Design and Implementation of Interactive Learning Media using SAC 3 Application for Basic Electronics Subject at State Vocational High School 5 Padang

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Abstract **-** This research focuses on designing interactive learning media with the SAC 3 application in the Basics of Electronics (DDE) subjects at State Vocational High School (SVHC) 5 Padang in order to see the quality, validity and practicality of the learning media that has been designed. The research model used in designing this learning media is the ADDIE model (Analyze, Design, Development, Implementation, Evaluation). The ADDIE model applied to research is limited to the implementation stage, which is the realization stage to students in simple groups. This media is carried out by testing validity and practicality (application to students). The media validity test is carried out by material experts and media experts as many as 2 experts each (Validator). The practicality test was conducted with a small group of ten class X students majoring in Audio Video Engineering (TAV). The results of the validity test obtained were 90.67% of material expert validators categorized as "Very Valid" and 94% of media expert validators categorized as "Very Valid", and the results of the practicality test were carried out on several students and obtained an average assessment of 94% which was categorized as "Very Practical". Based on research and design of learning media in the subjects of Basics of Electronics is fairly valid and practical to use.

Keywords **-** Learning Media, Basics of Electronics, Smart Apps Creator 3.

I. INTRODUCTION

Education cannot be separated from the learning process. Learning is a process carried out with the aim of facilitating students' acquisition of knowledge. It is the process in which students interact with teachers and learning resources in a learning environment. Learning is the support provided by educators to facilitate the acquisition of academic knowledge, the development of skills and habits, and the formation of attitudes and beliefs in students. Learning is any conscious effort made by teachers that can lead students to engage in learning activities [1].

Everything related to education will inevitably adapt to technological advancements. In the 21st century, educators and learners are required to learn and master digital technology. Technology significantly influences all aspects of education, including the use of media in the learning process. Teachers must be capable of preparing their students to apply both subject knowledge and technological skills while contributing creativity and innovation [2]. There are various models available for teachers to implement and apply these concepts.

A variety of skills required by learners in the current era of globalization are often referred to as 21st-century skills. The focus of these skills prioritizes adaptability to changing times, applicability to new concepts, and utility in the future [3]. The development of technology in the globalization era of the 21st century has led to changes in how humans interact with each other, in the workplace, and in the learning environment [4].

Technology has permeated all aspects of education, including the implementation of media in the learning process. This is also true for the use of media in vocational education, particularly in State Vocational High School (SVHC). SVHC emphasize practical skills more than theoretical knowledge. However, in this context, learners often focus solely on practical activities and may neglect the theoretical aspects of their education.

Learning media serves as a intermediary designed to convey educational content to students through specific tools, enabling them to quickly comprehend and absorb knowledge from the teacher [5]. In the realm of education, media refers to the means or vessel applied in the learning process to effectively deliver information or knowledge to students. The growth of learning media today is influenced by various factors, such as technological advancements, business, behavior, and communication. One notable development in media is the emergence of various types and formats, including printed modules, films, television, computer programs, and more [6].

The use of media in the learning process can facilitate students' understanding as it transforms abstract concepts into more tangible ones [7]. In the teaching and learning process, media plays a crucial role in enhancing the quality and

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objectives of education, ensuring that planned learning can develop successfully. Media not only aids teachers in communicating their lessons but also adds value to the learning activities.

Leveraging technology has led to the creation of interactive learning media using Android, presented in the form of applications. Interactive multimedia involves combining various media (file formats) such as text, images (vector or bitmap), graphics, sound, animation, video, interaction, and more, packaged in digital files (computerized) to effectively convey messages to the audience [8]. In other words, interactive multimedia is a type of multimedia equipped with controls that can be manipulated by users, allowing them to choose their preferences and proceed with the next steps in the learning process.

One utilization of interactive media is through the use of the SAC 3 application. Smart Apps Creator (SAC) is an interactive technology tool that designs multimedia content for mobile devices [9]. SAC can create multimedia content to be installed on Android-based smartphones [10]. Android, with its multifunctional capabilities, combines various advanced features to provide a more immersive experience compared to other media. Additionally, the ease of carrying and using Android devices anytime, anywhere enhances their practicality [11].

Creating multimedia learning applications for Android mobile devices with SAC is easily understood, as it does not require programming code and can generate HTML5 and .exe formats. SAC applications can be used to design mobile learning apps and learning quizzes. These designed learning media can replace traditional printed materials, addressing the limitation of printed books in some schools where access is uneven for students [12]. Therefore, Android-based learning media aligns well with the conditions and demands of the 21st century.

Based on observational data from SVHC 5 Padang, it is evident that the midterm exam scores (Ujian Tengah Semester - UTS) of the 10th-grade TAV students are low, with the majority not meeting the Learning Objective Achievement Criteria (KKTP) of 75 or above in the Basic Electronics subject (Dasar-Dasar Elektronika - DDE). This is influenced by several factors, such as the use of traditional full-text media in teaching, leading to a decrease in students' motivation and interest in absorbing the learning material. Additionally, school regulations allowing students to use smartphones during lessons are misused for non-educational purposes like online gaming. Hence, there is a need for engaging media that can stimulate students' interest and learning quality, such as learning media with the SAC 3 application installed on students' smartphones, enabling flexible use at any time.

II. METHODS

This research model applied in developing learning media is focused on the ADDIE development model, an acronym for Analyze, Design, Development, Implementation, Evaluation. The ADDIE research model is systematically organized, ensuring a structured implementation where each stage follows the guidelines of the preceding one. However, this research only proceeded up to the implementation or practicality testing stage, stopping short of the evaluation phase.

In the Analysis stage, the identification and acquisition of information on the use of learning media in the field are conducted. This includes needs analysis, teacher analysis, student analysis, and curriculum (material) analysis [13].

Moving to the Design stage, once the analysis is completed, the next step is the design of the product. The design concept utilizes the Smart App Creator application. In this stage, the design of the product model is the planning of the visual appearance of the media as a connection between the media and the user. The design is created to determine the overall visual presentation of the media.

Entering the Development stage, when the design process is complete, the interactive learning media is tested for validity by experts, including two media experts (validators) and two content experts (validators). The validators are provided with a questionnaire, following the research instrument, to assess the validity of the learning media being tested. This study is tested by validators, including two Electronics Engineering lecturers from Universitas Negeri Padang and two Audio-Video Technology teachers from SVHC 5 Padang [14].

Data analysis in this research employs descriptive analysis, presenting the results of the validity test of the interactive learning media [15]. Calculated using the formula:

$$NP = \frac{R}{SM} \text{ X } 100\% \quad (1)$$

From the above formula, the validity score is obtained and then adjusted according to the following categories [15].

TABLE I
VALIDATION ELIGIBILITY

Score	Criteria
81% - 100%	Very Suitable
61% - 80%	Suitable
41% - 60%	Less Suitable
21% - 40%	Not Suitable
0% - 20%	Very Not Suitable

The next stage is Implementation, where the learning media utilizing the SAC 3 application is tested on students at SVHC 5 Padang, specifically in the 10th-grade TAV class. The practicality test involves ten students as respondents for the Basic Electronics subject. The testing is carried out by installing the application on the students' Android devices. The data obtained from the students are then analyzed to find the percentage using the following equation:

$$NP = \frac{R}{SM} \text{ X } 100\% \quad (2)$$

TABLE III
PRACTICALITY ELIGIBILITY

Score	Criteria
81% - 100%	Very Suitable
61% - 80%	Suitable
41% - 60%	Less Suitable
21% - 40%	Not Suitable
0% - 20%	Very Not Suitable

From the above formula, the practicality value is obtained and categorized according to the established criteria for the media that has been created and tested by validators and students. The categories are as follows, as shown in the table below [15].

In the Evaluation stage, the determination is made regarding whether a product has been successful and meets the specified needs. This aspect also serves as an opportunity to identify areas that need improvement at each stage. The purpose of the evaluation stage is to produce a quality and effective media product for the learning process. However, in this study, the Evaluation stage was not conducted, as the researcher focused solely on the validity and practicality tests of the media.

III. RESULT AND DISCUSSION

The design process for this media took place at SVHC 5 Padang in the 10th-grade Audio Video Technology (TAV) class. The development of interactive learning media with the SAC 3 application follows the ADDIE development model, with stages starting from analysis, design, development, implementation, and evaluation. However, this research is limited to the implementation stage. Below is an explanation of the research results based on the steps of the ADDIE procedure:

A. Analyze Stage

The researcher conducted initial observations aimed at identifying and obtaining information regarding the use of learning media at the case study location. It is evident that both teachers and students require instructional aids for a more effective teaching and learning process, aiming to achieve the learning objectives as intended. At SVHC 5 Padang, the use of the independent curriculum has been implemented; however, its application is not comprehensive. Only classes X and XI have adopted it, while class XII still adheres to the previous curriculum, namely Curriculum 2013. The school regulations at SVHC 5 Padang allow students to bring smartphones to school and use them for learning. However, in reality, many students do not use smartphones as expected.

B. Design Stage

The required data has been collected in the previous stage, including the results of needs identification and other references that serve as guidelines for the next stage, which is the design phase. In this stage, the design of the learning media product using the SAC 3 application is planned, starting from the design framework to the finished product.

1) Cover: The media opener is the initial display when this media is opened and executed. On the opening screen, there is supporting information such as the title of the DDE subject in the center of the screen, information that the media is for the Audio Video Engineering (TAV) department for grade X and is used for the independent curriculum. There is also the Tut Wuri Handayani logo and information stating that this media is valid for one semester, namely the odd semester. Finally, there is a clickable button for users, namely the "start" button, and users will be directed to the next page.

2) Instructions for Using the Media: This page serves to facilitate students and teachers in using the media during the teaching and learning process. There are buttons (icons) such as the home button, next button, back button, and start button, each with its own function in utilizing the media.

Fig 1. Initial Display of the Media

Fig 2. Instructions for Using the Media

3) *Profil Menu:* Displaying student and mentor identities with the aim of informing users about the creation of interactive learning media.

Fig 3. Profile Menu

4) *Main Menu*: It is the menu for all core pages. In this main menu, there are buttons that will lead to the desired elements by the users. There are six elements in this main menu, and each element contains content corresponding to the Learning Objectives Flow (Alur Tujuan Pembelajaran - ATP).

Fig 4. Main Menu

5) Menu for Each Element: It has a consistent appearance for each element, featuring three main menu buttons and one auxiliary menu button on the page. The three main menu buttons consist of the material menu, video menu, quiz menu, and one supporting menu button, namely the mystery box menu.

Fig 5. Menu for Each Element

The display of the material element menu is as follows:

Fig 6. Material Element Menu

The display of the video menu is as follows:

Fig 7. Video Menu

The display of the quiz menu is as follows:

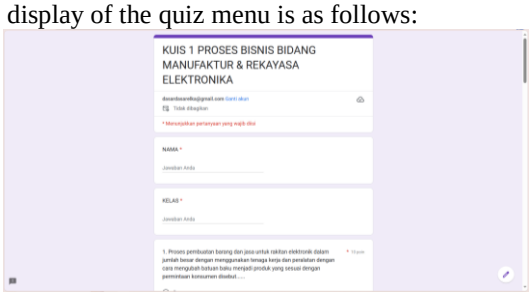

Fig 8. Quiz Menu

The display of the mystery box menu is as follows:

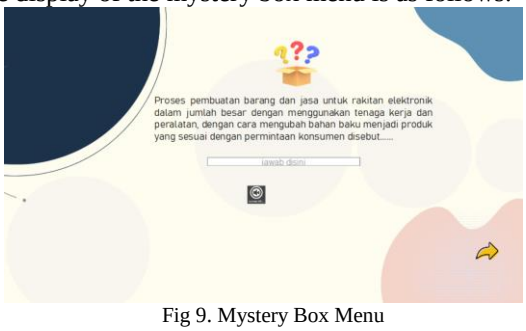

Fig 9. Mystery Box Menu

C. *Development Stage*

After completing the media design stage, testing is conducted in this phase to assess the validity of the learning media product. The validation of the learning media takes the form of a questionnaire with predefined formulas. The validity test is performed by media experts (appearance) and subject matter experts (content). Below are the results of the content validation by the subject matter expert.

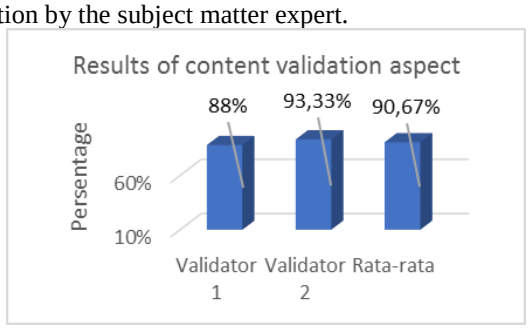

Fig. 10 Results of Content Validation by Subject Matter Expert

Next, here are the results of the media expert's validation on the material:

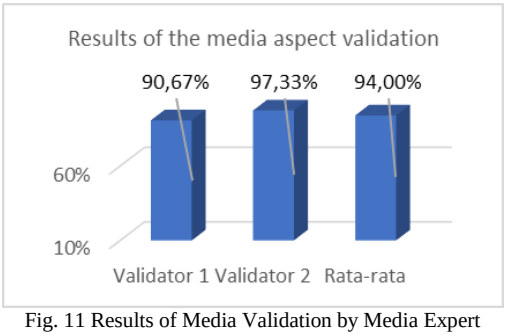

Fig. 11 Results of Media Validation by Media Expert

From the above results, it shows an average validation percentage from the subject matter expert of 90.67%, falling into the "Very Valid" category. Additionally, the average validation percentage from the media expert is 94%, also falling into the "Very Valid" category. Based on these categories, this learning media is deemed suitable for use by students.

D. *Implementation Stage*

The implementation stage is the phase where the finished product, which has been revised and validated by media and subject matter experts, undergoes a trial (practical test). The learning media is tested during the teaching process to determine the usability level (practicality) of the learning media. This learning media is tested on a limited basis with ten participants from the X TAV class at SVHC 5 Padang. Aspects assessed are included in the practicality questionnaire with ten indicators.

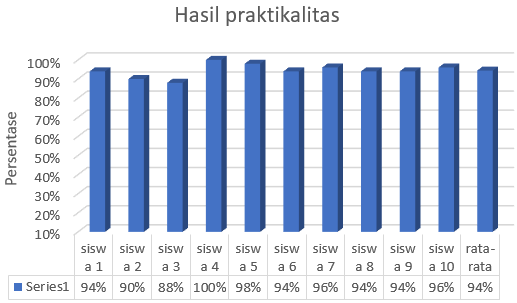

Fig 12. Results of usability level (practicality) Media

From the ten students, the average percentage obtained is 94.4%, falling within the practicality test percentage range of "Very Practical." Therefore, the developed interactive learning media can be used to support practical learning for students.

E. Discussion

The research with the title "Design and Implementation of Interactive Learning Media using SAC 3 Application for Basic Electronics Subject at SVHC 5 Padang" was conducted based on the limitations of learning media in the learning process, the majority of student grades that did not meet the passing criteria, and the inappropriate use of smartphones in school for the learning process.

Various types of media have been developed in this technological era to assist in making the learning process more effective, one of which is interactive learning media.

Interactive learning media in the Basic Electronics subject in grade X is designed to enhance students' progress in learning, such as interest, grades, and motivation. This learning media is implemented for students in the X TAV class at SVHC 5 Padang. Based on the results of data analysis and trials, this learning media falls into the categories of validity and practicality. Therefore, this interactive learning media is suitable for use in Basic Electronics learning. The validity and practicality of this media are outlined as follows:

Validity of interactive learning media

Based on the analysis of validation data filled out by the subject matter expert and media expert, this media is considered "highly valid" with an average score based on material validation reaching 90.67% and an average score based on media validation reaching 94%. This indicates that the interactive learning media in the Basic Electronics subject is suitable for testing.

Practicality of interactive learning media

The practicality trial of this interactive learning media was conducted on a small scale with ten students from the X TAV class at SVHC 5 Padang. After analysis, the average score reached 94%, indicating that this media is considered "highly practical."

Based on the discussion above, the validation and practicality results of the interactive learning media with the SAC 3 application that has been implemented indicate validity in the valid category and practicality in the practical category. It can be concluded that the interactive learning media with the SAC 3 application is suitable for use.

IV. CONCLUSION

The design of interactive learning media with the SAC 3 application in the Basic Electronics subject for the X TAV class at SVHC 5 Padang uses the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). However, this research is limited only to the implementation stage. The testing of the validity of the interactive learning media with the SAC 3 application in the Basic Electronics subject that has been created is declared valid for use in the learning process. The validation by Subject Matter Expert I resulted in a percentage of 88%, while Subject Matter Expert II achieved a percentage of 93.33%. The average of both subject matter experts is 90.67%, falling into the "Very Valid" category.

The validation by Media Expert I resulted in a percentage of 90.67%, while Media Expert II achieved a percentage of 97.33%. The average of both media experts is 94%, falling into the "Very Valid" category. The practicality testing of the interactive learning media with the SAC 3 application was conducted through limited trials involving 10 students, resulting in an average of 94%, falling into the "Very Practical" category.

V. LIMITATIONS AND FUTURE WORK

In the design of the interactive learning media that has been created, the researcher suggests further development for topics covered in the second semester. This would make the learning media more comprehensive than before, and its usability would extend for a longer duration, covering one academic year. This ensures that the interactive learning media is used for the entire Basic Electronics subject throughout the year.

Additionally, the researcher recommends conducting training sessions for teachers to create interactive learning media using the Smart Apps Creator 3 application. This is because the application is user-friendly, simple, and does not require coding in the media creation process.

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