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# Development of Android-Based Starter Motor Learning Media for Improving Students 'Abilities and Knowing its Learning Motivated Achievements

**Ibnu Mubarak[1], Tatang P[1], Iyep Sutia[1], S. Sriyono[1], Ridwan Adam, M.N[1], Rika Andriani[2]**

[1]Mechanical Engineering Education Department, Universitas Pendidikan Indonesia
Dr. Setiabudhi Street, No. 229, Bandung, West Java 40154
[2]SMAN 15 Kota Bandung
Sarimanis I Street, Sarijadi, Kec. Sukasari, Kota Bandung, West Java 40151

*Corresponding author: barox82@upi.edu*

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## ABSTRACT

This study aims to develop Android-based learning media to improve students' abilities regarding the reduction type starter motor system and to determine the acquisition of learning motivation. The method used is pre-experimental design in the form of one-group pretest-posttest, while media development uses the ADDIE method. The population of this study were students who contracted electricity courses. The results of this study indicate an increase in the learning outcomes of the Pre-Test and Post-Test which is significant with the acquisition of the significance test using the t test with a significance value of 0.000, this increase is due to the use of android-based learning media that has been made. So that this learning media has a good impact on increasing students' insight in using technology, especially Android for learning uses. In addition, the students' learning motivation on average is in the category motivated by this media.

**Keywords:** Android Application, Motor Starter Reduction, Learning Outcomes, Learning Motivation

## INTRODUCTION

Education is an activity that is carried out throughout life by each individual without discriminating in a discriminatory manner, so that education must be able to cover all the needs of its students according to the characteristics of each individual [1].

In order to control the quality of education, an educator must be able to innovate in carrying it out. The Covid 19 Pandemic period forced educators and students not to do direct learning, in accordance with government policies that prohibit the education process from being carried out directly (face-to-face), the government established a policy that Teaching and Learning Process must be done online [2].

This policy forces an educator to use media that can be done online, meaning that educators must use digital media so that it can be done online in accordance with government regulations, thus digital media must be able to provide the needs of students in learning, be it in the form of teaching materials, methods, as well as various teaching media. The point is that digital media must be efficient so that students can communicate creatively and rationally and think critically [3]. Learning media are methods and techniques used to communicate between teachers and students so that the learning process becomes more effective [4].

The media used is important in PBM, because it can help educators and students achieve learning goals, namely learning success, there are two important things in PBM, namely learning methods and media [4]. One of the teaching methods that can be used is to apply Blended Learning (BL) learning, several things that must be considered when creating the media that will be applied to BL, including the design of learning features (quality of technology, online tools, and face-to-face support). nothing but to achieve the goal of education [5].

This pandemic period demands the application of a combination of learning media that can provide abilities to students. The material presented here is the motor starter material which is an important component in a vehicle, with this device it will be easy to start the vehicle. There are several types of starter motors, one of which is the reduction type, this starter motor is one of the most widely used in vehicles, especially cars.

The reduction type starter motor generates a large torque (torsion moment) when compared to the other type of starter motor [6]. The vehicle requires a large amount of torque to be able to start the engine by turning the crankshaft through the flywheel. Based on observations in the field, many students actually do not understand the material of this Reduction Type Starter Motor, this can be seen from the results of tests and direct observations by researchers so far, on average students are still lacking in understanding the material.

There are many media or tools that can be used, one of which is by utilizing online meeting media (zoom meeting) and also android-based media. Researchers chose android-based media because students have android as a gadget, it's just that the use of android by students is not optimal, this is evident from the results of interviews and direct observations in the field by researchers, it was found that students used their android more to play games.

**Learning**

Learning is a process of changing someone's behavior. The experience of learning from someone can change a person's behavior from not knowing to knowing [7]. There are several learning theories including them:

Behavioristic, namely changes in behavior due to stimuli and responses as well as reinforcing factors. Behavioristic theory focuses on input in the form of stimulus and output in the form of output in the form of a response. Meanwhile, what happens between the stimulus and response is considered unimportant, because it cannot be measured [8].

Knowledge actually already exists in each individual, it cannot be transferred from one's brain to another's brain, so that students themselves must be able to interpret what has been conveyed by educators (Lorsbach and Tobin in [9].

Based on some of the above theories, this study focuses on the behavioristic theory which states that the behavior of students can change for the better due to stimulation, response, and reinforcement factors, the point is that stimulation at PBM can produce a good response for students.

The stimulus in this study is the provision of learning material through a medium that can be used by students anywhere and anytime, namely an Android-based learning media. While the response or output from the results of giving these inputs is the response from students in the form of learning outcomes they get after using this media.

**Learning outcomes**

Learning outcomes / learning outcomes are educational technology terms to state student performance that can be measured by the instructor / teacher [10], The short definition is that learning outcomes are continuous changes in the aspects of knowledge, skills and attitudes as a result of one's involvement in learning activities [11].

In this study the learning outcomes are the values obtained by students from the tests given to them after they get the material presented by the researcher face-to-face online (through the media zoom meeting), then the delivery of the material is strengthened by providing material through material based on an android application.

**Instructional Media**

The word media comes from Latin, namely medius, which literally means middle, intermediary, or introduction. According to Flemming [12] argued that "The media is often referred to as a mediator,

namely the cause or tool that intervenes in two parties and reconciles them". According to [12] argues that "the word media comes from the Latin medius which literally means middle, intermediary or introduction". According to Gerlach & Ely [12] "Media when it is understood in broad terms is human, material, or events that build conditions that enable students to acquire knowledge, skills, or attitudes.".

The conclusion that can be drawn from some of the definitions of learning media above is that learning media is a facility in the form of a tool used as a means of support in the teaching and learning process by teachers and students so that good, effective

learning can be achieved.

**Android Android-Based Learning Media**

This media is a tool that can be used for the Teaching and Learning Process (PBM), which is included in audio-visual multimedia learning media, because it combines the process of hearing and seeing. The basis for this media is a combination of print and computer technology, so that it can be used by everyone wherever they are, this is because this media is based on an Android system application that can always be taken wherever people go. This learning media is categorized as a tool that combines print and computer technology [12].

**Reduction Type Starter Motor**

The starter motor is a necessary drive for the engine, because the engine cannot work independently but requires power from the initial propulsion. The starter is one of the engine electrical systems that supports the engine starting tool. The starter system, which is equipped on a motorized vehicle, functions to rotate the motorbike before the combustion process of the fuel-air mixture gas occurs by spark plugs in the motor's combustion chamber. The working principle of the starter system is to convert electrical energy into mechanical energy [13].

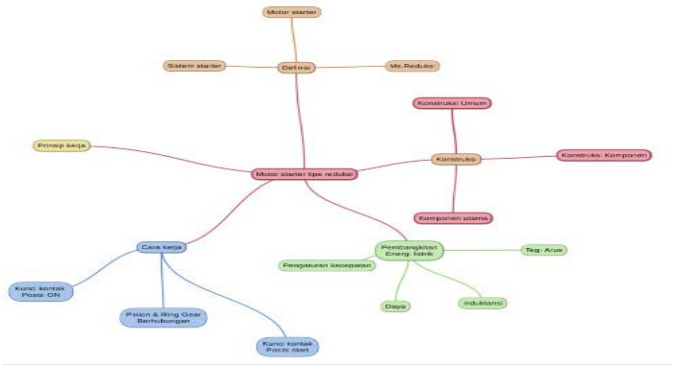


**Figure 1**. Mind mapping motor starter of reduction type

There are several types of starter motors, one of which is the reduction type, this starter motor is one of the most widely used in vehicles, especially cars. The reduction type starter motor generates a large torque (torsion moment) when compared to the other type of starter motor [14]. The vehicle requires a large amount of torque to be able to start the engine by turning the crankshaft through the flywheel.

**Media Development Method**

This media is a tool that can be used for the Teaching and Learning Process (PBM), which is included in audio-visual multimedia learning media, because it combines the process of hearing and seeing. The basis for this media is a combination of print and

computer technology, so that it can be used by everyone wherever they are, this is because this media is based on an Android system application that can always be taken wherever people go. This learning media is categorized as a tool that combines print and computer technology [15].

The purpose of this ADDIE model is to help an educator teach according to his needs, an educator must analyze the material needed, design the appropriate media, to evaluate the material that has been given to his students to find out the knowledge gained [16]. The following are the stages of this model:

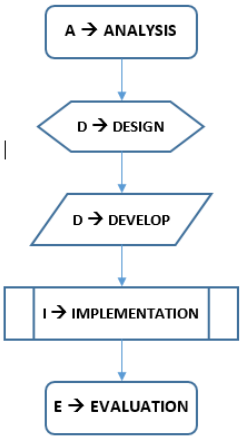


**Figure 2.** Media making method (ADDIE)

## RESEARCH METHODS

The research method used in this research is the Research & Development (RnD) method, the purpose of this use is to produce new products from a learning media, namely Android-based learning media. As stated by Borg and Gall [17] the RnD method aims to produce a product and then test it.

This research method refers to two core activities, namely research and development, research refers to universally applicable research principles, while development refers to the activities of adding, making, increasing, both in terms of quantity (amount) and quality of an activity or object that is used. into an activity [18].

This study was started from research conducted by researchers who found low student learning outcomes, this was allegedly caused by the researchers because the learning media were less attractive and did not provide an effective learning experience. This triggers researchers to develop a learning media that can provide a good learning experience for students, so that in the end it can improve their learning outcomes.

There are 10 steps in this RnD research, starting from finding potential problems, collecting data, to mass production of products being made or developed. The steps in this RnD research are as follows:

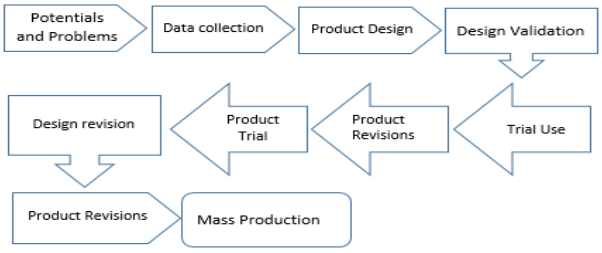


**Figure 3.** Steps for using the RnD research method [17]

The picture above shows the steps that must be taken in this study, the researcher starts by finding the problem that occurs, namely finding student learning outcomes that are unsatisfactory. After the core

problem is found, the researcher creates and develops learning media, and tests it on students, after the results are obtained based on the use of learning media, the next step is for the researcher to produce the media and use it in the learning process.

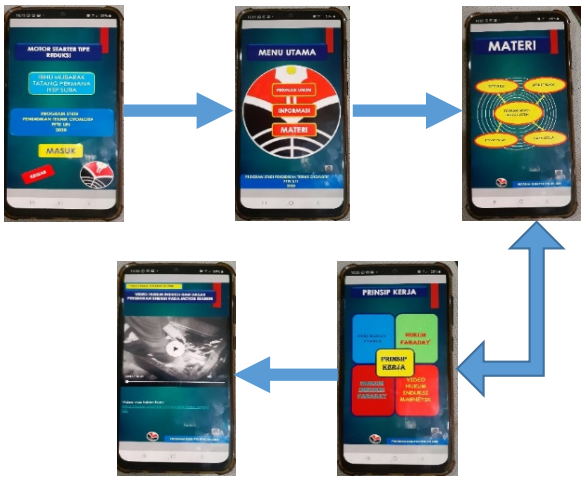


**Figure 4.** Learning media based on android

**Population and Sample**

Population is all objects in research which are generalizations of an object or subject that has the same quality and characteristics as determined by the researcher [19] [20]. In this study, the population is students who have contracted the Automotive Engine Electricity course, the researcher considers that the object of research has the same characteristics, namely from the department and also gets the same subject.

The sample is a small part of the existing population, the number of samples that must be taken is 10-25% of the total population provided that the population is above 100 people [19]. Meanwhile, if the number of samples is less than 100, then all samples must be taken, so the research is called census research or saturated samples [21]. So, the sample used in this study amounted to 39 students.

**Data Analysis**

1. Instrument Validation

Validity is an assessment of whether or not a measuring instrument will be used in research in the form of an evaluative of the degree of trust that can be proven empirically and theoretically through tests (Messick, S., 1987:1). How well the data collected covers the actual investigation area, and can measure what will be measured in a study [22].

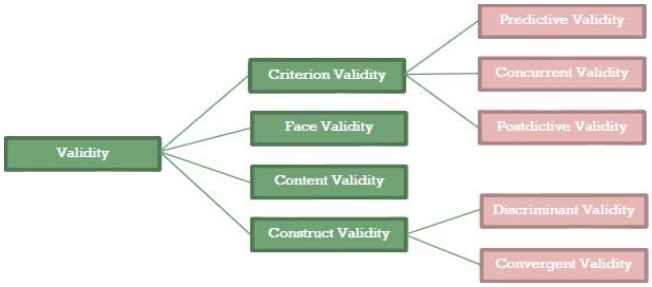


**Figure 5.** Types of validity tests [23]

Construct Validity is validity that shows the extent to which the instrument reveals a certain theoretical ability or construct to measure the causal relationship of certain behaviors or constructs [24]. Validation of this construct technique refers to how well the instrument can translate the concept of an idea or behavior that has been previously given by testing the instrument first. There are two types of construct validity, namely Discriminant and Convergent. Discriminant validity is the validity that tests a construction that in fact has no relationship.

while convergent validity tests the theoretically interrelated instruments [23].

The validity test is a test of the feasibility of measuring instruments to be used in this study, while the reliability test is a test that there is no error, there is no measurement error in a test or the instrument is used for measurement elsewhere [25].

The non-test instrument in addition to this research was also validated by material experts, besides that this research instrument was considered standard, because it was taken from a questionnaire that had been tested before validation. The acquisition of the learning motivation questionnaire is then compared with the motivation percentage scale as follows:

**Table 2.** Motivation percentage scale

| Percentage of Achievement (%) | Interpretation |
|---|---|
| X ≥ 76 | Very Motivated |
| 56 ≤ X < 76 | Be motivated |
| 40 ≤ X < 56 | Enough Motivation |
| X < 40 | Lack of Motivation |

(Source: [19])

2. Data Normality Test

The normality test is a data test that is indispensable to determine whether the sample data used meets the assumptions that are normally distributed or not [26], If the results of the data normality test show normal results, it means that the sample data can be carried out into the statistical calculation test, because the arithmetic statistic (parametric test) is derived from the normal distribution function.

Decision making regarding this normality test is taken by taking into account the criteria that the data is normally distributed if the Absolute Extreme (D) value in the Table of Normality Test results is more than 0.05 (D> 0.05), you can also use the Z value with the criteria for normally distributed data if Z> 0.05. In addition, it can be interpreted that if the significance value in the table is above 0.05 (Sig> 0.05) Normal data, while the opposite is true if the significance is less than 0.05 (Sig <0.05) Abnormal data [27].

3. Data Homogeneity Test

In addition to the data normality test, a homogeneity test is also needed which functions to see the proportion of samples having the same answer variation [25]. Researchers use the help of the SPSS 20 application to test homogeneity with Homogeneous criteria if the significance value is more than 0.05 (sig> 0.05) and not homogeneous if the significance value is below 0.05 (sig <0.05) [27].

4. Significance Test (T-Test)

The criteria for the T test using the SPSS 20 application is that the data is said to have a significant change if the Sig value in the Paired Samples Test calculation results has a value below 0.05 (sig <0.05), on the other hand, if the acquisition is above 0, 05 (sig> 0.05) then the data is said to have no significant effect.

## RESULTS AND DISCUSSION

### Media

The figure above shows that of the nine indicators, the results obtained are Very Good, namely there are four indicators (80%), while the remainder, namely one indicator, has a Good value (20%). So it can be concluded that the media created has met the requirements to be applied to the learning process, this is because all indicators in media assessment are categorized as good and can be used.

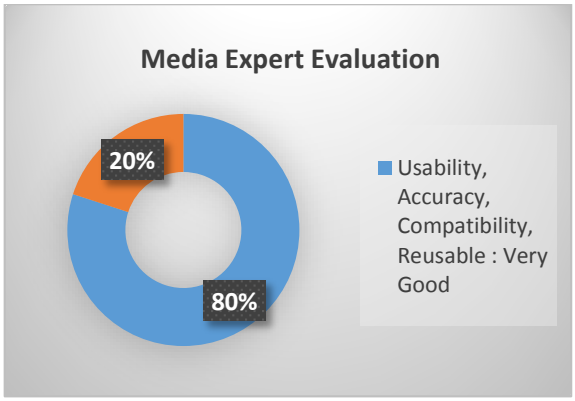


**Figure 6.** Percentage of media expert evaluation

### Material

In this Material Content indicator, it is found that there are six of the seven indicators getting very good scores, while one indicator shows good. This means that overall indicators regarding the content of the material are stated to be used on this Android-based media.

The picture above shows that the six indicators have very good values, namely numbers 1, 2, 3, 4, 5, and 6. While 1 other indicator, number 7, has a good value. If you look at the percentage, those with a very good category value of 86%, and those with a good value, namely 14%. So it can be concluded that the seven indicators can be used in this Android-based media because they show very good and good value categories.

Based on the assessment of material experts, that the learning aspects that exist in this media can be used because it is in accordance with the indicators of the suitability of the learning content.

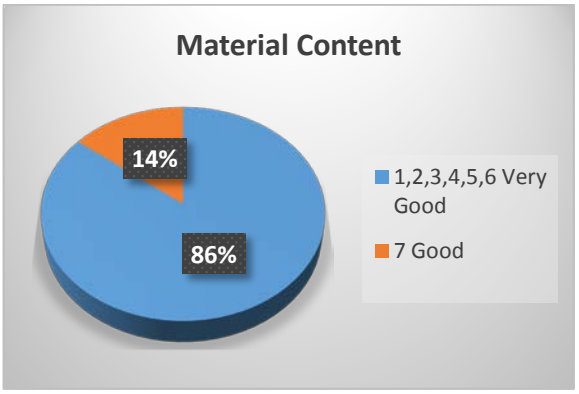


**Figure 7.** Percentage of material content

### Pre-Test and Post-Test

The lowest and highest scores on the Pre Test get values, namely 14 and 70. Meanwhile, the highest scores on the Post Test obtained scores of 52 and 98. The difference between the lowest and highest scores on each test is clear, namely 28 and 38 points, meaning that there has been an increase in the value of the post-test and pre-test that has been carried out, if the average value increase is 35.03. The lowest increase was 12 by respondent number 27, while the highest was 58 by respondent number 32.

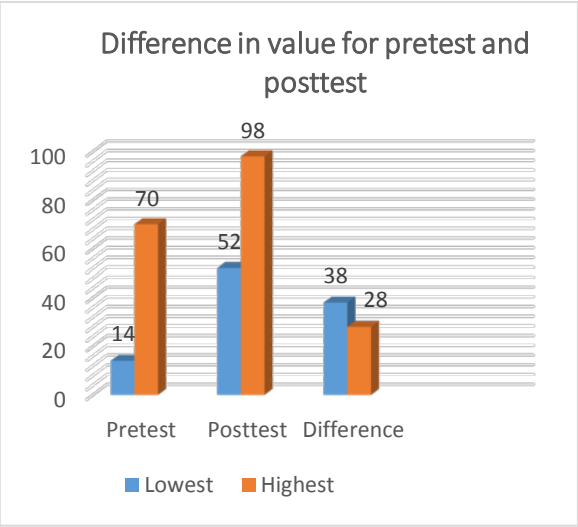


**Figure 8.** Difference in value between pretest and posttest

**Learning Motivation**

Motivation is something that can make someone do something directed to achieve something, individual behavior in achieving something is strongly influenced by the motivation they have. [26].

Motivation to learn is an encouragement that can make students carry out learning activities using all their power and efforts to achieve these learning goals, this encouragement ensures the continuity of Teaching and Learning Activities as evidenced by changes in behavior so that it can increase the knowledge and skills of the students concerned [27].

This android-based media is expected to be able to motivate students to do teaching and learning activities, this is evident from the results of learning motivation obtained by students, which show that 67% get the predicate highly motivated. These results are obtained based on the following table of motivation gain:

**Table 3.** Motivation percentage scale

| Percentage of Achievement (%) | Interpretation |
|---|---|
| **X ≥ 76** | Very Motivated |
| **56 ≤ X < 76** | Be motivated |
| **40 ≤ X < 56** | Enough Motivation |
| **X < 40** | Lack of Motivation |

(Source: [19])

The pictures above (5.17 and 5.18) show that 13 people (33%) have motivational scores between 56-75 in the Motivated category, while 26 (67%) respondents score between 76-100 in the Highly Motivated category.

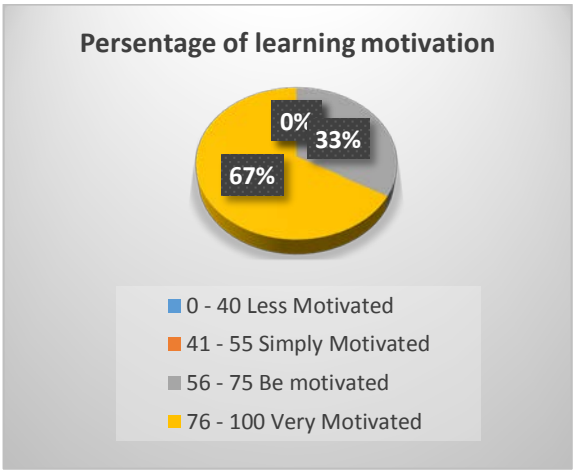


**Figure 9.** Percentage of acquisition percentage of motivation

**Normality Test**

Based on the results of the calculation of the data normality test that has been carried out, a significance value of 0.969 is obtained, this is if it is returned to the data normality test criteria which states if the significance value is> 0.05, then the data is normally distributed. The significance value of this study is 0.969> 0.05, so the data distribution

in this study is normally distributed, meaning that the data in this study can be continued to the next statistical test stage.

**Table 4.** Normality test results (One-Sample Kolmogorov-Smirnov Test)

| | | Unstandardized Residual |
|---|---|---|
| N | | 39 |
| Normal Parameters[a,b] | Mean | 0E-7 |
| | Std. Deviation | 8.67969315 |
| Most Extreme Differences | Absolute | .079 |
| | Positive | .079 |
| | Negative | -.070 |
| Kolmogorov-Smirnov Z | | .491 |
| Asymp. Sig. (2-tailed) | | .969 |

**Homogenity Test**

Data homogeneity is also needed to perform statistical tests, this test is carried out to see whether the sample proportions have the same answer variation or not. The results of the homogeneity test that have been carried out obtained a significance value of 0.077, this value indicates that the data under study has the same answer variation or the data is categorized as Homogeneous. This is in line with the data homogeneity criteria which states that the data is homogeneous if the Sig> 0.05.

**Table 5.** Homogeneity test results

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 3.211 | 1 | 76 | .077 |

**Significant Test (Test-T)**

The criteria in the data significance test are said to have a significant change if the Sig value in the Paired Samples Test calculation results has a value below 0.05 (sig <0.05), on the other hand, if the acquisition is above 0.05 (sig> 0, 05) then the data is said to have no significant effect.

The results obtained in this study are a significance value = 0.000, this means that the value is <0.05, it can be said that there is a significant difference between the PreTest and PostTest values caused by the treatment of providing Android-based learning media.

Giving treatment by providing additional media in addition to learning resources to students is something that can improve their learning outcomes, this is allegedly because with this Android media, students feel more interested, so that it can increase motivation, especially motivation from outside themselves or so-called extrinsic motivation.

Increased learning motivation in students can improve their learning outcomes, this is evidenced by the acquisition of a significant increase between learning outcomes before and after treatment, namely the provision of this Android-based learning media.

Based on these results it can be concluded that the android-based learning media created by researchers can improve student learning outcomes at DPTM FPTK UPI on the reduction type starter motor material.

## CONCLUSION

Based on the results of data analysis that has been carried out, namely the siginfikansi test (T-test), a value is obtained which states that the PreTest and PostTest results have a significant difference. This indicates that the difference in the value of the initial test and the final test has increased significantly, the increase in value is obtained as a result of the treatment given, namely the provision of learning media for the Android-based Reduction Type Motor Starter.

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