



# Utilization of Interactive Learning Media of Electronic Ignition Systems to Improve Students Metacognitive Skills

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## ABSTRACT

This study aims to determine the increase in student's meta cognitive skills by utilizing Android-based interactive learning media. The research method used a quasi-experiment with 40 students as subjects separated as experiment and control class. Research subjects were asked to use interactive learning media that had been created and then assessed from several aspects of meta cognitive skills. The research data obtained was analyzed using the t-test. Based on the t-test result shown that there is a significant difference between experiment group and control group post test results. The experiment group get higher score test results. It can be concluded that interactive media utilization for learning can improve student cognitive capability. Based on the results of the study, the use of interactive media influenced increasing students' meta cognitive skills in all aspect of the research. From the self-evaluation test the experiment class reached 86% score. It means that the utilization of interactive learning media can make students metacognitive skills very well developed.

**Keywords:** *android based, interactive learning media, meta cognitive skills, student development.*

## 1. INTRODUCTION

Seeing the current development of science and technology is very supportive to support developments in various fields, such as in the fields of education, economics, health, environment. For example, in the world of education, it is hoped that the use of technology can assist in the learning process which will have an impact on increasing students' understanding. Technology that can be utilized to support the world of education, which is also in great demand by the community, especially among today's youth, is Android smartphone technology [1]. Android is now in great demand from the community, especially students, but it is not in line with its use in the world of education. Judging from the results of research conducted regarding the use of smartphones, where most users are 13-15 years old (44.1%) and 16-18 years (55.9%) [2]. On Google Play there are lots of features and applications that can be operated on the Android system, but the majority are in the form of games that do not support education. Application

developers are also less interested in developing applications that support education because they have lower selling points than applications for games and social media.

There are obstacles experienced in the learning process. Obstacles faced such as the absence of interesting learning devices to increase student learning motivation [3]. Learning media that are applied to learning electronic ignition systems still use conventional modules and power points. This media is considered less attractive as a medium for conveying material, especially for complicated electronic ignition systems. Where conventional modules can only be seen and read, the use of still images in conventional modules is felt to make students less understanding because there is no feedback from the media [4]. Whereas in the power point media the drawback is that students cannot use the media whenever and wherever they are because they are constrained by the media devices that will be used which causes learning to only be done at school. From

the problems that have been described, it turns out that it has an impact on reducing the attractiveness of students to the electronic ignition system material which results in reduced understanding of students so that it has an impact on learning outcomes [5]. On the other hand, teachers also have problems with how students can understand, be interested in and focus on the learning process. From the existing problems, there is a need for an innovative learning device.

In addition, meaningful learning strategies need to be improved. Learning that is meaningful can empower the potential of students, such as empowering metacognitive thinking, tends not to be implemented optimally so that the learning process becomes less meaningful. Students tend to be passive in class in receiving lessons, and do not take the learning process seriously. Metacognition is important in learning activities and is a determinant of student academic success. Students who have good metacognition also show good academic success compared to students who have poor metacognition [6]. The use of interactive media is a solution to improve student learning activities. Students can actively explore information from learning content that has been prepared in the media. This media can also be arranged according to the needs of students to have meaningful learning according to the concept of meta-cognitive learning. With interactive media based on Android applications, you can also increase the use of smart phones for student learning activities.

## 2. THEORETICAL REVIEW

### 2.1. Interactive Learning Media

Development of interactive learning media Interactive learning media is a medium that can provide feedback to media users with several types of responses. This interactive learning media will benefit its users in the learning process. Learning experiences conducted with interactive learning media can give a better impression compared to conventional learning media. The use of interactive learning media that emphasizes how to learn independently will make students easily achieve appropriate learning outcomes because learning independently prioritizes the self-control of each student. It is related to the achievement of learning outcomes after the learning process.[7] Multimedia technology is a highly effective technique for enhancing understanding and memory especially for students in addition to motivating them[8]. Interactive learning media can provide information and an attractive learning experience [9]. Online teaching and learning platforms need to be supported by technology, information systems and computers, electronic

devices as an effort to build and design student learning experiences in vocational schools [1].

### 2.2. Meta cognitive skills

Metacognition is a process which is employed when we consider and are aware of our own cognitive capabilities [10]. Metacognition refers to all processes about cognition, such as sensing something about one's own thinking, thinking about one's thinking and responding to one's own thinking by monitoring and regulating it [11]. Metacognitive knowledge refers to being aware and having a deeper understanding of one's own thinking process [12]. The empirical studies demonstrated that teaching metacognitive skills may enhance students' sense of awareness, and this would lead to an increase in their motivation to learn [12]. Metacognition indicates that originally it is based on two major factors (knowledge of cognition and regulation of cognition) but it further evolved with multiple factors having specific processes [13].

## 3. Research Methods

The research method used is quantitative research. Quantitative research design is aimed at discovering how many people think, act, or feel in a certain way. This method involves large sample sizes, concentrating on the number of responses [14]. To obtain the expected research data, this study applied a quasi-experimental research design by analyzing the results of changes from the use of interactive teaching media. With this design it allows research subjects to experience learning experiences according to the research design [15]. The results of the treatment in learning activities will be evaluated as a reference for research results. This quasi-experimental research design uses a two-group pretest-posttest design to facilitate implementation and ensure the validity of the results of the experimental process.

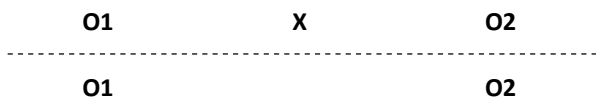


Figure 1. Research design.

University students of the experimental group ( $n = 20$ ) were instructed by means of a metacognitive support device why metacognitive activities are useful and how to apply them during learning. In addition, during learning, they were prompted to apply the metacognitive activities they just had learned. Students of the control group ( $n = 20$ ) were not instructed why and how to use metacognitive activities, and furthermore, they were not prompted during learning to apply these metacognitive activities.

At the end of the research design, all of the group research will take the posttest and self-evaluation test.

The data analysis used is an inferential statistical analysis technique that aims to evaluate the difference in the average scores of different pretests and posttests between two research groups. The analysis was conducted using the help of SPSS 20 for windows using a significance level of 0.05 (5%). Before testing with the t test analysis technique, the prerequisite analysis must first be conducted to determine whether the data analysis for testing can be continued or not.

We have developed interactive leaning media incorporated into the lesson plan that tackles science-related ignition system subjects. We also constructed a forty-item pretest and posttest and a 5-point Likert's Scale survey questionnaire consisting of sixty items referring to the experience of the respondents after experiment. The designed instruments underwent face validation by the three field experts and were provided with a validation tool as a guide in the validation process [14]. The reliability result was analyzed using Alpha Cronbach (Coefficient Alpha) measuring the internal consistency of the instrument. It also specified the anonymity of the respondents, and the data is confidentially generally analyzed without the respondent's identity publicized. The self-evaluation research instrument develops from several aspect: (a) goal setting, (b) planning and organizing, (c) problem solving, (d) self-evaluation, (e) self-correction and (f) concentration [10][16][17].

**Table 1.** self-evaluation score criteria.

Interval (%)	Criteria
85 – 100	very well developed
69 – 84	well developed
53 – 68	Developed
37 – 52	slightly developed
20 – 36	Underdeveloped

## 4. Result and Discussion

### 4.1 Research Result

Based on the carried-out data analysis, calculation results were obtained from cognitive test measurements and self-evaluation tests. The data is described in each stage concisely according to the stages of research whose results are as follows.

**Table 2.** The Pretest Difference Mean Score between Control Group and Experiment Group.

Group	N	Me an	S D	Mean Differe nce	t- test	P	Interpr e- tation
Experi ment Group	20	61	7.35	-1	-0.579	0.382	No difference

Control Group	20	60	7.10				
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The data in table 2 shows the difference test data on the t-test. The analysis showed a t-test score of 0.579. The interpretation of these values shows no significant difference between the two groups. This means that the understanding between the experimental group and the control group does not have a significant difference in understanding of the material of the electronic ignition system. From this stage, the experiment can proceed to the research implementation to the two groups.

**Table 3.** The Posttest Differences Mean Scores between Control Group and Experiment Group.

Group	N	Mean	SD	Mean Difference	t-test	P
Experiment Group	20	86	2.33	-15.00	-6.99	0
Control Group	20	71	5.67		2	

Table 3 shows the data on the results of the t-test on experimental activities. The results of the analysis show that the t test value is 6.992, the interpretation of this value is that there is a significant difference. This means that there is a significant difference in the understanding of the student groups after the experiment is carried out. From the results of the analysis, it was found that the experimental group got a higher average value than the control group. This proves that the application of interactive media can increase students' cognitive levels.

**Table 4.** The Differences in self-assessment survey between Control Group and Experiment Group

Self-assessment aspect	Value (%)	Interpretation
Experiment Group	86	very well developed
Control Group	68	developed

Table 4 shows the results of the self-evaluation test analysis of research activities. The data from the self-evaluation test showed that the control group got a value of 68% and the experimental group got a value of 86% from the research results. From these results it can be interpreted that the meta cognitive abilities of the control group can develop. Meanwhile, the experimental group that utilizes interactive media can make students' meta cognitive abilities develop very well.

### 4.2 Discussion

Based on the results of the posttest, there was a significant difference between the experimental group and the control group. The results of the posttest

experimental group showed a significant increase compared to the control group. This is because by using interactive media, a lot of information is packaged in an interesting way and can increase students' interest and focus on learning. This is in accordance with research that has been studied previously[3][12]. Another thing that can be provided by interactive learning media is that students can learn and get responses from the media, so they can find out whether the learning steps they are taking are correct or not.

From the results of the self-evaluation test, the results showed a particularly good increase in students' meta-cognitive abilities after using interactive media. This is because interactive media has been designed to accommodate meaningful learning and self-regulated learning. Material such as problem solving is included in the media so students feel challenged in solving problems. In addition, students are also required to work within the specified time in the media, so that they can practice planning their learning activities. This active process while studying creates greater impact for the student. These results have been studied from the previous research[4][5][7]. With interactive media utilization, learners can regulate most of every aspect that is needed to develop meta cognitive abilities.

## 5. CONCLUSION

Based on the t-test result shown that there is a significant difference between experiment group and control group post test results. The experiment group get higher score test results. It can be concluded that interactive media utilization for learning can improve student cognitive capability.

Based on the results of the study, the use of interactive media influenced increasing students' meta cognitive skills in all aspect of the research. From the self-evaluation test the experiment group reached 86% score. It means that the utilization of interactive learning media can make students metacognitive skills very well developed.

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