



## Application of Android-Based Interactive Learning Media in Clean Water Pipe Installation System Teaching Material

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### Article Info

#### Article History :

Received

Feb 2022

Accepted

April 2022

Published

December 2022

#### Keywords:

interactive learning media;  
android; unity developer  
software; clean water pipe  
installation system

### Abstract

The widespread use of smartphones among students has not been fully utilized to support the learning process. This study aims to develop interactive Android-based learning media that is attractive to eleventh grade students of KGSP to improve basic competence in analyzing clean water pipe installation systems. The research method used in the development of interactive learning media is research and development (R&D). The development model used is ADDIE (Analysis, Design, Development, Implementation, and Evaluation). It is design model that is more generic and serves as a guide in developing tools and infrastructure for effective training programs. Data analysis is used to determine the level of feasibility, the level of practicality, and to determine the effectiveness of Android learning media to improve basic competence in analyzing clean water pipe installation systems. Based on the obtained data, it can be concluded that the criteria of the media are very feasible, very practical, effective, and significant for increasing the basic competence of analyzing clean water pipe installation systems for SMK students in the KGSP expertise program.

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p-ISSN 2339-0344

e-ISSN 2503-2305

## INTRODUCTION

Rapid development of technology in the world has a direct influence on people lifestyles, including education sector. The existence of technological developments in education sector, making all kinds of knowledge and information easier to access by the public. Of course, it also influences Vocational High Schools (SMK). Vocational High School (SMK) is a level of secondary education that prepares students to be able to directly enter the job market. To be able to shape students to be experts in a particular field is not easy, an interactive learning process is needed so that what is conveyed by teachers can really be understood and mastered by students.

Learning media is an intermediary carrier of messages from the communicator to the communicant in the learning process. In education sector, the use of current technology is expected to assist the learning process which will have an impact on increasing students' understanding. Technology that can be utilized to support the education sector, which is also in great demand by the public, especially among youth, is Android technology.

Android learning media is a system consisted of an operating system, middleware and applications. Android belongs to open software so that it is possible to make an application easily and can be used by various mobile devices (Qumillaila, et al. 2017). Nowadays, android has become a system that is in great demand by the public, especially teenagers, but it is not in line with its use in the education sector.

The proper development of android-based interactive learning media on the Building Construction, Sanitation and Maintenance (KGSP) expertise competency can improve basic competencies in analyzing a clean water pipe installation system that is significant between those tested using interactive learning media based on android and those who do not use Android-based interactive learning media for eleventh students of KGSP SMK N 7 Semarang. The product that is developed in the present study is an interactive Android-based learning media in the form of a simulator called Si IPAR (Clean Water Pipe Installation Simulator) in the KGSP subject which is expected to improve basic competence in

analyzing clean water pipe installation systems. The purpose of this study is to develop an interactive learning media based on Android in the form of a simulator named Si IPAR (Clean Water Pipe Installation Simulator) at the KGSP expertise competency to improve basic competence in analyzing significant clean water pipe installation system.

Research that is relevant to present study is research conducted regarding the use of Android-based Adobe Flash media which can improve student learning outcomes, especially in the Anti-Lock Brake System in the TKRO major (Anas Satria, et al. 2022). The results of other studies show that in the development of interactive learning media based on Android applications that are used to increase students' understanding of the basic competencies of the electronic ignition system. This study shows that there is an increase in students' understanding of these basic competencies (Hendrik Purnama, et al. 2020). The results of a similar study show that the development of interactive learning media based on Android applications using Adobe Flash can increase student competence in knowledge of conventional filing systems (Adha Dwi Mardiana, et al. 2020). The results of other studies show that the development of an e-module for pastry & bakery products based on Android SMK culinary skills competencies is very effective and significant for improving student learning outcomes (Resitya Esi Ramadani, et al. 2022). Research by (Saputra & Basuki, 2021) shows that proper learning process will produce good quality. Learning models using interactive multimedia-based learning can improve student competence (Sanita & Maksum, 2021: 783). With an R&D design and a four-D development model, the developed Android-based learning media can be used and appropriate in the learning process to improve student learning outcomes.

## METHOD

The research method used in the development of interactive media-based learning media is research and development (R&D), because R&D is a research method used to produce certain products and test the effectiveness of these products. ( Kurniawan, Syamwil, &

Wijaya, 2018). The development model used in this study is the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). It is the design model that is more generic and serves as a guideline in building training program tools and infrastructure that are dynamically effective and support the performance of the training itself. Anzoategui, et al. 2019). This research consists of five stages. These are the applied stages:

1. Analysis Stage

The main activity of this stage is analyzing the need to develop new learning models or methods and analyzing the feasibility and requirements for developing new learning models or methods. The existence of problems in the learning model or method that has been applied is no longer relevant to the existence of target needs, learning environment, technology, student characteristics and so on.

2. Design Stage

This stage has similarity with designing teaching and learning activities. The design of this learning model or method is still conceptual and will be the basic of the next development process.

3. Development Stage

This stage contains product design realization activities. A conceptual framework for the application of new learning models or methods is prepared and realized into products that are ready to be implemented such as lesson plans, media and learning material.

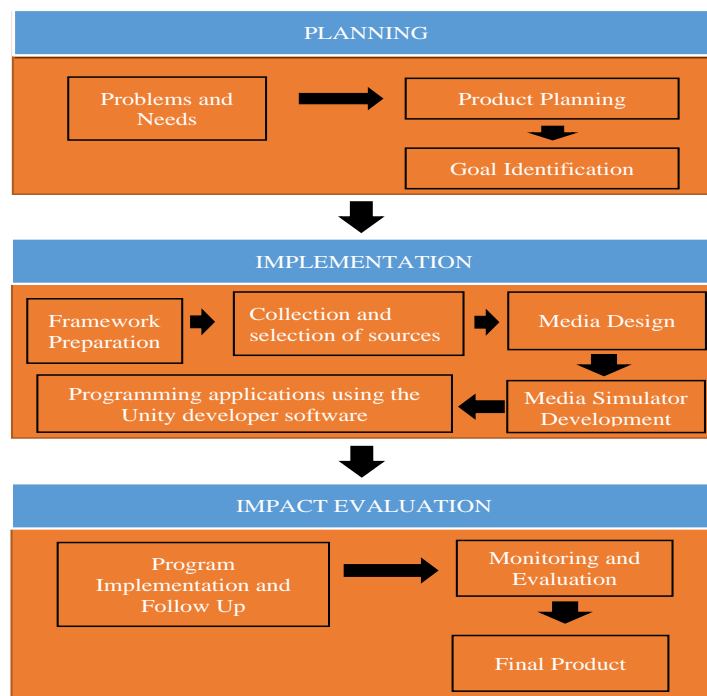
4. Implementation Stage

At this stage, the design of the model is implemented in real situations and an initial evaluation is carried out to provide feedback to the users of the next model.

5. Evaluation Stage

This stage can be applied at the process stage and the end of the activity. If it is applied to the learning model, formative and summative evaluations are carried out. The results of the evaluation are used to provide feedback to the users of the model. Revisions are made according to evaluation results or needs that cannot be fulfilled by the new model.

The following is the product development flowchart.



Picture 1. Product Development Flowchart

RESULTS AND DISCUSSION

1. Implementation of Development with the ADDIE Model

a) Analysis

At this stage, need analysis is done to develop a new learning model or method and

analysis of feasibility and requirements for developing a new learning model or method. (1) Analysis of the need for the development of Android-based interactive learning media, first there are problems in the previously applied learning model or method, which is no longer relevant to the existence of target needs, learning environment, technology, student characteristics and so on; (2) Analysis of the feasibility and requirements for developing a new learning model or method, from the results of observations on the analysis of the environment, technology, and student characteristics, it can be concluded that there are several facilities and infrastructure that support the development of Android-based interactive learning media, including the fact that at least every student has a smart phone, the existence of internet network that can be relied upon, and the consumption of using electronic devices that is relatively high at this time.

#### b) Design

The second stage of the ADDIE development model is the design or planning stage. The design stage is carried out to make it easier to design the media to be built. The design stage includes material design and media design. (1) Material design, research design for the development of Android-based interactive learning media in the form of simulators on KGSP expertise competencies; (2) Media design, including compiling an outline of media content and designing learning media, which includes the initial appearance of the simulator, learning outcomes, instructions for using the Simulator, and information about the Si Ipar simulator.

#### c) Development

This stage aims to see how far the feasibility of the media that has been designed. As the follow-up to the design that has been carried out in the design stage, the following development steps are carried out: (1) validation by learning media experts, this stage is carried out to determine the feasibility of the media being developed; (2) material expert validation, this stage is carried out to determine the feasibility of the material being developed. The material feasibility test is carried out to obtain suggestions and input from the validator on the product being developed, as evidenced by the results of filling in the validity

instrument which shows the feasibility of the material for use in the present study.

#### d) Implementation

The fourth stage of the research and development of the ADDIE model is the implementation or application stage. (1) pre-test in the experimental class and control class, the first application stage is giving pre-test in the experimental class and control class which aims to determine the initial state of the respondents before being given treatment; (2) conditioning, the conditioning stage in this study, what is meant is the conditioning of the respondents (experimental class and control class) after being given a pre-test. The conditioning of these respondents is to provide treatment in the form of using interactive learning media based on Android which is being developed at this time for eleventh grade students of KGSP 1 after being given a pre-test as the experimental group, while eleventh grade students of KGSP 3 as the control group in this study, after being given a pre-test there is no given treatment in the form of giving interactive learning media based on android; (3) posttest in the experimental class and control class, the final stage in testing the effectiveness of Android-based interactive learning media is to give a post test.

#### e) Evaluation

The last stage in this research and development is the evaluation stage, at this stage improvements will be made to a better system by processing the data that has been obtained from the previous stages that have been carried out. This evaluation is carried out after the four previous stages in the ADDIE model have been completed. (1) This formative evaluation phase aims to determine the feasibility of the media being made and to find out how far the designed Android-based interactive learning media can take place, as well as identify obstacles, by knowing the obstacles and things that cause the implementation of Android-based interactive learning media not run smoothly, early decision making can support the achievement of research objectives (Finlayson and Scriven 1967); (2) The summative evaluation stage aims to determine the effectiveness of using Android-based interactive learning media. Summative evaluation leads to decisions about achievement statements of Android-based interactive learning media to improve basic

competence in analyzing clean water pipe installation systems. Summative evaluation is also used to determine the continuation of research, stopping or continuing research, adoption and so on.

## 2. Media Feasibility Assessment Sheet

The instrument for assessing the feasibility of the media in the present study adopted the BSNP questionnaire which had proven to be valid, so there was no need to try out the response items again. Based on the data, it can be seen that the overall average is 4.28 with very feasible criteria, thus Android-based interactive learning media is declared to be valid and very feasible to use to improve basic competence in analyzing clean water pipe installation systems.

## 3. Media Practicality Test

This stage is carried out to determine the practicality of the developed media. The practicality test was carried out by 3 KGSP skill competency teachers and 30 students to get evidence from the results of filling out the response instrument which shows the practicality of the media used in the present study. Based on the collected data, the average practicality test response by teacher and student is 89%. When it matched with the practicality level tabulation, user responses are at range between 75% -100%, which means that this Android-based interactive learning media has very practical criteria and can be used to improve basic competence in analyzing clean water pipe installation system.

## 4. Media Effectiveness Test

The results of the normality test for media effectiveness instruments have a significance score (Sig.) as in the table, which shows a score of Sig. > 0.05, it can be concluded that the data is normally distributed.

The results of the homogeneity test of the experimental class and the control class especially the homogeneity test on the based of mean Pre-Test shows a significant of 0.690, which means the data > 0.05, so it can be concluded that the data is homogeneous, while the score on the based of mean Post Test shows a significant of 0.861, which means data > 0.05, so it can be concluded that the data is homogeneous.

The results of the calculation of the N-Gain test with the help of the SPSS 23.0 program, score in the form of a percentage (%) are in the

attachment to the N-Gain Score Test Output Table. Based on the results of the calculation of the N-Gain score test, it shows that the average N-Gain score for the experimental class is 68.94% with a minimum N-gain score of 44% and a maximum N-gain score of 94.64%. Meanwhile for the control class it was 45.03% with a minimum score of 9.68% and a maximum N-gain score of 63.83%.

The results of the T test on Pre-Test and Post Test for the experimental and control classes shows that the significance score (Sig) on Levene's Test for Equality of Variances is  $0.197 > 0.05$ , so it can be concluded that the variance of the N-Gain data (%) for the experimental class and control class is just the same or homogeneous. Based on the calculation results, the value of T count N-Gain Percentage = 8.348 with a T table score at ( $df(n-k) = 33; \alpha = 5\%$ ) is 1.69236. Because T count is greater than T table, so it can be concluded that before being treated using interactive learning media based on android class XI KGSP 1 and class XI KGSP 3 SMK N 7 Semarang, there is no difference between the two classes.

## CONCLUSION

The final product is the developed Android-based interactive learning media using R&D development with ADDIE model. Dealing with the results of the feasibility test, the average score of the validation results of media experts gets an average score of 4.28 with very feasible criteria. User practicality test in this study gets the average score of 89% with very practical criteria.

The effectiveness test of Android-based interactive learning media, based on data analysis starting from the prerequisite analysis test, the test results obtained using SPSS version 23, it can be concluded that the experimental class and control class are normally distributed and the same or homogeneous. After testing the prerequisite analysis, the data analysis was carried out by carrying out the N-gain test to determine the effectiveness of the media, the average N-gain score for the experimental class is 69%, while the average N-gain score for the control class is 45%. After obtaining the N-gain percent score, before the t test is carried out, the N-gain score is tested once again using the normality and homogeneity

tests. The results have a minimum error rate for educational and social research standards of 5%, so the value of the test results normality and homogeneity must be  $> 0.05$ . After being proven to be normal and homogeneous, then there is an independent sample t test to find out the significance of the media and a value of  $0.197 > 0.05$  is obtained. It can be concluded that the variance of the experimental class and control class data is the same or homogeneous. Based on the significance of  $0.000 < 0.05$ , it can be concluded that there is a significant (real) difference in effectiveness between learning using interactive learning media based on Android compared to conventional methods to increase basic competence in analyzing clean water pipe installation systems in eleventh grade students of KGSP SMK N 7 Semarang academic year of 2022-2023.

After carrying out a series of tests, it was concluded that Android-based interactive learning media has become the final product. At the validation stage of media experts and material experts it can be concluded that it is very feasible for students to use it to improve learning outcomes. In the N-gain test, it is concluded that Android-based interactive learning media is quite effectively used by students to improve basic competence in analyzing clean water pipe installation systems. In the t test, it obtains significant result and can be used by students to improve basic competence in analyzing clean water pipe installation systems.

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