appearance of the media, 2) ease of use, 3) media content, 4) design, 5) usability, and 6) language. The feasibility test gained a percentage of 99% or was categorized as very feasible criteria. The results from material experts consisted of (1) content feasibility aspects, 2) linguistic, and 3) presentation aspects, obtained a percentage of 98% with very appropriate criteria. The results of this research were in line with research conducted by Rahmawati (2022) that showed the development of audio-visual media resulted in the robe pattern obtaining an average CVR value of 0.86 in the assessment of media and material experts in the very

appropriate category. This result was in line with Sardi (2023), on the development of Android-based scar media differentiation showed a very feasible category with a media expert assessment of 95% and a material expert assessment of 90%. Another research conducted by Senny (2023) also obtained similar results to this research, namely that the e-module developed was considered very feasible based on the assessment of media experts and material experts with a result percentage of 80.4% and 86.8%.

2. Effectiveness of e-module

The e-module was tested for its effectiveness through trials of implementing the e-module in classroom learning. Data collection was carried out using the pretest-posttest control group design technique. The sample class did a pretest before being given treatment. After that, the posttest was done by implementing an Android-based e-module.

**Descriptive Analysis of Research Results**

Descriptive analysis in this research aimed to show student learning outcomes in the experimental and control classes, and find out how big the difference was in student learning outcomes between learning using Android-based e-modules compared to previous learning. The data results in the pretest and posttest assessments were analyzed descriptively to determine the achievement of student learning completeness. Descriptive analysis of the experimental class and control class pretest and posttest can be seen in the following table:

**Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Pretest Experiment | 35 | 45.00 | 74.00 | 58.2571 | 8.28302 |
| Experiment Posttest | 35 | 72.00 | 98.00 | 89.8286 | 7.13931 |
| Pretest Control | 35 | 43.00 | 75.00 | 54.4286 | 8.23295 |
| Control Posttest | 35 | 62.00 | 88.00 | 78.3143 | 6.51140 |
| Valid N (listwise) | 35 | | | | |

Based on the table above, it can be seen that student learning outcomes in the experimental class received a higher assessment, namely 88.00 compared to the control class, and it can be seen that learning using e-modules received a higher assessment compared to learning using printed modules.

**Data Normality Test**

The normality test aimed to determine whether the data obtained was normally distributed. The results of the data normality test can be seen in the following table:

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | Class | Statistic | df | Sig. |
| Student learning outcomes | Pretest Experiment | .126 | 35 | .173 |
| | Experiment Posttest | .137 | 35 | .094 |
| | Pretest Control | .129 | 35 | .147 |
| | Control Posttest | .105 | 35 | .200* |

Based on the results of pretest and posttest calculations, the control class and experimental class obtained statistical and significant values > 0.05, so it can be concluded that the data was normally distributed. Based on these results, it showed that Ha was accepted. Thus, it can be concluded that the data that researchers obtained in the pretest and posttest in the experimental and control classes was data with a normal distribution.

**Data Homogeneity Test**

The data homogeneity test used Kolmogorov Smirnov with significance criteria ≥ 0.05. The results of the data homogeneity test can be seen in the table below:

**Test of Homogeneity of Variance**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Student learning outcomes | Based on Mean | 1.069 | 3 | 136 | .365 |
| | Based on Median | .863 | 3 | 136 | .462 |
| | Based on the Median and with adjusted df | .863 | 3 | 130.900 | .462 |
| | Based on trimmed mean | 1.033 | 3 | 136 | .380 |

The results of the data homogeneity test depicted that the significance value of the data in the pretest and posttest is 0.365 ≥ 0.05, so it can be said to have a homogeneous distribution.

**T-Test Analysis**

Independent sample T-test test The Independent Sample T-test test in this study aimed to determine the significance of the posttest coefficients of the two groups and the difference in pretest-posttest scores using the two unrelated samples test and determine whether there was a difference in the posttest results of students from the experimental group and the experimental group. control. The results of the hypothesis test calculations can be seen in the following table:

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Pretest | Equal variances assumed | 1.222 | .273 | .963 | 68 | .339 | 2.143 | 2.224 | -2.295 | 6.581 |
| | Equal variances not assumed | | | .963 | 65.195 | .339 | 2.143 | 2.224 | -2.299 | 6.584 |

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Posttest | Equal variances assumed | .102 | .751 | 4.236 | 68 | .000 | 9.286 | 2.192 | 4.912 | 13.660 |
| | Equal variances not assumed | | | 4.236 | 67.217 | .000 | 9.286 | 2.192 | 4.911 | 13.661 |

In the table above it can be seen that the results of calculating the average difference in pretest data for the experimental class and control class using the independent sample t-test with a 2-tailed significance level were found to be 0.339. The condition above showed the sig value. (2 tailed) > 0.05, it can be concluded that H0 is accepted or there is no difference in students' initial abilities between the experimental class and the control class. Meanwhile, the posttest data in the experimental and control classes using the independent sample t-test showed a 2-tailed

significance value of 0.000. The condition above showed the sig value. (2 tailed) < 0.05, or H0 was rejected, there were differences in student learning outcomes between the experimental class and the control class.

The calculation result of the average difference in the pretest-assessment obtained a 2-tailed significance value of 0.339 and in the post-test assessment obtained a 2-tailed significance value of 0.000. These results showed that there were differences in student learning outcomes between the experimental class and the control class. In line with research (Tamrongkunanan & Tanitteerapan, 2020) that showed that the posttest score is higher than the pretest score, students who used e-module learning media had better achievement of learning outcomes with a statistical significance of 0.05. The effectiveness of the e-module can be shown from the results of the gain values in the pretest and posttest assessments. The results of the N-Gain calculation can be seen in the following table:

| No | Assessment Aspects | Score | Result | N-Gain Percentage (%) | Criteria |
|---|---|---|---|---|---|
| 1 | Experimental Class | Mean | 76.2556 | 76 | Effective |
| | | Maximum | 96.08 | | |
| | | Minimum | 34.21 | | |
| 2 | Control Class | Mean | 52.4826 | 52 | Less effective |
| | | Maximum | 72.92 | | |
| | | Minimum | 21.74 | | |

Based on the pretest and posttest results in the experimental class, the gain percentage was 76.25% (effective category). Meanwhile, the pretest and posttest results in the control class showed a gain percentage of 54.48% (less effective category). According to Syahputra and Prismana (2021), Android-based learning media equipped with image, video, text, and audio displays can have a positive influence on the learning process. The results of research conducted by Budhi (2023) stated that Android-based interactive learning media was effective in significantly improving student learning outcomes. In line with other research conducted by Gusaasi (2022) summarized that student learning outcomes increased after teachers implemented interactive e-modules. This showed a significant impact on improving student learning outcomes when using Android-based e-modules. A similar thing was also found in research by Anas Satria (2023) that the Android-based Adobe Flash learning media developed was effective in improving student learning assessments based on the N-Gain score of 76.47%. Other research conducted by Mardiana (2020) related to the development of interactive learning media also portrayed that interactive learning media was effective in increasing student learning outcomes significantly with the results of obtaining an average pretest and posttest score of 27.1 as well as obtaining an overall average N-Gain score. 0.62 by meeting the 'adequate' criteria in improving student learning outcomes.

3. Practicality of e-module

The practicality test was obtained from the ten teachers' and ten students' responses. The results showed that the e-module was very practical to use in learning and gained 85% and 82%. Overall, the results of the practicality test depicted that the Android-based e-module of process and serve appetizer dishes materials were easy to understand and could improve student learning outcomes. This was in line with Noverida & Zulyusuri (2022), who said that e-modules could be practical if teachers and students were curious and easy to use. Other results also stated that students were enthusiastic and interested in learning. The e-module made the learning activities easier and not boring because it had many interesting pictures. A similar thing was also found in Rahmawati's research (2022), which explained that an overall practicality assessment of the media developed was very efficient since it was easy to apply and easy to understand, with a percentage result of 93.44%.

## CONCLUSION

Based on the results and discussion of Android-based e-module learning media for processing and serving appetizer dishes, it can be concluded that Android-based e-modules are feasible and effective in improving student learning outcomes. The results of the analysis explain that the use of e-modules in the learning process can improve student learning outcomes. Based on pretest and posttest assessments and the Android-based e-module learning media is very practical for teachers and students to use in the learning process and can be used by students independently.

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