The Development of Interactive Learning Media Based Android Application Using Adobe Flash in Conventional Filing System

Adha Dwi Mardiana ✉, Hadromi Hadromi

Fakultas Teknik, Universitas Negeri Semarang, Indonesia

Article Info	Abstract
	This study aims to develop interactive learning media on Android application-based conventional filling systems, find out the level of feasibility and effectiveness of the media as well as knowing the students' responses. This research used development research methods with ADDIE development models and final test results using one group pretest-posttest design. The instruments used are questionnaires and tests. The results of media validation obtained 190 scores from media experts and a score of 339 from material experts. The assessment of media experts and materials experts declared very decent criteria. The research result of students proved to be effective since the average pretest score of 55.2 and the average posttest score of 82.3, the average difference of 27.1 with the completion of the test results achieved 86.7% from 3.3%. The t-test showed the value of $t_{count} = 27.85 > t_{table}$ of 2.045. It means there is a significant difference, the results of the gain test get a score of 0.62 with medium improvement criteria. The final product received a very good response from students as users with a percentage of 85.4%.

✉ Correspondence :
Fakultas Teknik, Universitas Negeri Semarang, Indonesia
Kampus Sekaran, Gunungpati, Kecamatan Gunung Pati, Kota
Semarang, Jawa Tengah, Indonesia 50229
E-mail: adhadwimardiana28@gmail.com

INTRODUCTION

Education is one of the crucial pillars to advance the nation and holds an important role in increasing human resource quality, which is it can maintain and raise the human life standard (Setiawati, 2017; 351). The development of education is influenced by the teaching and learning process. Furthermore, the learning process and assessment in the 2013-Curriculum must be relevant to 21-century learning competencies. Darling in Mohali (2019: 38) stated that learning in the 21-century requires teachers to manage class activities effectively, and do some learning reflections constantly. The development of technology can be used to support the learning process, one way to achieve it by developing learning media. The application of technology as learning media can raise learning motivation and students' learning outcomes (Chuang, 2014: 1977).

Based on a preliminary study conducted in Lightweight Automotive Engineering of SMK N 2 Kendal, showed that the learning method is conventional with a teacher-centered method. For example, the teachers tend to use a traditional scheme rather than interactive learning media in delivering the materials. So, the materials seem monotonous. The students' learning source still used traditional textbooks and handouts this condition caused the learning process un-maximum. The learning media in the teaching and learning process commonly applied a blackboard and *PowerPoint* to show the materials slide by slide. This condition derived a lack of motivation and the saturated feeling of the students.

Based on the questionnaire results of 30 student participants of Lightweight Automotive Engineering showed that 100% of participants had an android smartphone. The usage of smartphones for assessing entertainment media such as games achieved 23% and social media got 54%. On the other hand, the researcher found that there were only 23% used a smartphone for learning. Based on the results data, the usage of smartphones for learning seems lees. It is necessary to use smartphones positively in learning activities so that students can learn independently (Astuti, et al. 2017: 58). The students' interest in Android-based learning media was 63%, in contrast, there was 3% of *Powerpoint* media and 34% preferred book. Based on the result, it can be said that there is a need for innovation in learning media by utilizing students' smartphones to support learning activities.

Based on observation results in a preliminary study that was carried out at SMK N 2 Kendal in the subject of Electrical Maintenance for Lightweight Vehicle (PKKR) especially in the conventional Filling system materials showed many students did not understand the materials optimally. Based on the structured interview, PKKR teachers stated that the automotive electrical material is a difficult subject since it tends to abstract (intangible), and the students must be able to interpret it themselves. Hence, the learning media is beneficial to help the students to understand electrical materials.

Based on a related and preliminary study at SMKN 2 Kendal, the researcher choose these issues to develop interactive learning media by using an android smartphone entitle 'The Development of Interactive Learning Media Based on Android Applications Using Adobe Flash on Conventional Filling System Materials'.

Learning media are everything in learning, either physical or technical, which makes it easier for teachers to deliver learning material to the students so that learning purposes can be easily achieved (Adam dan Syastra, 2015: 79).

Interactive media is a combination of several components such as images, photos, text, audio, video, and animation (moving images) are arranged as attractive as possible so that users can interact with the media by inserting interactive features (Nofianto, et al. 2017: 3). Interactive learning media generally involves user control in the presented learning material such as *start* and *stop* controls or displaying a simulation of learning material (Skulmowski and Rey, 2020: 150).

Android is an operating system for Linux-based smartphones which includes an operating system, middleware, and applications. Android is an open operating system so that developers can freely create applications for the android platform (Putra, et al. 2016: 47).

The Filling system is a vehicle electrical system that has a Filling function to recharge the battery so that it is in good condition and able to supply electrical needs for other electrical systems during the turn-on machine (Widjanarko, 2008: 1).

Based on the elaboration of the theory, developing interactive learning media hopefully support learning activities such as the students can see and reopen the materials through their smartphone, the students have guidance in practicing, maximizing the smartphone usage to support the learning process, and increasing students' knowledge.

The purposes of the study are 1) to examine the expediency of interactive learning media, 2) to determine the effectiveness of interactive learning media based on android application in the subject of conventional Filling system materials, 3) to examine students' feedback in dealing with interactive learning that develops by the researcher.

METHOD

The current research used Research and Development (R&D) method. The research scheme of this study used the ADDIE model that consists of Analysis, Design, Development, Implementation, and Evaluation.

The present study has two analysis phases: 1) performance analysis, this analysis conducted to gain performance problems and describe it clearly so that the solution formulated, 2) needs analysis, a phase that systematically organized to decide the performance problem and determine a proper strategy that will be used as a solution to solve the problem.

The research design of the current study is designing the process of interactive learning media based on android application, especially in conventional filling system materials. This designing process is organized based on analysis needs. In this stage, the learning program is formulated, so that it can achieve the learning goal. The navigation scheme of interactive learning media can be showed in figure 1.

The developing stage in this research consists of the realization stage and design validation. Learning media was developed by applying a product plan that made it before.

The implementation stage in the present study is a realization of a learning program that has been designed before. The media that has been declared feasible is examined to all students as a user. The students were provided a pretest and a posttest to determine the effectiveness of media. During the examining process, the questionnaires were given to gain students' perspective toward their experience as a user of interactive learning media.

The final results of the media feasibility evaluation in this study have been validated by media experts and material experts. Additionally, it has had responses from students. Furthermore, the effectiveness of learning media in increasing students' knowledge can be seen in the students' passing grade of Conventional Filling Materials System subject. The result of effectiveness evaluation can be drawn by comparing pretest and posttest scores.

The research design in product testing used Pre-Experimental Design, and the experimental model used one group pretest-posttest design. The research subject consists of 30 student participants in Electrical Maintenance for Lightweight Vehicle (TKRO) SMK N 2 Kendal. The types of data are quantitative and qualitative. The quantitative data is taken from the questionnaire form and the test result, while qualitative data is derived from students' feedback toward the interactive learning media. To gain the data, the researcher use questionnaire, test, and students' feedback form.
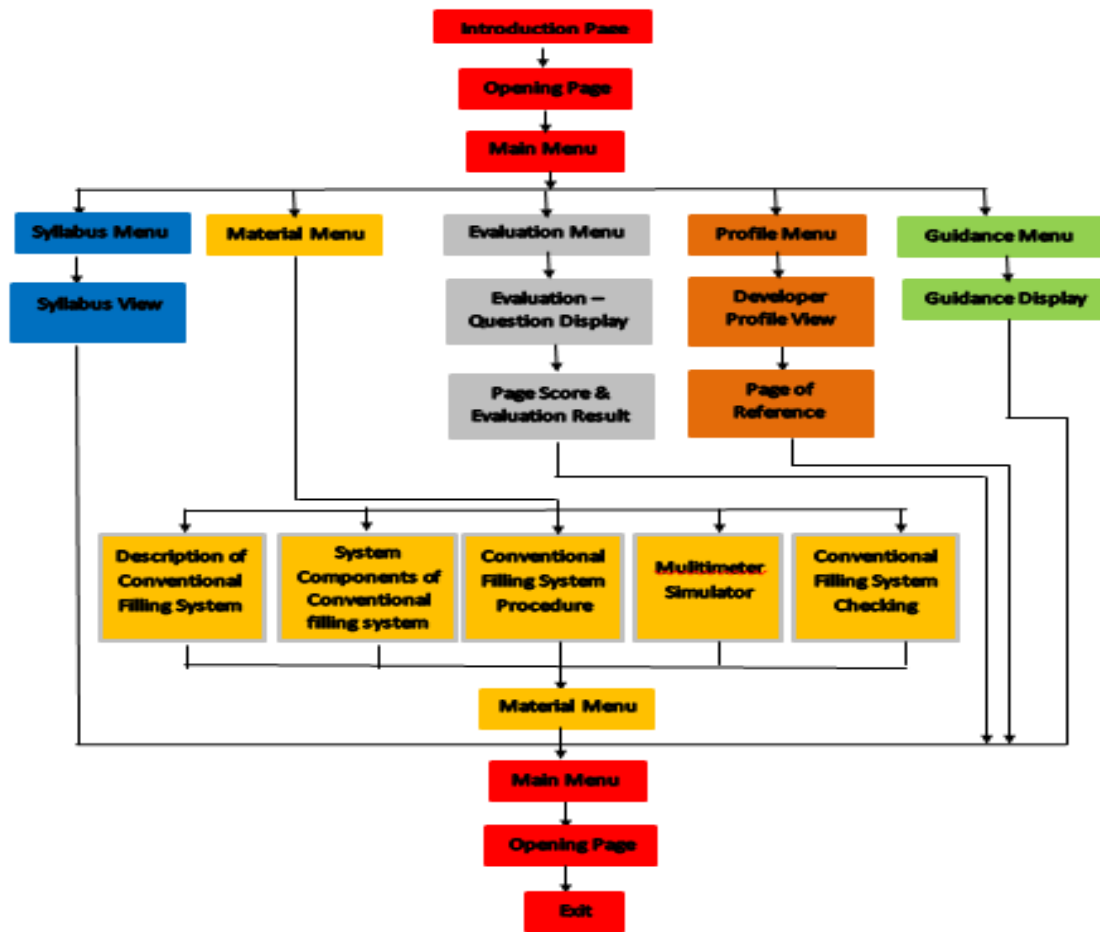
Figure 1. Application Roadmap

RESULT AND DISCUSSION

The test result data of media experts and materials experts were analyzed to examine the worthiness of the developed learning media. The following are the results of the data analysis of the feasibility test by media experts and material experts, especially on the interactive learning media of the developed conventional filling system.

Table 1. The Result of Media Expert Judgments

Media Expert	Score
Adhetya Kurniawan, M.Pd.	94
Manikowati, M.Pd.	96
Total Score	190
Maximum Score	232
Criteria	Very Reliable

Based on the present data in table 1, it can be seen that the feasibility test from two experts got 190 total scores of 232 maximum score. This result was consulted by the response scale table from media expert and included in the interval value 189,5 – 232 as '**very reliable'** criteria**.**

Table 2. The Result of Material Expert Judgment

Material Expert	Score
Wahyudi, S.Pd., M.Eng.	173
Mubarokan, S.Pd.	166
Total Score	339
Maximum Score	368
Criteria	Very Reliable

Based on the present data in table 2, it can be seen that the feasibility test of learning media from two experts got 339 total scores of 368 maximum score. This result was consulted by the response scale table from material experts and included in the interval value 300 – 368 as '**very reliable'** criteria**.**

Based on the two experts' judgment toward interactive learning media in the

conventional Filling system, each category achieved a very reliable score. It can be concluded this interactive learning media is worthy of learning media.

Before the instruments test is applied to measure the effectiveness of learning media, the instruments were trialed to examine the constructed question made by the researcher in dealing with validity and reliability. The data result was taken by pretest and posttest score of 30 students participants of XI TKRO SMK N 2 Kendal. The pretest showed 55,2 of the average score. It means that only 3,3% of students pass the passing grade. In contrast, the average score of the posttest got 82,3 or 86,6% students successful in filling the passing grade. After getting the result of the pretest and posttest, the research is continued by conducting a normality test, homogeneity test, t-test, and gain-test. The average result can be seen as the following diagram:
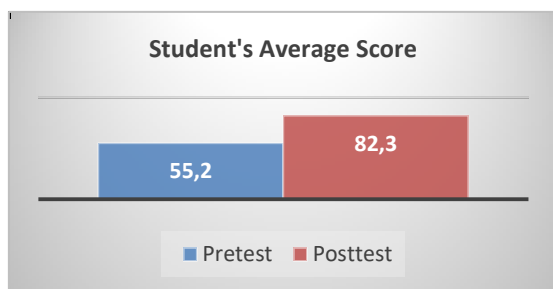
Student's Average Score

55,2   82,3

■ Pretest ■ Posttest

Figure 2. Average Score Diagram of Pretest and Posttest

The normality test result of pretest and posttest by using *Chi Quadrate* formulas ($\chi2$), it can be seen as follows:

Table 3. The Result Calculation of Normality test in Pretest and Posttest

Test	χ^2_{count}	χ^2_{table}	Conclusion
Pretest	3.34	11.07	Normally distributed data
Posttest	3.90	11.07	Normally distributed data

By using the Chi Quadrate formula at 5% significant level, the result is $\chi2$ count of 3,90 and dk= 6-1 = 5 obtained $\chi2$ table 11,07. Based on the results of the calculations, it can be seen that $\chi2$ count < $\chi2$ table, so it can be concluded that the pretest and posttest data are distributed normally.

The result of the homogeneity test can be seen as follow:

Table 4. The Result Calculation of Homogeneity Test

F_{count}	F_{table}	Conclusion
1.75	1.85	Homogeneous Data

Based on the calculation result of the homogeneity test from the data that has been obtained, the calculated F value is 1.75 with *dk* numerator = 30 - 1 = 29 and *dk* denominator = 30 - 1 = 29 at the 5% significance level, the F table price is 1.85. Because of the F count $\leq$ F table, it can be concluded that the research data has been obtained homogeneously

The t-test result can be seen in the following table:

Table 5. T-test Result

t_{count}	t_{table}	Conclusion
27.85	2.045	Significant

Based on t-test calculation gained t_{count} is 27,85 and at the 5% significance level with dk= 30-1 = 29 it is obtained t (0,05) (29) = 2,045 (t_{table}). Based on the calculation, t_{count} is in the rejection area of H_o. It can be concluded that there is an increasingly significant learning outcome between pretest and posttest.

The normalized gain test result can be seen in the following table.

Table 6. The Normalized Gain Test Result

	Score	Gain average	Interpretation
Pretest	1656	0.62	Medium Enhancement
Posttest	2468		

Based on *the gain* test and comparison between *the gain* interpretation table from 30 student participants, obtained 23 student participants that experienced moderate improvement with 0,44 - 0,70 *gain* scores. There were 7 participants experienced advance improvements with 0,71 – 0,80 *gain* scores. Furthermore, *the gain* score form 30 students were averaged. So, it obtained 0,62 which means based on *gain* interpretation declared as a medium enhancemen.

Table 7. The Percentage of Students Feedback

Feedback	Percentage (%)
Very Agree	48.9
Agree	45
Adequately Agree	5.7
Disagree	0.4

Based on the total score obtained from the questionnaire, the participants got 85.4% of the scores. These results were consulted with the table of students' response criteria, and the result declared as "very good" criteria.

The final product of interactive learning media in a conventional Filling system based on an android application provides its materials on basic-competency. This basic competency covers applying the maintenance filling system method and maintenance it periodically. The materials consist of 5 sub-menus: descriptions of conventional Filling systems, components of the conventional Filling systems, how the conventional Filling systems work, simulators of using multimeters, and the conventional Filling systems checking.

This interactive learning media in the conventional filling system is not only obtained text media and pictures but also it combined by animation, audio, simulator, and video that created in smartphone applications for a smartphone that supported the Android smartphone system. This application is made by s*oftware* Adobe Flash CS6, and the output of this project is *apk* file. The students can easy to access this program by using their smartphone as long as the smartphone is supported by the android operation system. Further, the teacher may access this application on the computer or laptop by using an android emulator or by choosing a media player that already exists on the computer so that the teacher can teach in the class.

Interactive learning media in conventional Filling system proofed effective in increasing students' outcomes significantly with a 27,1 difference average score between pretest and posttest. The final product of interactive learning media declared 'adequate' criteria in improving students' outcomes based on a normalized gain

test with 0,62 of average overall scores. Based on pretest data, one student was successful in exceeding the passing grade or equal to 3,3%. On the other hand, there were 29 students or equal to 96,7% who failed in passing the standard score. After giving the interactive learning media, the students were invited to join the posttest. The result showed that there were 26 students (86,6%) were successfully passed the score nad only four students remained (13,3%). The final result of the interactive learning conventional filling system had excellent feedback from the participants or user media by gaining an 85,4% score.

The present research was in line with Putiriani, et al. (2017) research entitled "Developing Learning Media Based on Android Application by Construct 2 on Polyhedron Material for 8 Grade Junior High School Student". This research used the research and development method by developing 'ADDIE'. The results depicted a 3,89 score (good categories) from expert judgment, and 4,8 (excellent) from the teacher. So it can be declared 'valid'. The students feedback achieved 4,14 (good), and 82,6% of students exceeded the passing grade. Hence, the learning media is declared effective since it fulfilled the effectiveness aspects

So it can be concluded that the interactive learning media based on the android application on the material of the conventional filling system is feasible and effective in increasing students' understanding and learning outcomes. Furthermore, this application system touched students' interest and getting excellent responses from students as media users.

CONCLUSIONS AND SUGGESTIONS

Interactive learning media based on an android application in conventional filling system material developed using Adobe Flash software stated feasible to be used as a learning media. The calculation results of the media expert's assessment achieved 190 that included in the "very reliable" criteria. Furthermore, the calculation results of the material experts got

339. This score included the "very reliable" category.

Interactive learning media based on an android application in conventional filling system material is declared effective in improving students' understanding and knowledge, especially in the conventional filling system materials. Based on the results of the increased calculation in the average score of students who initially on the pretest results got an average value of 55.2, then increased in the posttest results to 82.3 with 27.1 improvements.

Based on the t-test calculation results gained 27,85 from t_{count} with 5% significant, while the t_{table} with a significance level of 5% was 2.045. It can be concluded between the pretest and posttest results were a significant increase. The results of the normalized gain test calculation showed medium improvement criteria with an average gain value of 0.62. Based on passing grade results after using interactive learning media with conventional filling system, it was found that 86.6% of the 30 students exceeded the passing grade score (KKM).

The students' responses achieved 85,4% in responding to interactive learning media of conventional filling system subjects. The students' responses elaborated that interactive learning media help them to study, became active, and interested in using interactive learning media during the learning process. In conclusion, the present media can be categorized as excellent by students as media users.

Based on the research result and conclusion, the researcher found the gap that may be filled by other researchers in developing interactive learning media. The researcher found that the IC regulator system has not been explored optimally in dealing with the electrical Filling system. It can fill the gap of the research if further researchers develop that topic. Future researchers are advised to use the newest software so that the learning application can be made easily and decrease a problem that may appear caused by software limits.

ACKNOWLEDGMENT

REFERENCES

Adam, S. dan M. T. Syastra. 2015. Pemanfaatan Media Pembelajaran Berbasis Teknologi Informasi Bagi Siswa Kelas X SMA Ananda Batam. *CBIS Journal* 3(2): 78-90.

Arikunto, S. 2013. *Prosedur Penelitian, Suatu Pendekatan Praktik*. Jakarta: PT Rineka Cipta.

Astuti, I. A. D., R. A. Sumarni, dan D. L. Saraswati. 2017. Pengembangan Media Pembelajaran Fisika *Mobile Learning* Berbasis Android. *Jurnal Penelitian dan Pengembangan Pendidikan Fisika* 3(1): 57-62.

Chuang, Y.T. 2014. Increasing Learning Motivation and Student Engagement through the Technology-Supported Learning Environment. *Creative Education* 5(23): 1969-1978.

Muhali. 2019. Pembelajaran Inovatif Abad Ke-21. Jurnal Pendidikan dan Pengkajian *Ilmu Pendidikan: e-Saintika* 3(2): 25-50.

Nofianto, R., Andrizal, dan Wagino. 2017. Pengembangan Media Pembelajaran Interaktif untuk Mata Pelajaran Memperbaiki Sistem Starter dan Pengisian Berbasis Software Lectora Inspire pada Program Keahlian Teknik Kendaraan Ringan di Sekolah Menengah Kejuruan. *Automotive Engineering Education Journals* 1(1): 1-10.

Putra, D. W., A. P. Nugroho, dan E. W. Puspitarini. 2016. *Game* Edukasi Berbasis Android sebagai Media Pembelajaran untuk Anak Usia Dini. *Jurnal Informatika Merdeka Pasuruan* 1(1): 46-58.

Putriani, D., N. H. Waryanto, dan K. Hernawati. 2017. Pengembangan Media Pembelajaran Berbasis Android dengan Program *Construct* 2 pada Materi Bangun Ruang Sisi Datar untuk Siswa SMP Kelas 8. *Jurnal Pendidikan Matematika* 6(3): 1-10.

Setiawati, N. A. 2017. Pendidikan Karakter sebagai Pilar Pembentukan Karakter Bangsa.

Prosiding Seminar Nasional Tahunan Fakultas Ilmu Sosial 1(1): 348-352.

Skulmowski, A. dan G. D. Rey. 2020. Subjective Cognitive Load Surveys Lead to Divergent Result for Interactive Learning Media. *Hum Behav & Emerg Tech* 2(2): 149-157.

Sudjana. 2005. *Metoda Statistika.* Bandung: PT Tarsito

Sugiyono. 2019. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D.* Bandung: Alfabeta

Widjanarko, D. 2008. Studi Tingkat Penguasaan Rangkaian Sistem Pengisian (Filling System) oleh Siswa Pasca Proses Pembelajaran Mata Kuliah Teori Kelistrikan Otomotif. *Lembaran Ilmu Kependidikan* 37(1): 1-6.