

# Development Of Multimedia Learning To Improve higher-order thinking Skills in Basic Electronics Material

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**Abstract.** This multimedia learning development research was motivated by the difficulty of educators in finding the right media to improve higher-order thinking skills on Basic electronic material. The research conducted is more developed on improving higher-order thinking skills. This research aims to develop multimedia learning electronics that are feasible, effective, and practical to use. The research phase consists of four stages: preliminary research, prototyping, summative evaluation, and systematic reflection and documentation. The procedure used for developing multimedia learning is to use four stages of development research: preliminary research stage, prototype, summative evaluation, systematic reflection, and documentation. The preliminary research phase consists of a literature study and a field study. The prototype stage consists of the design stage, formative evaluation i.e., expert assessment, small group evaluation, and field test. The summative evaluation stage consists of effectiveness and practicability tests. Based on user ratings, practical learning multimedia is used with a practicality level of 83% and is in a good category. Multimedia learning is effective in student learning with posttest results (75%) in improving students' higher-order thinking skills.

**Keywords:** Multimedia Learning, Higher Order Thinking Skill, Effective, Practical.

## 1 Introduction

Education is one of the ways that humans need to achieve their life goals. Education is very important in the formation of human character, mentality, and potential. Through education, students are expected to become better and more competent human beings[1]. However, students are still less encouraged to be able to master higher-order thinking skills. Students have difficulty in mastering higher-order thinking skills[2]. Learners need to improve their higher-order thinking skills. If not, then this will have a negative impact on students. Students will have short-term memory while learning, meaning that students will easily memorize but quickly forget the material they learn. This will also have an impact on the quality of human resources in Indonesia. At present Indonesia is at the bottom of the rankings in almost all types

of competencies needed by adults to work and work as members of society. The solution to learners' difficulties in mastering higher-order thinking skills is to use multimedia learning[3]. Multimedia learning can also make learning exciting, learners get the opportunity to engage their interests further. This learning medium is also effective in improving thinking skills. Students who use multimedia learning provide an average learning achievement in the cognitive realm that is better than real media. The development of learning media that can improve the higher-order thinking skills of learners is very important. The use of higher-order thinking skills in the right context will teach students the habit of thinking deeply, and the habit of living life with an intelligent, balanced, and accountable approach.

Multimedia learning has added value compared to previous research. Multimedia learning can be effective in improving the higher-order thinking skills of learners. The learning media has characteristics: using a scientific approach, providing higher-order thinking practice questions, and creating meaningful learning[4,5]. Through learning media that use a scientific approach, students can train their higher-order thinking skills. Through training on questions that measure higher-order thinking skills, students will get used to thinking deeply to solve problems that require higher-order thinking skills. These multimedia characteristics can help students in acquiring higher-order thinking skills[2,6]. Researchers see that there is a need for the development of multimedia learning to be able to improve higher-order thinking skills.

## 2 Development Model

Development research conducted by researchers is research that aims to produce an effective product for use in schools, not to test an existing theory. There are two models in development research, namely validation studies, and development studies. Validation studies are a development research model that aims to refute learning theories, while development studies are a development research model that aims to solve educational problems using relevant knowledge theories. This research uses a development studies model because researchers aim to produce a product that can solve problems in schools using pre-existing knowledge. The procedure for developing learning media in this development research is illustrated in the following chart:

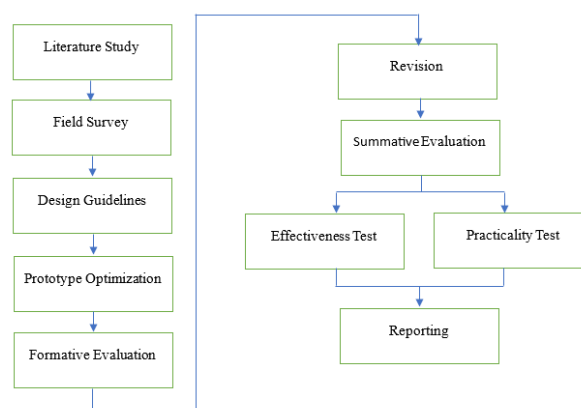
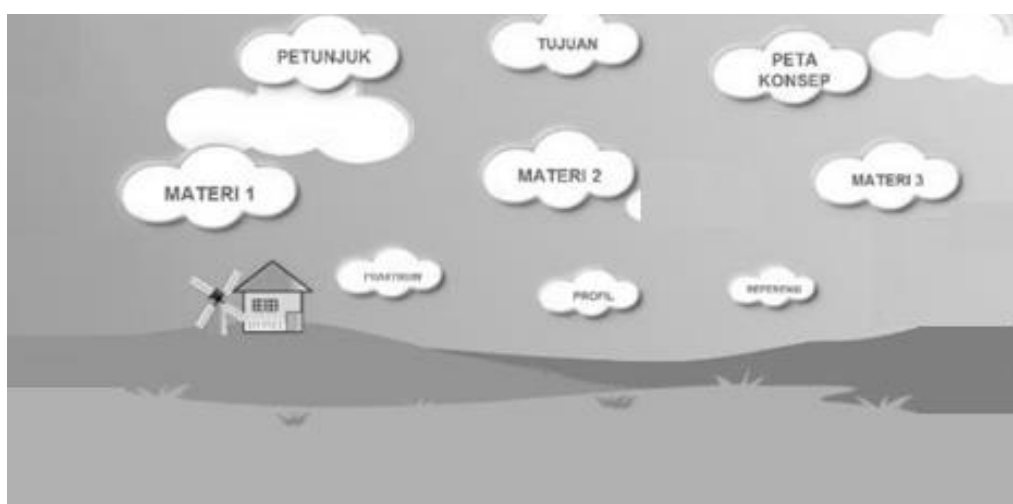


Fig. 1. Development Diagram

### 3 Results and Discussion

The product resulting from this development research is a learning medium that can improve higher-order thinking skills. The teaching material in this study is basic electronics. The selection of material is based on problems in learning basic electronic materials. This consideration is based on the results of preliminary studies conducted during observations in the study program. Multimedia concept design design refers to two components, namely: display and content. The first component is the display. The display designed consists of: the main page, apperception in the form of conversation, and text equipped with images, animations, videos, sample questions and practice questions.



**Fig. 2.** Learning Media Display.

Users of multimedia learning state that multimedia learning is practically used as a learning medium with a good level of practicality. Based on user ratings, practical learning multimedia is used with a practicality level of 83% and is in the good category. The results of the assessment questionnaire for students and teachers based on indicators of multimedia practicality aspects can be seen in the following table:

**Table 1.** Results of the practicality assessment questionnaire

No	Indicators	Number of values	Category
1	Ease of Use Application instructions	44	Good
2	Ease of operation media	40	Good
3	Media operation Wide variety of environments	35	Good
4	Media operation across a wide variety of times	41	Good
Total		160	Good

The maximum number of values of each indicator = 12  
 Number of maximum facet values = 192

The overall multimedia learning value of the indicator in percentage form can be seen in the following figure:

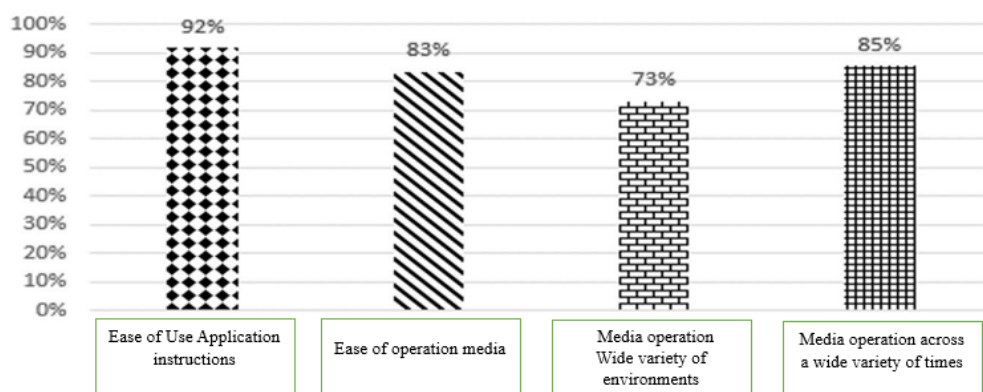


Fig. 3. Percentage graph of multimedia learning scores for the overall indicator

#### 4 Conclusion

The procedure used for the development of learning media is to use development research consisting of 4 stages, namely preliminary research stage, prototyping stage, summative evaluation, reflection systematic and documentation. The results of the student posttest also stated that learning media was very effective (75%) in improving students' higher-order thinking skills. The N-gain value obtained by students in this study was 0.64 (medium category). Multimedia learning is stated to be practical (85%).

#### References

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