The Development of Android-Based Learning Media for Light Vehicle Engineering Skill Students of SMKNegeri 2 Pengasih

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Abstract. This study aims at: (1) producing android-based learning media used by students in the teaching and learning process of Light Vehicle Engineering expertise in State Vocational High School 2 of Pengasih (SMK Negeri 2 Pengasih); (2) evaluating the feasibility level of the developed learning media; (3) describing the effectiveness level of the developed products of Android-based learning media. This research can be categorized as Development Research, which adopts ADDIE development model including analyze, design, develop, implement, and evaluate. The stages of product development consist of analysis, design, development, implementation and evaluation. The product trials consist of internal trials and external trials. The data from the trial results were collected by questionnaire, field observation, and documentation. The research instruments were questionnaires, learning media in the form of Application Package Files (APK), and documents. The subjects of this study were 46 students of Light Vehicle Engineering expertise in State Vocational High School 2 of Pengasih, with two instrument validators, two product validators and two teachers. The results of the study analyzed through qualitatively and quantitatively. The findings showed that (1) The product development, in the form of Android-based learning media, contained several menus, such as, top right-corner menu, description menu, theoretical menu, and exercise menu. (2) The feasibility level of android-based learning media from the material experts can be categorized as “good” while from the media experts stated as “good” and the feasibility test to the students indicated in “good” category. (3) The effectiveness level of Android-based learning media application products obtained N-gain of 76.09 (effective).

Keyword: Android; Media; Vehicle; Engineering.

1. Introduction
Vocational education refers to a process with various planned activities to acquire knowledge and skills. Vocational High School Education is the highest level of secondary education in Indonesia, which has the main objective to prepare workers according to the workforce demands including self-development on physical, intellectual, emotional, and spiritual dimensions.
The teaching and learning process is a communication process containing the process of delivering messages from educators to students carried out by learning. The inadequate learning process may hinder the learning objectives being achieved by students. The factors that influence the level of learning success come from the students themselves as well as other factors, such as; educator/teacher, use of learning methods and media. The learning media has a function as a tool to convey learning messages. It must be created as attractive as possible so that the delivered material can be easily understood and raise the students motivation in learning the course.

Based on the observation in several vocational high schools, the learning process only uses media of conventional form such as blackboards, textbooks, and sometimes power point material. This kind of process appear to be less interactive and the students seems not really comprehend the materials. Moreover, the teacher is still becoming the main learning resource for students though most of students usually do not focus during the learning process, only a few students in the front row who look so serious paying attention and concentrating on recording the material presented by the teacher. It indicates that the learning process of State Vocational High School 2 of Pengasih (SMK N 2 Pengasih) is still done using a teacher-centered approach with the lecturing method and it makes the students look bored in the classroom.

The lack of students’ preparedness before the learning process often makes them difficult to understand the delivered material from the teacher. The limited media and only a few material explanations, once a week, can create obstacles during the learning process. Therefore, it is so important to present the technology-based learning media that is relevant to students’ needs that are easily accessible and can support the learning process both in the classroom and outside of teaching and learning activities in the classroom. The development of instructional media certainly must emphasize on the current the students interest, the time allocation in the curriculum, the material that must be conveyed, and the facilities owned by students and the school environment.

In developing learning media, it is necessary to utilize adequate information and communication technologies such as smartphone technology. Smartphones have various types of operating systems and the current trend is Android. Using android-based technology learning, the learning process will not be monotonous with text because audio visual elements and even animation can be used to facilitate students in understanding the material.

The findings on the development of android-based learning media done by Kurniawan Teguh Martono [1] points out that one of the technologies that will have an impact on learning is the use of computer technology embedded in cellphones (communication devices). Furthermore, Lyn, et al [2] reports that cellphones have a number of characteristics that can be used to design the most appropriate learning services for language students.

Based on the results of interviews results with the teacher and observations in several state vocational schools in Yogyakarat that already implemented the 2013 Curriculum with A predicate of accreditation, it is found that that the learning media in the automotive engineering program of Light Vehicle Engineering needs to be developed considering the difficulty level of the mandatory materials. Most of students use their mobile phones at school and even they play it during the learning process so this media can realize the use of smartphone wisely through interactive learning applications. Also, in achieving the qualified learning that is fun for students, innovation and creativity in the process of developing learning media is a crucial aspect.

Based on the above description, the researchers tries to develop android-based learning media on light vehicle engineering expertise, especially on light vehicle engine maintenance with fuel injection system material at State Vocational High School 2 of Pengasih. The presented learning material is the gasoline injection fuel system since this materials are very important to be understood by students.
Responding to these problems, the researchers develop teaching materials that will help students to learn using smartphone technology. The developed instructional material is an android-based learning media application that can be used for the theoretical learning process of light vehicle engine maintenance subjects.

Based on the existing problems, this study focused on developing android-based learning media for students of State Vocational High School 2 of Pengasih, especially on how the results of the development of Android-based media products with the material of understanding the gasoline injection fuel system, and how the feasibility and effectiveness of Android-based learning media in State Vocational High School 2 of Pengasih.

2. Literature Review

2.1 Media Pembelajaran
Azhar [3] states that one of the characteristics of educational media has a non-physical understanding known as software in which the messages contained in hardware as the content to be conveyed to students. In line with this, Timothy, et al. [4] reveals that the use of media in learning as a means to provide a rich environment for learning stimulation (for example: multimedia, video, text, real objects). Sarrab, et al [5] also explained that to evaluate and increase the chances of learning success, it is necessary to develop mobile learning media. As stated by Dian Indriana [6] that in the process of learning and teaching, the media is a very useful tool for students and educators and it is supported by Kurniawan Teguh Martono [1] who clarifies that the use of learning media in the form of applications on cellphone can make the learning process more flexible.

2.2 Pengembangan Media
According to Sugiyono[7], research and development is a method that serves to test, develop, and create certain products. It is supported by Gay [8] that development research is not to make theories or test theories but rather to examine consumer needs and then develop products to meet those needs. Wegener [9] also explains that Analyze, Design, Develop, Implement, and Evaluate (ADDIE) models are suitable for developing student-centered and flexible learning systems in the process. The ADDIE model is suitable for developing educational products and other learning resources, because ADDIE acts as a guiding framework for complex situations [10].

ADDIE model has several stages, namely: (1) analysis, is the basis for all other steps of instructional design, defining the problem, identifying the problem source and determining possible solutions; (2) design, verify the output of the analysis steps to plan a learning development strategy and determine the appropriate testing method to achieve the learning objectives; (3) development, builds on both analyzing and design steps, to produce learning media and validate produced learning resources; (4) implementation, refer to the learning implementation by preparing the learning environment whether it is class-based or laboratory-based and emphasizes the material understanding by students; (5) evaluation, assess the quality of learning products and processes, pre- and post- implementation [10].

2.3 Android
Abdul Kadir [11] explained that android was originally developed by a small company in Silicon Valley which the operating system is taken over by Google in 2005 and they used it as an “open source” of operating system. The software for android application development include Java Development Kid (SDK) Eclipse, Android SDK, and Android Development Tool (ADT), Adobe Flash professional CS 6. As explained by Setya Chendra Wibawa & Svan Schulte, et al, [12] that Android is designed primarily for touch screen mobile devices such as smart phones, computers, and tablets. Lee, et al [13] states that cellphone learning applications are software products for mobile devices. Lee [14] defines Android as a mobile operating system that is modified based on the Linux version. Android provides an open platform for developers to create applications by Safaat[15].
3. Research Methods
The development of Android-based learning media uses the ADDIE Research and Development method and the software as creator. The steps in developing this learning media are as follows:

- **Analyze**
  Conducting a survey to find out the need for learning media on the related schools. The results that will be obtained from this analysis phase are: (1) knowing the subjects that urgently need media; (2) obtaining the curriculum information; (3) obtaining and identifying subject matter; (4) obtaining media information data; (5) knowing the application for development that is suitable for the needed media.

- **Design**
  The Android-based learning media that was developed essentially contained lesson material and practice questions, which contained text, pictures, and videos. To operate this learning media, the students only use their smartphone during the learning process.

- **Develop**
  Development is carried out by preparing the content material and exercise items, and determining the media to be developed. The developed media in this study is an android platform application, which is made by using Adobe Flash CS 6 application utilizing Adobe Integrated Runtime (AIR) version 30 support facilities. After that, it is tested to determine the product validity based on expert judgment from the material expert, and media expert.

- **Implement**
  Implementation is carried out after the media is tested and ready for use. After that, the final stage of testing is done to find out the media aspects of the lesson to the user or students.

- **Evaluate**
  Conducting an evaluation based on the results of the implementation and assessing whether the Android-based learning media is feasible to use and performing as the expected results.

4. Results and Discussion
The development results of android-based learning media applications in the form of Application Package Files (APK) has relatively small memory capacity of 76.41 MB, so that users can install on their smartphones easily and store this products practically as learning resources.

![Figure 1](image1.png)

(a) Tampilan aplikasi
(b) Tampilan menu

**Figure 1.** the interface of android-based learning media.

The final product of this Android-based learning media consists of several main menus. The top right corner menu covers user guidelines, developer profile and exit button. The description menu includes...
media description, learning objectives, discussion material and reference sources, glossary, theory menu shows introduction, fuel system, air induction system, electronic control system, diagnosis, inspection and setting, and the training menu contains multiple choice questions, yes/no questions and assignments). The material presented in the learning media is equipped with text, images, videos. In addition, there is an exercise completed with discussion and feedback given in the form of positive reinforcement if the answer is right, on contrary if the answer is wrong, negative reinforcement will come up. Therefore, the students can gain deeper understanding regarding of the material.

Validation of media experts stated that the learning media was ready to be used "Feasible", with the mean score of 4.00 or in "Good" catagory, as presented in the following Table 1:

| Interval   | Kriteria               | Frekuensi | Persentase |
|------------|------------------------|-----------|------------|
| 4,2 < X ≤ 5 | Sangat Baik            | 0         | 0%         |
| 3,4 < X ≤ 4,2 | Baik                  | 31        | 100%       |
| 2,6 < X ≤ 3,4 | Cukup Baik           | 0         | 0%         |
| 1,8 < X ≤ 2,6 | Kurang Baik          | 0         | 0%         |
| 1 ≤ X ≤ 1,8 | Sangat Kurang Baik    | 0         | 0%         |
| Total      |                        | 31        | 100%       |

Validation result from the material experts stated that the learning media was ready to be used "Feasible", with the mean score of 4.16 or in "Good" catagory, as presented in the following Table 2:

| Interval   | Kriteria               | Frekuensi | Persentase |
|------------|------------------------|-----------|------------|
| 4,2 < X ≤ 5 | Sangat Baik            | 8         | 16%        |
| 3,4 < X ≤ 4,2 | Baik                  | 41        | 84%        |
| 2,6 < X ≤ 3,4 | Cukup Baik           | 0         | 0%         |
| 1,8 < X ≤ 2,6 | Kurang Baik          | 0         | 0%         |
| 1 ≤ X ≤ 1,8 | Sangat Kurang Baik    | 0         | 0%         |
| Total      |                        | 49        | 100%       |

The trial of Android-based learning media was carried out on light vehicle engineering classes at State Vocational High School 2 of Pengasihamong 46 students. The results of the trial obtained the mean score of 4.11 or in "Good" catagory, as presented in the following Table 3:

| Interval   | Criteria               | Frekuensi | Persentase % |
|------------|------------------------|-----------|--------------|
| 4,2 < X ≤ 5 | Sangat Baik            | 18        | 39,1%        |
| 3,4 < X ≤ 4,2 | Baik                  | 23        | 50,0%        |
This study is using N-gain test to determine the results of effectiveness category. The use of Android-based learning media obtained the calculation results of the mean score of N-gain as 76.09%. It can be categorized as “effective” category, as presented in the following Table 4:

| Percentage (%) | Interpretation        |
|----------------|-----------------------|
| < 40           | Not Effective         |
| 41 – 55        | Moderate Effective    |
| 56 – 75        | Less Effective        |
| > 76           | Effective             |

5. Conclusion

Based on the results of the study it can be concluded that: (1) Product development including android-based learning media consisting of several menus: top right corner menu, menu description, menu theory, and problem training menu; (2) The level of feasibility of Android-based learning media is obtained from material experts in the category of good / feasible and media experts enter the category of good / feasible; and finally (3) The level of learning for the application of Android-based learning media products is included in the effective category.

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