1st BICONE (Bhinneka Conference)
Empowering Society 5.0: Education, Technology, and Social Transformation
Vol 1 No 1 , 2025

Development of Interactive E-modul Based on Articulate Storyline in Microsoft Excel Material for Informatics Subject at SMKN 1 Bandung

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***Abstract*—This study aims to develop an electronic module (e-module) on Microsoft Excel material for the Informatics subject using Articulate Storyline software at SMKN 1 Bandung. The background of this research is the need for interactive, engaging learning media that aligns with the characteristics of vocational high school students, particularly in understanding practical and applicable content like Microsoft Excel. The research employed the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. These stages were systematically carried out to produce an e-module that is feasible for use in learning. The test subjects included a material expert, media experts, and students involved in both small-group and large-group trials. The validation results showed that the developed e-module obtained a feasibility percentage of 88% from the material expert (very feasible), 85% from media expert 1 (very feasible), and 80% from media expert 2 (feasible). The small-group trial yielded a score of 86%, while the large-group trial resulted in 85%, both categorized as very feasible. Based on these results, it can be concluded that the Articulate Storyline-based e-module on Microsoft Excel material is highly feasible to be used as a learning medium for the Informatics subject at vocational high schools.**

***Keywords*: ADDIE, Articulate Atoryline, E-module, Microsoft Excel, Media Development**

I. INTRODUCTION

In the digital era, the integration of technology in education is essential to enhance learning effectiveness and prepare students for the workforce. One effective approach is the use of digital-based instructional media, especially for practical subjects like Informatics in vocational high schools [1]. Microsoft Excel is a widely used software in education, administration, and industry. Its mastery is crucial for vocational students, particularly in supporting data processing skills needed in professional settings [2]. However, at SMKN 1 Bandung, student achievement in Informatics, especially Excel, is relatively low compared to other subjects. This issue is compounded by the use of conventional teaching methods, which are less interactive and less aligned with students' digital habits [3]. To address this, interactive e-modules using Articulate Storyline offer a promising solution. These modules provide flexible, multimedia-rich learning that can be accessed anytime and support self-directed learning [4]. Despite its potential, such technology remains underutilized in schools like SMKN 1 Bandung.

This study aims to develop and evaluate an interactive e-module using Articulate Storyline for teaching Microsoft Excel. The goal is to enhance student engagement, improve learning outcomes, and support the transition from theory to practice in vocational education [5].

II. EASE OF USE

A. Type of Research

This research was conducted using the research and development method (Research and Development). Research and Development is a study produced to produce a particular product and test the effectiveness of the product [6]. This research focuses on the development of E-Modules (electronic modules).

The module created contains components, namely: analysis, design, development, implementation, and evaluation (ADDIE). These components are carried out in a structured manner on learning strategies, learning materials, facilities, competencies, teacher competencies, and student characteristics to help design learning that produces effective, efficient, innovative, and interesting learning models.

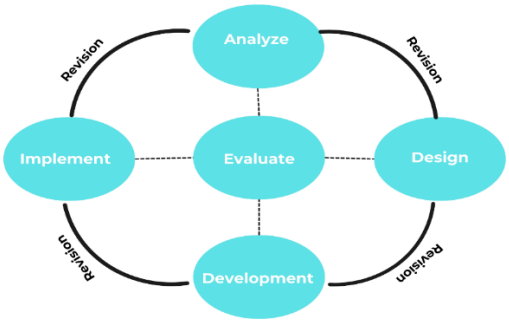


Figure 1 Model ADDIE

B. Instrument

Data collection was an essential initial stage in this development research [7] .as it provided the necessary foundation for designing an effective and relevant learning product. Several techniques were used to obtain supporting data, including observation, interviews, and questionnaires. These methods aimed to gather comprehensive information from teachers and students regarding classroom activities and instructional practices. Additionally, validation instruments were distributed to All instruments were developed using a

Likert scale, which is to change qualitative data into a broad scale with the provision that the score can be seen on 5 points and is designed to convey various aspects of the e-module, such as design, content, usability, and interactivity. The data obtained from this instrument is the basis for analyzing the feasibility and quality of the media developed.

C. *Prosedure*

The research and development procedure for E-modules on Microsoft Excel material in the Informatics subject at SMKN 1 Bandung follows the stages of the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation) [8]. The following stages are required in its implementation.

D. *Analysis*

The first stage is the analysis stage. This stage is carried out using the observation method and interviews with Informatics subject teachers at SMKN 1 Bandung to determine the needs that must be met in the process of developing E-Module learning media using Articulate Storyline software. The product developed is an E-Module learning media for SMKN 1 Bandung students, on the Microsoft Excel material for Informatics subjects. From the results of the analysis, information was obtained regarding the needs analysis and curriculum needs as follows

1. Needs Analysis

   Needs analysis is the process of analyzing the requirements needed to create and run Articulate Storyline. Development media needs analysis table and implementation media needs analysis.

Table I Analysis of media implementations needs

No	Hardware Requirements	Spesification
1	Hardware	Minimum CPU 2Ghz processor or higher (32 bit or 64 bit) Memory 2 GB
		Hard disk still has 1 GB of free space
3	Monitor	1,280x800 resolution
4	Soundcard	to make a sound
5	Mikrofon	to record sound
6	Webcam	to record video narration

2. Need Curriculum

   Curriculum analysis is conducted by reviewing the curriculum implemented in Bandung. Curriculum analysis is used to ensure the suitability of the material to be entered into the E-module used with the material used in the school's learning. The material is in the form of Microsoft Excel learning material in Informatics subjects. The following is an explanation of the material

Table II Microsoft Excel Material

No	Element	Learning objectives	Material
1	Basic Features of Microsoft Excel	Students are able to understand the features contained in Microsoft Excel and apply them in practice	1. Microsoft Excel Features 2. Autofit feature 3. Adjust Size 4. Number formatting 5. Chart
2	Formulas in Microsoft Excel and Arithmetic Operations	Students can understand formulas in Microsoft Excel and operate arithmetic in applications.	1. Formulas 2. General Functions SUM, AVERAGE, MAX, MIN 3. logical function if

E. *Design*

This stage is also known as the design (blueprint). At this stage, a product display and design will be produced, and at this stage, the materials used will be compiled by collecting teaching materials owned by the Informatics subject teachers of SMKN 1 Bandung such as LKS (Student Worksheet) books, modules, or from the internet, then these are processed and developed into E-Modules based on the target media used. In addition, at this design stage, the developer also creates flowcharts, Use Case Diagrams, and Activity Diagrams to facilitate the use of E-modules [9].

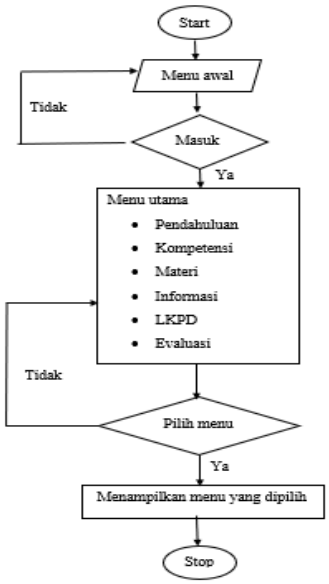


Figure II Flowchart

As for the Use Case Diagram

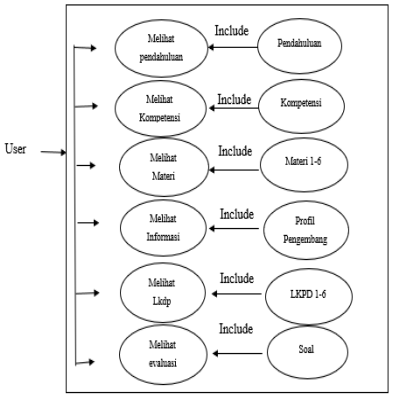


Figure III Use Diagram Case

Meanwhile for the Activity Diagram

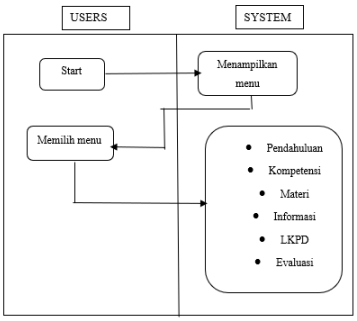


Figure IV Activity Diagram

F. Development

At this stage, the process of compiling the product that will be developed as an E-Module is carried out by creating E-module learning media and learning media products are made according to previously determined software, namely using the Articulate storyline.

G. Implementation

At the Implementation stage, a trial will be conducted on students of SMKN 1 Bandung on the Microsoft Excel material in Informatics subjects. At this stage, a questionnaire will also be given to measure and find out the opinions or responses of students of SMKN 1 Bandung regarding the learning media that has been created.

H. Evaluation

At this stage, the researcher will conduct the final revision, related to the results of the learning media developed based on input obtained from the response questionnaire or field notes on the SMKN 1 Bandung observation sheet. This aims to ensure that the product developed in the form of an E-Module can be developed truly appropriately and can be used in learning carried out at the school.

1.Stage of Data College

Data collection instruments are tools used to assist the data collection process. Instruments can make it easier for researchers to develop products because the existence of data collection instruments will make it easier for researchers to obtain the data needed in the development process. There are 3 instruments that must be given attention to the development of learning media developed by researchers, including Media Expert Instruments, Material Expert Instruments, and Student Instruments

In this research, the development method (Research and Development) was used. Therefore, the technical analysis of the data on the questionnaire sheet is descriptive. The data obtained from filling out this questionnaire comes from material experts, media experts and respondents in the form of quantitative values (numbers) converted into qualitative values (letters).

Table III Scoring rules for Media Expert, Material Expert and Student instrument items

No	Criteria	Score
1	Strongly agree	5
2	Agree	4
3	Simply Agree	3
4	Don't agree	2
5	Disagree	1

Determine the overall value in the assessment aspect of each test by calculating the average assessment score, then to determine the feasibility based on the assessment in the form of a percentage using the formula:

$$\text{Feasibility percentage (\%)} = \frac{Analysis\ Result\ Score}{Maximum\ Score} \text{ x100\%}$$

Then the calculation results obtained will be compared using the score interpretation table in the following table.

Table IV Score Interpretation

No	Score	Qualification
1	81%-100%	Very Worth It
2	61%-80%	Worthy
3	41%-60%	Decent Enough
4	21%-40%	Not Worth It
5	0%-20%	Totally Not Worth It

[10]

III. RESULT AND ANALYSIS

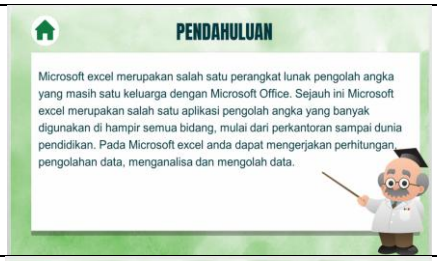
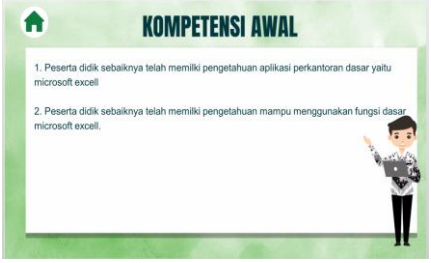
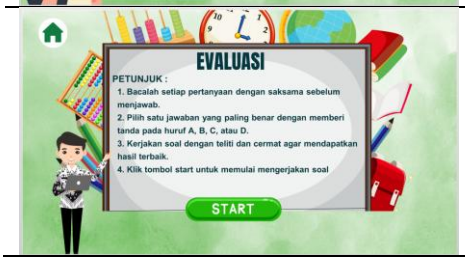
In this chapter of results and analysis, the results of the analysis that the developer found from the initial stage of making the e-module to the end are presented. In addition, this section also presents data obtained from the results of the research conducted, including the assessment of Media Expert 1, Media Expert 2, Material Expert, and assessments from students consisting of assessments from small groups to large groups.

A. System Evaluation

This section presents the data from the product model development results and validation test results which consist of 2 stages, namely the development stage and the implementation stage. In addition, this section also displays the final results of the E-module product development that was developed.

The following is the final design of the E-module product on Microsoft Excel material using the Articulate Storyline application in the form of a website that can be accessed from electronic devices used by students.

Table V Emodule Display Result

Picture	Explanation
	Home Page: This page displays the login form that must be filled in by students. In addition, there are also logos of the developer university and the school where the development is carried out. There is a logo and Title E module in the middle of the display and also a button to turn on the backsound on the top right.
	Main menu: this section contains the menus contained in the e-module as follows: Introduction to Competence, Material, Information, LKPD, Evaluation.
	Introduction: This nebu contains brief knowledge about Microsoft Excel
	Initial Competencies: This section contains explanations that students must understand before running the e-module.
	Material: this material menu contains materials 1 to 6.
	Developer profile: this section contains information about the developer's identity.
	LKPD: contains Student Worksheets 1 to 4
	Evaluation: this section contains evaluation questions that students can work on directly.

B. Testing

- Media Expert 1

Table VI Media Test Expert

Score acquisition	Maximum score
85	100
Result	85%
Reach Level	Very Worth It

$$\text{Feasibility percentage (\%)} = \frac{Analysis\ Result\ Score}{Maximum\ Score} \text{ x100\%}$$

$$\text{Feasibility percentage (\%)} = \frac{85}{100} \text{ x100\%}$$

This media expert test was conducted by a Lecturer in Information Technology Education, Faculty of Science and Technology, Bhinneka PGRI University, Tulungagung. The following are the results of the Media Expert Test by Mr. Fahrur Rozi, M.kom. Based on the calculation above, the percentage of the eligibility of the media expert test obtained a value of 85%. When adjusted to the Eligibility Criteria Table,

the criteria for "Very Eligible" were obtained by Media Expert 1.

- Media Expert 2

Table VII Media Test Expert

Score acquisition	Maximum score
80	100
Result	80%
Reach Level	worthy

$$\text{Feasibility percentage (\%)} = \frac{Analysis\ Result\ Score}{Maximum\ Score} \text{ x100\%}$$

$$\text{Feasibility percentage (\%)} = \frac{80}{100} \text{ x100\%}$$

This media expert test was conducted by a Lecturer in Information Technology Education, Faculty of Science and Technology, Bhinneka PGRI University, Tulungagung. The following are the results of the Media Expert Test by Mr. Dr. H. Abdul Haris Indrakusuma, M.pd. Based on the calculations above, the percentage of eligibility for the media expert test was obtained with a value of 80%. If adjusted to the Eligibility Criteria Table, the "Eligible" criteria are obtained by Media Expert 2.

- Materials Expert

Table VIII Media Test Expert

Score acquisition	Maximum score
88	100
Result	88%
Reach Level	Very Worth It

$$\text{Feasibility percentage (\%)} = \frac{Analysis\ Result\ Score}{Maximum\ Score} \text{ x100\%}$$

$$\text{Feasibility percentage (\%)} = \frac{88}{100} \text{ x100\%}$$

This test was conducted by the Informatics subject teacher on Microsoft Excel material at SMKN 1 Bandung Tulungagung, namely Mrs. Alimah Nuri Hidayah. S,Pd. From the results of the analysis and calculation of the percentage of the feasibility of the Material Expert Test, a score of 88% was obtained. These criteria based on the Score Interpretation Table are included in the category of "Very Eligible" to be used as a learning medium in a class.

- Product Test Results

Table IX Small Group Trials

Score acquisition	Maximum score
860	1000
Result	86%
Reach Level	Very Worth It

$$\text{Feasibility percentage (\%)} = \frac{Analysis\ Result\ Score}{Maximum\ Score} \text{ x100\%}$$

$$\text{Feasibility percentage (\%)} = \frac{860}{1000} \text{ x100\%}$$

Based on the score of the analysis results and the calculation of the percentage of the feasibility of the Small Group Trial of the E-module based on Articulate Storyline with Microsoft Excel material at SMKN 1 Bandung, it got a score of 86%. If adjusted to the Score Interpretation Table, the category is included in the category of "Very Feasible".

Table X Small Group Trials

Score acquisition	Maximum score
4590	5400
Result	85%
Reach Level	Very Worth It

$$\text{Feasibility percentage (\%)} = \frac{Analysis\ Result\ Score}{Maximum\ Score} \text{ x100\%}$$

$$\text{Feasibility percentage (\%)} = \frac{4590}{5400} \text{ x100\%}$$

Based on the calculation of the Analysis Results Score above at the Large Group Trial stage, a score of 85% was obtained, so it can be concluded that the students' assessment of the E-module learning media based on Articulate Storyline in Microsoft Excel material if adjusted to the Score Interpretation Table, the category "Very Eligible" was obtained.

IV . CONCLUSION

Based on the results of research and development conducted with the title "Development of Electronic Modules (E-Modules) on Microsoft Excel Material for Informatics Subjects Using Articulate Storyline at SMKN 1 Bandung" using the Research and Development method and using the ADDIE method. The following conclusions were obtained, The validation results showed that the developed E-module met the eligibility criteria as a learning media. The results of the validation scores from experts and student responses are as follows. Validation by Media Expert 1 obtained a score of 47 with a feasibility percentage of 85% and was included in the "Very Feasible" category. Validation by Media Expert 2 obtained a score of 44 with a percentage of 80% and was categorized as "Feasible". Validation by Material Expert obtained a score of 44 with a percentage of 88% and was included in the "Very Feasible" category. The results of the field trial showed that the E-module received positive feedback from students with the following data. The Small Group trial obtained a score of 456 with a feasibility percentage of 86%, included in the

"Very Feasible" category. The Large Group trial obtained a score of 2414 with a feasibility percentage of 85%, also included in the "Very Feasible" category. Thus, it can be concluded that the E-Module based on Articulate Storyline developed on Microsoft Excel material is very suitable for use as a learning medium for Informatics subjects in vocational schools, especially to support interactive, interesting learning processes that are in accordance with the needs of students.

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