Development of Android-Based Learning Media to Improve Teachers' Pedagogical Aspects for Competence Program of Metal Casting Engineering

Haryogi Winarto[1], Widarto[2]
{haryogi.winarto.2017@student.uny.ac.id[1], widartomsaid@gmail.com[2]}

Department of Mechanical Engineering Education, Faculty of Technic, Universitas Negeri Yogyakarta, Indonesia

Abstract. The goal of this study was to development of android-based learning media to improve teachers' pedagogical aspects for Vocational High School Competence of Metal Casting. This study uses the Research and Development method to develop and measure the effectiveness of learning media to improve the pedagogical aspects of educators. Primary and secondary data were analyzed in this study. Primary data were gathered via questionnaires and in-depth interviews. Meanwhile, secondary data were gathered using the approach of a literature review. The respondents in this study were ten high school teachers who were chosen using a random purposive sample approach. The results showed that mobile learning can effectively help improve the pedagogical aspects of teachers.

Keywords: Improvement; Pedagogical; Learning Media; ADDIE; Metal Casting.

1 Introduction

The use of technology in everyday life is unavoidable. The development of technology in the current era of globalization is very rapid. For this reason, the community is required to make a change in every activity [1]. Based on previous research conducted by [2], designing media must pay attention to several important aspects that can be used to design media before it is implemented in the world of education, including the following: 1) Learning media is easily accessible anywhere and anytime; 2) Learning media can facilitate work in understanding and studying learning materials in a learning media; 3) The material used must be in accordance with the curriculum used in the subject of learning in the media; 4) Learning media must be easy to use for ordinary users, not to the point that media should be easy but more difficult for users in terms of appearance and effectiveness of other uses; and 5) The media created must emphasize simplicity and use.

This learning development also refers to and supports the development of ICT in the 21st century, because learning in this era combines two important aspects, namely information technology and communication technology as the basis of learning. The function of these two components is to assist processing, transfer of information between media and data management. This ICT is built on three main keywords, namely information, communication, and technology which have several main roles, namely as science, learning aids, educational facilities, indicators and competency standards. In vocational high schools, teachers are already using information and communication technology-based media, but the use of these media is

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still not optimal, so supporting learning media are needed that are able to display text, images, videos, animations, simulations, and evaluations to improve student understanding. With the variations in the use of various android-based media in the learning process, it is intended for the implementation of an effective and efficient learning process [3].

As a result, developers must be familiar with the concepts, models, principles, design, and assessment of instructional media. One of the integrated learning media is an android-based learning media [4]. This research refers to the ADDIE research and development model which is a type of systematic learning design model. This approach is structured based on a systematic sequence of actions consisting of five items, namely analyze, design, development, implementation and assessment. The visual stages of this model can be viewed in the following figure:

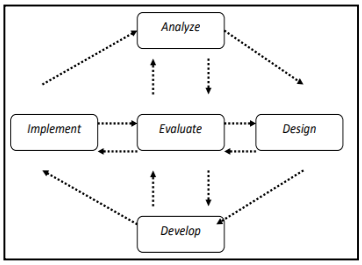

Figure 1. ADDIE model stages

According to the illustration, this research model is more reasonable and comprehensive, and it can be applied to various aspects of product development in learning activities, such as models, strategies, methods, media, and instructional materials used. However, the researcher summarized the model's steps in this study using four stages: assessment/analyze, design, development, and implementation, and evaluation [5].

This is also corroborated by study undertaken by [6], which indicates that the majority of learning media are packaged as print media or printouts in the form of textbooks, which are less appealing and practical to utilize during the course of learning activities. This demonstrates the importance of innovation in learning media that is compatible with technology advancements, particularly in Android-based learning media. It is critical for the creation of educational media at all levels, including elementary, middle, and even higher education [7]. The more quality aspects, elements, components and objects that support learning including learning media, the more effective the learning process will take so that the quality of learning will be better and in accordance with the needs of students for supporting infrastructure from schools or the need for learning styles that adopt technological development [8].

2 Method

This study uses the Research and Development method to develop and measure the effectiveness of learning media to improve the pedagogical aspects of educators. The model approach used in this research is the ADDIE method (analyze, design, development, implementation, and evaluation). At the beginning of the study, the researcher gave directions

and how to use the media, then the respondents applied it in learning for one week, and in the post-test the researcher gave a questionnaire to be filled out as an evaluation. Primary and secondary data were analyzed in this study. Primary data were gathered via surveys and in-depth interviews with ten respondents. Meanwhile, secondary data were gathered via the literature review process. Respondents in this study were high school teachers totaling ten teachers who have metal expertise competence and were selected using a random purposive sampling method [9].

3 Result and Discussion

To analyze using the ADDIE development model, the discussion is presented in stages in the following paragraphs:

3.1 Analyze Level

In the analyze stage, the researcher contains several indicators, namely performance analyze, student analyze, fact analyze, and learning goal analyze. However, in the five indicators, what the researcher focuses on is fact analyze because it relates to the concepts, principles, and procedures used as a form of identification of the material relevant to the development of the teaching chart used. The last analyze relates to the learning objectives, which put forward two main statements, namely: the predetermined learning objectives, and the achievement of the learning objectives. The results of the analyze level test are presented in the following table:

Table 1. Analyze level evaluation results

Aspect	Score
Performance Analyze	78.8
Student Analyze	83.6
Fact Analyze	82.2
Learning Objectives Analyze	74.3

Based on the data in table 1, it can be seen that the satisfaction level of respondents in the performance analyze aspect is 78.8, the student analyze aspect has a value of 83.6, the fact analyze aspect has a value of 82.2, and Learning Objectives Analyze is the smallest value, namely 74, 3. In general, this reaction level is quite satisfactory, but there are suggestions from several respondents to add more facilities and flexibility in the analyze level.

3.2 Design Level

At this level, the researcher proposes a mobile learning display made by the researcher, then the researcher gives several questionnaires to measure the extent to which the design made is in accordance with what has been analyzed at the previous level. The ADDIE can be used to assess success in building android-based learning media for educators. It comprises of five levels: Assessment/Analyze, Design, Development, and Implementation, and Evaluation. The analyzer's findings were then used to construct the ADDIE model, which was used to enhance the teacher's pedagogic skills. The display of mobile learning media in this study is presented in the following figure:

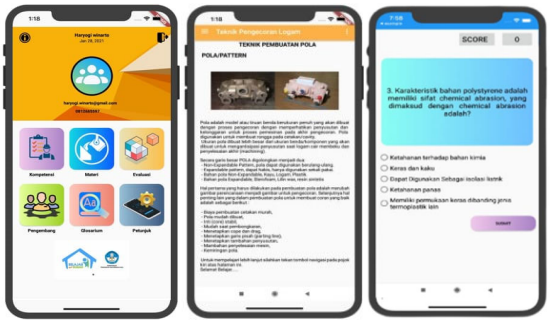

Figure 2. Mobile learning display

Furthermore, the results of testing the quality of content and the purpose of the application are presented based on three main things, namely the selection of teaching material competencies, initial planning of competency-based learning tools, and the design of learning materials as a learning evaluation tool. The results of the questionnaire at the design level are presented as follows:

Table 2. Analyze level evaluation results

No	Indicator	Score
1	Accuracy	88.2
2	Importance	76.5
3	Completeness	82.6
4	Balance	75.4
5	Interest	86.9
6	Appropriateness to user's situation	88.6

Based on the data above, it can be said that the respondent's assessment of the design in the application is quite good, as evidenced by the high scores of accuracy and completeness.

3.3 Instructional Quality Level

In the instructional quality section, it focuses on learning carried out by teachers and students, with several important things being emphasized, including: 1) providing learning opportunities, good media will certainly provide equal learning opportunities for every student: 2) provide assistance learning, the teacher will assess how this media is easy to help the material being discussed; 3) the media can strengthen motivation for teachers in teaching; 4) can lead to social interaction after teaching by the teacher; 5) assist the teacher in delivering the material. The results of this level test are presented in the following table:

Table 3. Instructional quality level test result

Indicator	Score
Provides Opportunity to Learn	76.3
Provides Aids to Learn	87.4
Motivational Quality	91.6
Instructional Flexibility	87.2
Relation to Rest of Educational Program	78.7
Quality of Testing and Assessment	78.9

Likely Impact on Student	82.3
Likely Impact on Teachers and Teaching	76.5

Based on the results above, it can be seen that in the instructional quality media stage, teachers tend to give a good assessment because the media is considered to be able to help learning and can improve and develop teachers' pedagogical abilities in various aspects.

3.4 Instructional Quality Level

In this section, several things are emphasized to be developed as follows: 1) teacher assessment of the media, whether the media used has met the requirements as appropriate learning media to be used in education; 2) the quality of the media used, whether it is of good quality; and 3) whether the media used has good durability. The results of this level test are presented in the following table:

Table 4. Technical quality level test result

No	Indicator	Score
1	Reliability	79.1
2	Ease to Use	83.4
3	Quality of Response Handing	74.8
4	Quality of Program Management	87.6
5	Quality of Documentation	76.7
6	Flexibility	88.4
7	Software Development	82.7

Based on the results of data and research, it can be seen that the technical quality aspect has a good value. The teacher views that there are two very prominent aspects in this technical aspect that this media is easy to use and other aspects that support that the media is very feasible to use and helps in the pedagogical process. This technology is the basis for the development and utilization of most other learning materials. The results of printing technology can be in the form of print-outs or prints [10]. However, in the process of solving some learning problems, print technology as the most basic and imprinting technology is actually needed to answer learning problems, but it is not needed to answer some learning problems in other contexts.

The main objectives in the implementation step include: 1) Developing the pedagogical abilities of teachers to achieve learning objectives; 2) Ensure the occurrence of problem solving to overcome problems previously faced by teachers in the learning process; 3) Ensure that at the end of the lesson, the teacher's pedagogical abilities are improved. This supports the ADDIE model which describes technological knowledge as a condition that requires a person, (1) to be able to understand and apply information technology widely; (2) able to recognize when information technology can help or hinder in achieving a goal; (3) able to adapt to various changes in information technology that occur[11].

4 Conclusion

Based on the results of the analyze, it can be concluded that through the development of mobile learning media, education will be able to improve pedagogical aspects. This supports that in the ADDIE model. The results showed that mobile learning can effectively help improve the pedagogical aspects of teachers. This increase can be seen in two aspects, namely the

instructional quality level and the technical quality level. At the instructional quality level, the main indicator of pedagogical improvement is because the media used can increase motivation both from the teacher and from the students and also the teacher assesses that this media facilitates the learning process. Overall, based on research data, learning media android is feasible to implement on the learning process.

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