

## **Development of Electronic Bonding Modules Using the Autocad Program for Students SMK Negeri 2 Merangin**

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**Abstract:** This study aims to produce interactive multimedia products bonding bricks using the AutoCAD program for students of SMK Negeri 2 Merangin that are attractive, effective, and efficient. This interactive multimedia development procedure uses the Lee & Owens development model. The model development process consists of five stages of development, namely: (1) needs analysis, (2) design, (3) development, (4) implementation and (5) evaluation. The data collected in this study were obtained from material experts, media experts, small group trials of 3 people, and large group trials of 10 people. The results showed that: (1) The development of the brick bonding electronic module using the AutoCAD program for students at SMK Negeri 2 Merangin was assessed by the validator as in the good category. (2) aspects of the attractiveness of the developed multi-media learning are very good. (3) the use of interactive multimedia is effective on student learning outcomes. Based on the results of this research, the multimedia products developed are very interesting, effective, and efficient to use as a source of learning and can help students in learning. This multimedia product can also be used for independent learning or as a companion medium for teachers in the learning process.

**Keywords:** Development, Engineering Drawing, Interactive Multimedia

### **A. Introduction**

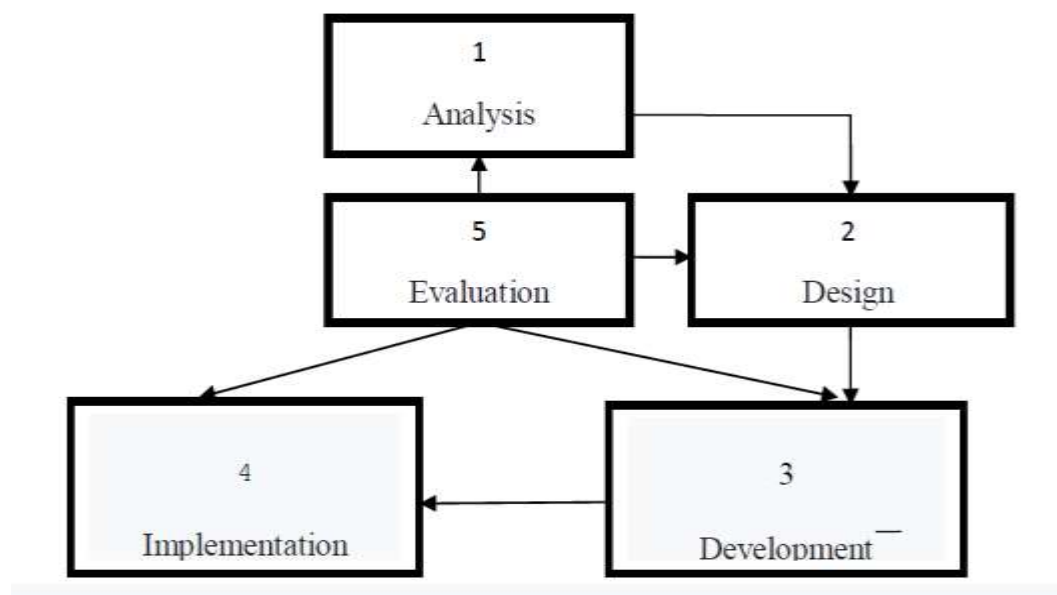
Learning in SMK is one of the important and even main factors in determining student success. Therefore, an effective learning process is needed, namely learning that is able to facilitate students to achieve the specified competencies supported by adequate facilities, complete practice tools, various media, and appropriate learning methods (Wagiran, 2010). The teaching system applied in the teaching and learning process of Engineering Drawing competence is a system of teaching theory and practice (Chu et al., 2021). Before students are given the task of drawing, the teacher provides theory with the lecture method, question and answer, and demonstration as an introduction, only then are given the opportunity to ask questions that are not understood. After students feel clear, students are immediately given the task of

drawing what is requested in the questions in accordance with the theory that has been given.

The reality that is encountered in the learning process, especially in the subject of drawing brick bonds, students are less interested in doing the assignments given because of understanding the content and skills, as well as the available theoretical concepts that are still abstract in nature (Giddens & Sutton, 2021). Besides that, students also have difficulty drawing brick bonds, the pictures are not neat, and it takes a long time. When students practice by manually drawing brick walls that are built, their stability is not guaranteed because the accuracy of the bonds cannot be accounted for. Thus, based on the description above, it demands an immediate settlement so that the quality of the graduates produced can be maintained. In the process of drawing brick bonds, it is necessary to make auditive narrative media with the AutoCAD application, there are auditive explanations, the object visualization is attractive, and interesting in a shorter time, and after being drawn with the AutoCAD application the brick ties will be guaranteed stability because the accuracy of the bonding can be accounted for. Today AutoCAD is one of the most used CAD software by the Business World/Industry World and individuals. This is because this software offers various conveniences in drawing, both 2-dimensional and 3-dimensional images accurately and has many facilities to speed up the drawing process.

## **B. Methods**

The development model used in this study is the learning design model developed by Lee & Owens (2004). In accordance with the object and product characteristics to be developed, the use of the model is used according to the needs of this thesis. Broadly speaking, this development research model consists of 5 (five) steps, namely: (1) the analysis stage, (2) the design stage, (3) the development stage, (4) the implementation stage.) and (5) the evaluation stage. as shown in the following image:



**Figure 1.** Development Model Lee & Owens (2004)

The development carried out in this study is to make a learning design for drawing bonding bricks using the computer-based AutoCAD program, namely interactive multimedia. The basis for choosing the Lee and Owens model is because this model is descriptive in nature, namely showing clear and careful steps to produce a product, the development stages in this model are the same as other standard development stages, but this model is specifically designed for multimedia-based learning and is very suitable for product to be developed.

### C. Result and Discussion

The results of the expert validation of learning materials consisted of seventeen indicators, for the development of brick-bonding electronic modules using the AutoCAD program for students of SMK Negeri 2 Merangin relating to the quality of learning materials, the validator considered that the quality of learning materials contained in the CD (Compact Disk) program was satisfactory. good and appropriate, therefore the developer does not revise the learning material contained in the program.

#### Discussion of Learning Media Expert Validation Data

##### Appropriate Material

Suggestions and improvements to the results of the first validation stated that the learning material contained in interactive multimedia was in accordance with the

material displayed, but the method of using media/software was not clearly illustrated in the module, it needed to be refined, especially in the procedure for using the program. The developer perfects the procedure for using the program by displaying instructions for using the module in the program which contains 1) the learning steps to be taken; and 2) the equipment that must be prepared, which consists of a. hardware requirements b. software requirements; 3) Autocad learning principles consist of a. open the Autocad 2010 program B. understand the basic appearance of Autocad 2.

### **Use of Media and Images**

Etymologically, the word "media" is the plural of "medium", which comes from the Latin "medius" which means middle. Whereas in Indonesian, the word "medium" can be interpreted as "between" or "medium" so that the notion of media can refer to something that delivers or forwards information (message) between the source (messenger) and the recipient of the message. Media can be interpreted as a form and channel that can be used in the process of presenting information (AECT, 1994).

There are several limitations or understandings of learning media conveyed by experts. From these limitations, it can be concluded that learning media is everything related to software and hardware that can be used to convey the contents of teaching materials from learning resources to students (individuals or groups), which can stimulate the thoughts, feelings, concerns, and interests of students in such a way. so that the learning process (inside/outside the classroom) becomes more effective. Improvements to the procedure for using the program and enlarging certain images are carried out by the developer by discussing with multimedia programmers so that they can be corrected according to the validator's suggestions so that more varied and interesting images are obtained.

### **Image Clarity and Narration**

On aspect/indicator 3 media experts suggest enlarging the image or application and adding more images or applications Based on the validator's suggestion, the developer made improvements to the program, namely enlarging the image, and providing attractive images to make it easier for students to understand the material presented. This is in line with the opinion of Mayer (2009) explaining that: *"Learning will be disrupted if pictures that are interesting but not relevant to the material are added to multimedia messages. This is because pictures that are interesting but irrelevant will affect students' memory of the main message (content) conveyed"*. After going through validation twice by learning media experts, it was stated that the images in the learning program were in accordance with the learning material. Furthermore, aspect/indicator 4 describes in more detail the per-point narrative. Narration is a verbal expression conveyed by the narrator

*which functions as the delivery of information related to the learning message conveyed. Therefore, the use of program narratives must be clear so that information can be captured clearly.*

According to Mishra and Sharma (2005) that:

*"Sound can complement visual information and can be used to attract attention, arouse and retain interest, provide cues and feedback, assist, memory, and provide various types of subject matter (heart or engine sounds, sound clips)".*

According to Mayer (2009) states:

*"Characteristics of an effective book-based multimedia presentation, consisting of text and illustrations. First, the presentation should consist of words and pictures together i.e., text and illustrations rather than text alone. In short, the presentation should be multimedia. Second, the appropriate portions of the text and illustrations must be presented next to each other on the page. In short, the presentation must be integrated. Third, the main cause and effect explanation must be presented without extraneous text and illustrations".*

Furthermore, Mayer (2009) put forward the principle of voice (voice principle) in the development of multimedia "voice cues can make a difference to each learner's feelings of a social response to instructional messages. Mayer (2009) also states, "Learning increases when interesting, but unrelated sounds and music are not included in the presentation". Based on the suggestions from the validator and the principles of multimedia development, the developer made improvements to the program so that the narration sounds did not appear together in certain parts and held discussions with the multimedia programmers to technically improve the narration sound more precisely. After going through validation twice by learning media experts, it was stated that the narrative in the learning program was in accordance with the learning material.

### **Making Questions and Exercises**

According to media experts, it is necessary to provide practice questions that students can directly use. As the learning objectives to be achieved by students include cognitive aspects, affective aspects, and psychomotor aspects, the developer changes the depth level of the practice questions that have been programmed in the application. In accordance with the depth level of the questions, the developer makes the depth levels of questions from low, medium, and high levels.

Based on the suggestions from the validator and the principles for making these questions, the developer included questions with the conditions mentioned above and held discussions with multimedia programmers to technically improve the questions to be more precise. After going through validation twice by learning media experts, it was stated that the practice questions in the learning program were in accordance with the learning material.

### **Discussion of Small Group Trial Results Data**

Based on the verbal input and suggestions submitted by the students during the small group test on the brick bonding electronic module development product using the AutoCAD program for students at SMK Negeri 2 Merangin, the developer revised the product as follows:

- 1) Students using the CD program follow the steps to introduce AutoCAD in the program. AutoCAD introduction instructions and steps can direct the user to run the program. From the results of observations in small group trials students with low abilities were stiff in operating computers even though there had been steps to introduce AutoCAD. From these findings, the researchers evaluated and revised the steps for introducing AutoCAD to the program. This is in the opinion of Richey (1994) "Before designing designs, tools, and media the important thing to note is "the process of practicing and presenting it". Paying attention to whether the way of presenting is effective and efficient enough, such as the complexity of the design and development, how to use the product, and the ability or background of the designer or its use.
- 2) Students do practice questions easily Exercises and assignments help learners to achieve learning. According to Smaldino (2008), "Relevant training and practice can improve abilities, skills and new attitudes so that they can deliver students to achieve learning objectives." Heinrich (1996) states: "In learning, students must be given examples of exercises that are in accordance with the learning experiences of students so that learning is more meaningful and valuable. To use the software, students' prerequisite abilities must also be identified and considered.
- 3) It's good enough, you need to be more observant in using technical terms adopted into Indonesian the general comments given by material experts as a whole in the validation activity were that the product was good and very helpful in the subject of drawing brick bonds.

Based on the assessment of the material expert, the product can be tested.

### **Discussion of Large Group Trial Results Data**

Based on input and suggestions delivered orally during the large group test, students provided suggestions and input on the development of brick-bonding electronic module products using the AutoCAD program as follows:

- 1) AutoCAD introduction guide  
Instructions for using the program provide convenience in how to utilize and use the electronic module. The instructions for making it easy to use and use the brick bonding electronic module using the AutoCAD program have been



fulfilled properly, this shows that the instructions for introducing AutoCAD for students can be understood and used properly.

2) Multiple examples of materials.

Examples aim to strengthen the reader's understanding of facts/data. Therefore, the examples must be adequate and appropriate because the principles in presenting the examples must be relevant to the contents of the description, consistent with terms, concepts, propositions, and meaningful. In the development of this module, the developer has presented the necessary examples for each learning material, therefore the developer does not add more examples to the learning materials considering the time that has been designed in this program.

### **Discussion of Peer Observation Data**

Based on the results of the observations made during the small group tryout and large group tryout, the following observations were obtained:

**1. Aspects of Attractiveness**

- a. Students who master computers in the high category are excited when they open learning interactive multimedia programs and are calmer when opening AutoCAD introductory material. Students with high abilities need a short time to complete the learning program and faster than other students.
- b. Students who master computers in the moderate category have no difficulty opening the AutoCAD introductory material and wonder a little about other students. Students with moderate abilities take a little longer to complete the learning program than students who master computers in the high category
- c. Students who master computers in a low category have difficulty from starting to ending the program and always ask questions both with friends and with accompanying teachers. However, from the results of observations of students in the low category, they seemed enthusiastic about participating in each stage of the interactive program application, this was indicated by the feeling that these students felt comfortable sitting in front of the laptop to open each part of the application even though they were assisted by an accompanying teacher.

**2. Effective Aspect**

The purpose of learning to use clear and easy-to-understand language has been well received by students. This shows that the formulation of learning objectives has provided information for students about the learning outcomes to be achieved.

The contents of the material are in accordance with the curriculum, examples, pictures, AutoCAD introduction steps and colors are very supportive. This shows adequate examples and pictures so that students can better understand

and understand the material in the learning module. The terms in the interactive CD-learning are familiar to students in learning, especially in the use of technical terms, students often use these terms. So, for the effectiveness aspect, the use of interactive CD-learning media has fulfilled the effective aspect.

### **3. Efficiency Aspect**

To achieve the aspect of efficiency, indicators of success are achieved from the results of the pre-test and post-test showing that learning outcomes have increased by 18%. The number of students who have achieved the Minimum Completeness Criteria after the post-test was carried out in as many as 10 out of 10 students if the percentage of students who pass is 100%. This shows that the use of interactive CD media for learning to draw brick bonds using the AutoCAD program has reached aspect 8.

## **D. Conclusion**

After going through several stages of the development process carried out to produce an interactive multimedia product drawing brick bonds using the AutoCAD program which is suitable for use in students of SMK Negeri 2 Merangin, it can be concluded as follows:

- 1) The research steps for developing a brick bonding electronic module using the AutoCad program for students at SMK Negeri 2 Merangin, using the media development model from Lee and Owens (2004) in the development stage consists of 5 development stages, namely the analysis stage, the design stage, the development stage development, implementation phase and evaluation phase.
- 2) In the attractiveness aspect of the material presented, students are enthusiastic in learning and following the instructions for use. In addition, students are also interested in the color composition contained in the product, this is supported by musical accompaniment. In terms of effectiveness, the resulting product makes it easy to use the program, provides speed in drawing and the material presented is easy for students to understand at SMK Negeri 2 Merangin. In terms of efficiency, the clarity of the examples and steps for using the program is very easy for students to understand and provides speed in drawing and the material presented is very easy for students to understand at SMK Negeri 2 Merangin.

The research development procedure is based on the steps of media development from Lee and Owens (2004) starting from the needs analysis stage, initial to final analysis, design stage, development stage, and evaluation stage. Product reviews, test subjects, data collection instruments, and data analysis techniques.



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