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Development of Canva-Based Interactive Learning Media for Basic Electronics Learning in Vocational Education

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Abstract - Due to the fast advancement of digital technology, new learning environments are built in vocational education by using interactive learning resources which seem essential for promoting students conceptual understanding and engagement in their learning. But in Basic Electronics courses, conventional instructional methods that are mostly dependent on lectures and printed materials lead to low participation of students paying attention during lectures and the abstract concepts are often difficult for them or for layman. The aim of this research was to produce valid and practical Canva-based interactive learning media for the Basic Electronics subject in the classroom. This research used a R&D method with the Four-D (4D) development model consisting of Define, Design, Develop and Disseminate stages. It was validated by a media expert and a subject matter expert, and then it was tested to Grade X of SMK Negeri 1 Sumatera Barat. The data was collected using expert validation questionnaires and student practicality questionnaires. Results of the validation show that the developed media earned validity score by media experts of 91% and subject-matter experts of 93% which are both categorized as very valid. In addition, the evaluation of practical learning conducted by students showed that media was highly practical and easy to use in learning activities. Thus, you have an information packet in the forms of instructional materials, videos, learning objectives, evaluations and interactive navigation delivered to the learners in one digital package that may be opened using a computer or laptop connected to the Internet. The results indicate that the interactive learning media based on Canva can be implemented as a medium of instruction to support learning in Basic Electronics in vocational education. Future research should be conducted taking into account experimental research designs to examine its effectiveness in enhancing student learning outcomes.

Keywords - Interactive Learning Media, Canva, Basic Electronics, Vocational Education, 4D Model, Educational Technology.

I. INTRODUCTION

Digital Transformation in Education The last decade has witnessed a huge transformation in the ways of teaching and learning as digital technologies have been incorporated into education. Digital learning environments prompt new roles for instructional media to be developed by teachers in ways that improve student-centered learning with respect to motivation, engagement, and conceptual understanding [1]. In vocational education there are accumulating demands from students to master the performance requirements of both practical competencies and theoretical knowledge, making interactive learning media more easily available increasingly important [2].

Basic Electronics is a basic subject in the Electronics Engineering fields on many Vocational high schools . This subject teaches you basic knowledge on electronic devices and components, fabrication processes, industrial electronics and technology, techniques of measurement and it also covers safety in work. Therefore, students are required to grasp many abstract concepts that cannot always be best taught in traditional classroom settings [3], [4].

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Based on preliminary observations at SMK Negeri 1 Sumatera Barat, there are some instructional challenges. Powerpoint presentations and printed teaching materials predominated the learning activities in a teacher-centred instrucional approach. This medium has not yet been applied to study using Interactive Learning Media, especially in the Science Subject of Basic Electronics [5]. Consequently, students often struggled to comprehend concepts theoretically before performing lab practice, while class-based education became increasingly dull and ineffective. These conditions also restricted self-directed learning outside the classroom. It is these curriculum needs that have driven the development of a more interactive digital learning resource [6].

Interactive learning media have been widely studied as an effective educational device because they can integrate text, images, animations, audio, video and user interaction into a single learning environment. This multimediative approach helps students involve in the learning process instead of merely getting information passively [7]. Multimedia learning theory suggests that students learn best when verbal explanations are presented alongside the right kind of visual representations and interactive elements. Previous studies have shown that multimodal instructional methods positively affect students motivation for studying, engagement with activities, and overall academic performance [8], [9].

Canva is one of many multimedia development platform, and has become one of the more facile digital applications used for classroom education recently. Canvas is to be able to come up with an more attractive learning presentation in a rather simple way by using tools such as canvas image so that you do not have advanced graphic design skills. It provides education templates, media integration options and in-built video along with bespoke hyperlinks to make interactive navigation easy for

the teachers when creating a digital medium education material. These traits make Canva an especially valuable tool for vocational education, which needs visual demonstrations and other interactive instructional resources [10].

Some research studies had been conducted on the development of interactive learning media using various technologies. Six studies described improvement of the validity and practicality following expert review and/or having students implement. However, only a handful of studies have been solely devoted to developing of interactive learning media with the help of Canva for content matter in Basic Electronics as a subject following the Merdeka Curriculum in Indonesia's vocational schools [11]. Hence, this study aims to fill in this gap by embedding all different curriculum components, multimedia learning materials, instructional videos and formative assessments into a single interactive learning platform [5].

The novelty in this research is the development of an integrated Canva-based interactive learning media for the Basic Electronics subject at Vocational High Schools. In contrast to traditional presentation media, the developed product provides a single digital learning context for use both in-class instruction and independent-learning style situations by integrating elements such as learning objectives, curriculum achievements, instructional materials, embedded incomputer learning videos and evaluation activities with interactive navigation [12].

This research is conducted to (1) prepare the Canva-based interactive learning media on Basic Electronics subject using Four-D development model, (2) evaluate the validity of the prepared media assessed by experts, and (3) determine its practicality based on students response after it has been implemented in vocational education.

II. METHODS

A. *Research Design*

This study employed the Research and Development (R&D) approach to develop an interactive learning medium for the Basic Electronics subject. The research adopted the Four-D (4D) instructional development model proposed by Thiagarajan, which consists of four sequential stages: Define, Design, Develop, and Disseminate. The model was selected because it provides a systematic framework for designing, validating, revising, and implementing educational products before classroom application. The primary objective of this study was to produce an interactive learning medium that fulfills the criteria of validity and practicality for use in vocational education [13].

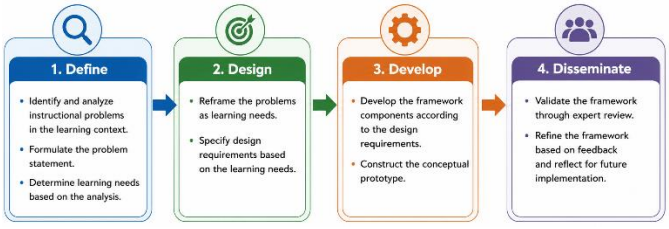

Figure 1. Stages of the 4-D Method

1. *Define (Definition)*

At the define stage, a needs analysis is carried out to identify problems that can be used as a background for research. The analysis revealed several instructional issues:

- Learning activities were predominantly teacher-centered;
- Interactive learning media had not yet been implemented in basic electronics instruction;
- Students experienced difficulties understanding theoretical concepts before laboratory practice;
- Learning resources were limited to printed materials and presentation slides.

2. *Design Stage*

Following the analysis, the subsequent phase involves developing the product. Prior to the actual production of the item, researchers craft the design to confirm that the media produced fulfills the requirements of the intended audience. This includes designing using Canva software. In the Design phase, the framework and presentation of the educational materials were developed. The product architecture included:

- Home Page
- Outcomes of Learning (CP)
- Goals of Learning (ATP)
- Educational Resources
- Teaching Videos
- Engaging Assessment
- User Manual
- Creator Profile

The media was designed using Canva, which enables the integration of multimedia elements such as text, graphics, hyperlinks, videos, icons, and interactive navigation. The visual interface emphasized simplicity, consistency, readability, and ease of navigation to enhance user experience.

3. *Development (Development)*

Stage furthermore after planningproduct, namely the Development stage, the stage where the media creation or production process takes place. After design product has finished step. The next step is media creation. To create the media, the researchers used Canva software, a software used to create interactive learning media that can be used on a computer. After the prototype had been completed, expert validation was conducted. Media experts evaluated:

- Interface Quality
- Typography
- Color Composition
- Navigation
- Usability
- Accessibility

Meanwhile, subject-matter experts evaluated:

- Curriculum Compatibility
- Content Completeness
- Conceptual Accuracy
- Relevance Of Examples
- Instructional Presentation

Suggestions from validators were incorporated into product revisions before implementation. This iterative evaluation process ensured that the final product met educational quality standards before classroom use.

4. Disseminate Stage (Spread)

In the dissemination stage, the learning materials are packaged and distributed to the designated students. After implementation, learning objectives are also measured to gauge the effectiveness of the developed learning materials. The results can then be used as evaluation and development material for further research.

B. Data Collection Instruments

1. *Interview*

Interviews serve as a method for gathering data that includes direct engagement between researchers and those taking part in the study. The purpose of interviews is to obtain a detailed insight into the experiences, opinions, and viewpoints of individuals related to the phenomenon being analyzed. Depending on how much of a predetermined outline is utilized, interviews may be categorized as structured, semi-structured, or unstructured.

2. *Questionnaire*

A questionnaire serves as a tool for gathering information that is achieved by interacting with the source of data. In the context of a questionnaire, it consists of a series of inquiries utilized by investigators to acquire information straight from the sources by engaging in conversation and posing questions. To improve the validity and practicality of the Canva application as a learning medium, solutions are needed that include improving research methodology, developing relevant content, integrating with active learning methods, and a user-friendly interface.

In this research, information gathering occurred through the issuance of validation surveys, which included validation surveys intended for developing Canva media educational resources, along with practical surveys that collected student feedback regarding the digital comic media that had been created. The Likert scale refers to a type of research tool utilized for assessing attitudes and views. This scale is employed to complete surveys where respondents are prompted to express their degree of agreement with several questions. Typically, the inquiries used in research are termed research variables and are defined in detail. The modified Validation Questionnaire Grid can be seen in Table 1.

Table 1. Instrument Grid

Aspect	Indicator
Material	Compatibility of material with CP and ATP. Accuracy of Material. Timeliness of Material

C. Data Analysis Techniques

The media feasibility testing phase was conducted by two media validators and two material validators. The media feasibility assessment criteria were determined using a Likert scale, as shown in the assessment table below [14].

Table 2. Scores Using the Likert Scale

Score	Category
1	Strongly agree
2	Agree
3	Somewhat Agree
4	Disagree
5	Strongly Disagree

Determine the total score of the answers obtained by adding up the values obtained from many indicators, the maximum score for each validity item is 5, by giving validity values using the formula:

$$Feasibility = \frac{\sum Score\ Obtained}{\sum Expected\ Scores}\ x\ 100\%$$

The percentage results are a reference for the feasibility of digital comic learning media using Canva software in the Basics of Electronics subject for class X [15].

Table 3. Results of the learning media validation test

Achievement Level (%)	Category
0%-20%	Very weak
21%-40%	Weak
41%-60%	Enough
61%-80%	Strong
81%-100%	Very strong

III. RESULT AND DISCUSSION

A. Results

1. *Creation of Engaging Educational Media*

This research led to the creation of a Canva-centered interactive educational resource for the Basic Electronics course within vocational training. This educational tool functions as a web application that is accessible on computers or laptops with an Internet connection. The layout combines educational material with multimedia elements to offer learners a more immersive and autonomous educational experience.

The development procedure adhered to the Four-D framework, starting with an analysis of needs, followed by the design of instruction, production of the product, validation by experts, revisions, and limited testing. The final version included six main menus that facilitate both classroom teaching and independent study. The primary elements of the created educational resources encompass:

- Main page
- Competency Goals (CP)
- Flow of Learning Aims (ATP)
- Instructional content
- Educational videos
- Engaging assessments
- Instruction manual
- Creator biography

The instructional materials cover all learning elements of the Basic Electronics subject according to the Merdeka Curriculum. Each learning topic is accompanied by instructional videos and interactive navigation, enabling students to access learning resources independently according to their individual learning pace. Creating interactive Canva learning media using the 4-D method.

2. *Media Creation*

a. Define Stage

Based on observations that have been carried out in interviews with one of the teachers of the Basic Electronics subject at SMK Negeri 1 West Sumatra, Mr. Ade Retno Sanjaya, S.Pd.Gr, the use of media in the Basic Electronics subject has not been maximized.

b. Planning Stage

Creating engaging Canva media for the subject of Basics of Electronics starts with establishing an outline for the content that will be produced. Each page showcases various elements including a navigation menu, desired learning outcomes (CP), a structured flow of learning objectives (ATP), necessary materials, quizzes, and instructional videos.

1) Menu

The main page menu consists of several option buttons such as CP & ATP, Materials, learning videos, quizzes and profiles.

Figure 2. Menu

2) CP & ATP

Learning objectives are an outline of the material to be studied. A visual representation of the learning objectives is shown in Figure.

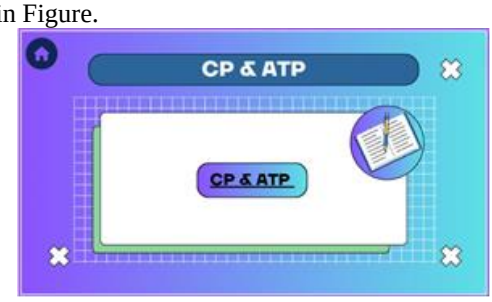

Figure 3. CP & ATP

3) Material

The choice of media materials is aligned with the Learning Outcomes and the progression of Learning Objectives in the curriculum, allowing for the development of the content. The representation of the material is illustrated in the figure.

Figure 4. Material

4) Quiz

Canva's interactive learning media quizzes are presented in the form of questions and answers, quizzes that are in accordance with the content of the learning objectives, as seen in Figure.

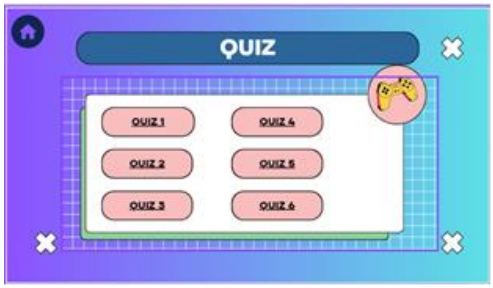

Figure 5. Quiz

5) Learning Video

The learning video display menu will display learning videos related to the material that has been presented.

Figure 6. Learning Video

6) Profile

The profile menu will display the profile creator.

Figure 7. Profile

c. Development Stage

The development stage is the stage where the media is created or produced. Once the product design is complete, the next step is media creation.

d. Dissemination stage (Disseminate)

At the dissemination stage, packaging and learning media are provided to the students who have been determined. After implementation, at this stage, measurements are also carried out.

3. *Media Validation*

The developed learning media was evaluated by two media experts from the Department of Electronics Engineering,

Universitas Negeri Padang. The validation process focused on visual appearance, interface design, typography, navigation, accessibility, and usability.

Table 4. Media Expert Validation Results

Aspect	Percentage	Category
Media Design	91%	Highly Valid

The cumulative validation score achieved was 91%, signifying that the created educational media met the standards for a highly credible teaching product. The reviewers noted that the design was visually appealing, the navigation was straightforward, and the multimedia elements were effectively incorporated.

Several suggestions were provided during validation, including improvements in menu consistency, icon placement, and layout organization. These recommendations were incorporated into the revised version before implementation.

4. *Material Validation*

Content validation was conducted by two Basic Electronics teachers at SMK Negeri 1 Sumatera Barat. The evaluation emphasized curriculum alignment, conceptual accuracy, completeness of learning materials, and instructional relevance.

Table 5. Material Expert Validation Results

Aspect	Percentage	Category
Learning Content	93%	Highly Valid

The mean validation score received from experts in the field was 93%, suggesting that the educational material was very suitable for use in a classroom setting. The reviewers affirmed that the teaching resources were created in alignment with the expected learning outcomes (CP) and learning goals (ATP) outlined in the Merdeka Curriculum. In addition, the provided examples, illustrations, and educational activities were deemed pertinent to the skills anticipated from vocational students in Grade X.

5. *Practicality Evaluation*

Following expert validation and product revision, the interactive learning media was implemented in a limited trial involving Grade X students at SMK Negeri 1 Sumatera Barat. Students evaluated several aspects of the learning media, including:

- Ease of operation,
- Interface attractiveness,
- Instructional clarity,
- Learning motivation,
- Readability,
- Usefulness of embedded videos,
- Effectiveness of animations,
- Evaluation activities.

The feedback from students showed that the educational media created was deemed Highly Practical. Learners mentioned that the app was user-friendly and allowed them to study Basic Electronics principles with greater independence. Furthermore, the multimedia elements enhanced students' engagement and involvement throughout the learning sessions.

B. Discussion

The findings demonstrate that the developed Canva-based interactive learning media fulfills the requirements of instructional quality based on expert judgment and student responses. The validation score from media specialists, which stands at 91%, suggests that the created product demonstrates outstanding quality in its interface, user-friendliness, and visual messaging. Attractive layouts, intuitive navigation, and consistent interface design contribute positively to students' learning experiences. These findings support multimedia learning principles suggesting that well-designed visual interfaces reduce unnecessary cognitive load and facilitate information processing [16], [17].

In the same way, the 93% score for material validation verifies that the teaching materials accurately reflect the skills needed for the Basic Electronics curriculum. The integration of learning objectives, instructional explanations, illustrations, and multimedia resources enables students to understand abstract electronics concepts more effectively than conventional lecture-based instruction [18].

An important contribution of this study is the integration of several instructional components into a single learning environment. Unlike traditional PowerPoint presentations that mainly provide static information, the developed learning media combines instructional materials, learning videos, interactive navigation, formative assessments, and curriculum guidance within one digital platform. This integration allows students to access learning resources independently both inside and outside the classroom [8], [19].

The positive practicality responses also indicate that students accepted the learning media as an effective instructional tool. Multimedia elements, including videos and animations, increased learning motivation while simplifying difficult concepts through visual representation. Interactive navigation enabled students to determine their own learning sequence according to individual needs, thereby supporting self-directed learning.

These results align with earlier research indicating that instructional materials utilizing multimedia greatly enhance students' interest, motivation to learn, and comprehension in vocational training. Mayer's Cognitive Theory of Multimedia Learning suggests that learners reach a more profound grasp of concepts when spoken explanations are combined with pertinent visual elements instead of being delivered independently. Likewise, recent studies in engineering education have emphasized that interactive digital media encourage active learning and improve students' participation during classroom instruction [20].

In contrast to earlier studies, the uniqueness of this research is found in the creation of a detailed interactive learning space based on Canva, which has been tailored for the Basic Electronics course within the framework of the Merdeka Curriculum. Rather than functioning merely as presentation software, Canva was utilized to develop an integrated instructional platform that includes curriculum mapping, learning materials, embedded instructional videos, interactive assessments, and user guidance. This comprehensive design provides a practical solution for teachers seeking accessible and

low-cost digital learning resources without requiring advanced programming skills [11].

However, this research has various constraints. The assessment of the product mainly concentrated on its validity and practicality with a small group of participants. As a result, the statistical analysis of the developed educational media's effectiveness in enhancing students' academic performance has not been conducted. Thus, upcoming research should utilize experimental or quasi-experimental methodologies with more extensive samples to explore the effects of Canvas-based interactive learning media on students' educational results, critical thinking abilities, and retention of knowledge over the long term.

IV. CONCLUSION

This study successfully developed a Canva-based interactive learning medium for the Basic Electronics subjectin vocational education using the Four-D (4D) instructionaldevelopment model. The development process consisted of four systematic stages: Define, Design, Develop, and Disseminate, resulting in a digital learning medium that

integrates curriculum objectives, instructional materials, embedded learning videos, interactive assessments, and userfriendly navigation within a single platform. The assessment carried out by media specialists showed that the created educational media received a validity rating of 91%. This score signifies that the design of the interface, the navigation framework, the ease of access, and the multimedia display met the standards of a very valid teaching resource. Additionally, the content evaluation performed by experts in the subject area achieved a validity score of 93%, verifying that the educational materials were precise, thorough, and in harmony with the Learning Outcomes (CP) and Learning Objectives Flow (ATP) of the Merdeka Curriculum.

The assessment of practicality also showed that learners viewed the educational resources as user-friendly, appealing, and helpful in facilitating self-directed study. The incorporation of various multimedia elements such as written content, visuals, teaching videos, animations, and interactive navigation established a more captivating educational atmosphere in contrast to traditional teaching methods. In general, the Canva-centered engaging educational tool can be viewed as a reliable and functional teaching aid for facilitating Basic Electronics education in vocational training. The findings suggest that accessible digital authoring tools such as Canva can be effectively utilized by vocational teachers to develop interactive learning environments without requiring advanced programming skills.

Future research should evaluate the instructional effectiveness of the developed media through experimental or quasi-experimental research involving larger participant groups. Additional features such as virtual laboratories, interactive simulations, adaptive assessments, and artificial intelligence-based learning support may also be incorporated to further enhance students' learning experiences.

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