Designing android-based learning media and assessment in improving students achievement

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Abstract. Mobile phone with android platform is one of the electronic devices that experienced rapid development from other electronic devices. Therefore, in this paper the researchers tried to explain about how 1) Designing and developing learning media and android-based assessment on the computer electronics course in STMIK AKBA 2) Increasing the learning result of STMIK AKBA students on the computer electronics course through the application of instructional media and android-based platform assessment based. The type of research used in this paper is Research & Development (R & D) while the data analysis method is done by using descriptive and inferential analysis technique to reveal the result of study that has been done. The results of the study found that the learning media can run appropriately with the desired where the Main Menu, Material Form, Material Edit Form, Admin Form, Login Form and Evaluation Form can work very well and based on the results of inferential analysis, it can be reported that there is a significant increasement in student learning achievements.

1. Introduction
The learning media on the computer electronics course is a highly necessary thing to explain clearly about the learning material without having to be explained conventionally, eventhough with conventional methods cannot be abandoned because there are certain things that students can understand if those are conventionally explained. Therefore, a born of learning media can only serves as an intermediary which can help students in learning, especially in computer electronics learning. The success of learning is determined by two main components namely teaching methods and learning media, where both components cannot be separated from each other [1] [2]

In the learning of microcontroller material on the computer electronics course, many students still have not been able to comprehend it well so we as lecturers take the initiative to create a learning media which can help students in learning without a lecturer attendance. Beside that, with the existence of learning media applications, the student can also assess his or her ability in relation to the material that she or he has been studied. The way to know their ability can be done by selecting or clicking the evaluation button in which there are questions to be answered. If the test scores of the obtained results are high then it can be concluded that the student can understand the material that he or she has learned.
In addition, by utilizing various android facilities can help lecturers in making the interactive learning applications. Thus, we think to try to make an android-based learning media which equipped with the test applications that can assess the students ability associated with the material that has been obtained and learned in the application.

2. Research Methods
This research type is research and development (R & D) by using waterfall model in the system development. The research object is to develop the learning media and the assessment of android based on computer electronics course in STMIK AKBA. The data collection method is done with the test, observation and documentation while the data analysis technique is done with the quantitative descriptive.

3. Result
3.1. The Result Design
Based on the design results of instructional media applications using Android Development tools assistance as the editor of android programming using java and XML programming (Extensible Mark-up Language). However, before being used as an android programming editor, first must be injected the SDK of android. After the design is done then it appears that all the design results can run in appropriate way where in the stages of implementation of android-based microcontroller learning application has a user level.

The display of the application results from the design can be seen as follows:

Figure 1. The Form of Main Menu
In the menu section of this material is a menu which displays the button per meeting where in each meeting has different material starting from the meeting button 1, the meeting button 2, the meeting button 3, and the further meeting. If we press the button item on the main menu, thus it will appear as shown at the Figure 2 where on the picture we are able to choose each meeting that we want.

Figure 2. The Form of Material Menu.
At the menu of this login form, the user will be directed to enter the username and password in order to access the Admin form. If Username and Password are true, then The User will be able to login to Admin form that is the form to manage items or material if user and password is not contained in database will be automatically rejected by the system. Other than, the buttons shown earlier there are also other buttons that have not been displayed in forms such as microcontroller form that discusses the introduction of microcontroller, this button explains about the name related to application maker and profile photo owned by the creator of the application, then in the Evaluation button there are questions to be answered by the student, where the content of the question is taken from the material that has been studied previously with the aim; the students can assess their own ability by answering all the questions in the evaluation button. While at the Exit button share used to perform the closure of applications which are running.
3.2. The test result based on experts and practitioner views

3.2.1 Analysis on the application views

On the form of the main menu there are several views where the students can choose one which is appropriate for them, as if the students want to know the material in its application just click on the material form. Because in the main menu there are some indicators that will be assessed as a glance button about the microcontroller, MaterialButton, About Button and Exit Button. The test results of each indicator of the practitioners obtained the results of analysis as shown in table 1.

| Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------|---------|---------------|--------------------|
| Good      | 2       | 20.0          | 20.0               | 20.0               |
| Very Good | 8       | 80.0          | 80.0               | 100.0              |
| Total     | 10      | 100.0         | 100.0              |

Based on Table 1, it shown from the assessment results by the practitioners in the test results found that the results were very good at 80% while for Good stated about the form of main menu at 20%. It indicated that the indicators in the main menu form were rated as expected. Furthermore, to see the picture based on the graph, can be shown in Figure 3 below.

In the material form there are also parts that should be assessed such as functionality of the material button 1, 2 and 3 and so on. Where in test, the testing conducted by clicking on each button, if the button displays the material in appropriate with the link provided then the form is considered successful. Thus, to find out the button function of each material. It also appears that most practitioners are 70% or as many as 7 people from 10 practitioners who are prepared for the assessment. From the results of the test found that the existing content information on the learning media meets criteria that is very good while the good category of 30% of the assessor. More clear and complete the results of the analysis, the result can be seen in Figure 4.

In the login form it is important to keep every system that has been created and it is intended for the user in order to access certain parts of an application. In relation to that case so the login form is intended for users who are given the right to be able to access the content of the material or the other and the indicators assessed are Login Button, Username & Password empty, Username & password correct. Furthermore, in the admin form is used by someone who has full rights in a system, thus the indicator is assessed in testing the admin form that is how the functionality of the button on content edit and button to make the removal of some material or even the entire contents of the existing material. The test results login and admin form obtained the same value cause it is clearly revealed that the test results of the practitioners agree if the login form and admin form in this application in either category as much as 20% while 80% assessor who claim that the login form although the admin form on this learning media meet the criteria; very good at 80%, for more details can be seen in figure 5 below.
3.2.2 Analysis of statistic Inferential

In conducting the statistical analysis, then the first step is done in this study is testing normality as a test requirements parametric analysis with criteria if the sig. value of (p) count is greater than the selected significance value (a = 0.05), then the data satisfies the normal distributed criterion. Referring to the result of student learning obtained by analysis result using application of SPSS 20 for windows with value of (Sig. Asymp)> 0.05 from the result of analysis it seems that all data have normal distribution and result of analysis can be seen in table 2 below.

| Data      | Asymp. sig. (2-tailed) Kolmogrov-Smirnov | Statement                      |
|-----------|-----------------------------------------|--------------------------------|
| Pre-test  | 0.982                                   | Asymp. sig. (2-tailed) > 0.05  |
|           |                                         | (Normal)                       |
| Post-test | 0.144                                   | Asymp. sig. (2-tailed) > 0.05  |
|           |                                         | (Normal)                       |

3.3. The result of descriptive analysis

Referring to the results of the descriptive analysis it appears that the mean values obtained for pre-test are 56.94, median 57.00, 46.00 mode, Standard deviation 9.72, Variance 94.585, Range 40.00, minimum value 40.00, and maximum value 80.00. While the results of descriptive analysis for post-test obtained average value of 73.31, median 75.00, 64.00 mode, Standard deviation 10.37, Variance 107.69, Range 40.00, minimum value 46.00, and a maximum value of 86.00. Referring to the results of the descriptive analysis, it appears that the value of post test has a better value than the value of pre-test. The percentage of students’ learning achievement increased from the previous 35 students, where the students who have excellent score as much as 48% (17), good category at 48.6% (17) and enough category as much as 2.9%, more clearly can be seen in table 3.
Table 3. The result of descriptive analysis of learning result

| Valid   | Frequency | Percent | Cumulative Percent |
|---------|-----------|---------|--------------------|
| Enough  | 1         | 2.9     | 2.9                |
| Good    | 17        | 48.6    | 51.4               |
| Very Good | 17      | 48.6    | 100.0              |
| Total   | 35        | 100.0   |                    |

3.4. T test of paired samples test

The purpose of t-test is to see the differences in learning outcomes before and after using learning media that have been developed previously and the results of analysis can be seen as shown in table 4 with the testing criteria hypothesis H0 is accepted if the probability value of count (sig.) is greater of from the value of α (selected level of significance = 0.05), otherwise the hypothesis H0 is rejected if the p value is greater than α.

Table 4. Paired Differences

| Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | t | df | Sig. (2-tailed) |
|------|----------------|-----------------|-----------------------------------------|---|----|----------------|
| Pair 1 | pre – post     | -16.37143       | 2.22329                                 | -20.88969 | -11.85317 | 7.364 | 34   | .000 |

As showed in table 4 above, it is obtained the t value as 7.364 while the value of t table is 2.03, because the value of tcount< t table (7.364> 2.00) and the significance value is smaller than alpha 0.05 which has been determined (0.00 <0.05) so it can be inferred to reject H0 and receive H1. Meaning that, there is an increasement in student learning outcomes. This is also approved by the average value of pre-test results of 56.94 increased to 73.31. This proved that by using android-based learning media can improve student learning achievements.

4. Discussion

Various experts have explained that by using the learning media will make students more motivated in learning if compared to just reading a textbook or by learning to use conventional methods that is lecture method. Seeing this does not give much contribution to the learning achievements of computer electronics courses thus need a device that contains teaching materials can facilitate students in understanding the material well, through interactive learning applications. Learning media can also be in the form of mobile learning where a learning media utilize the use of mobile applications, in such a way help students in learning independently wherever they want[1][7].

In education world, it has found many technologies can support in teaching and learning activities because most of the lecturers and students have used various hardware and software of android as a tool to achieve maximum learning outcomes because students have experience and participate directly[11][12].

In addition, the part of technological development that we feel today with the existence of advanced technology that produce the applications used in learning with the help and utilization of mobile devices. Mobile users are accounted in the great quantities, especially among the students. The use of learning media in the form of mobile learning that utilizes this mobile phone can be said as a step taken by students to be more focused. Where the advantages of mobile learning compared with other learning is it can be used at anywhere and any time, small and lightweight device sizes from desktop computers, is expected to include more learners as mobile learning utilizes the technology.
commonly used in everyday life as well easy to carry anywhere, besides that android can also be used in terms of image processing in assessing the quality of product[13][14][15].

5. Conclusion
Based on the results of the analysis and discussion above can be concluded that the application developed into the very good category and easy in its use, then from the results of statistical analysis of inferential of the post-test with post test obtained information that by using android based learning media can improve student learning achievement in computer electronics course.

References
[1] M. S. Sumbawati, R. C. Wibawa, Munoto, and S. C. Wibawa, “Development of Vocational Interactive Multimedia based on Mobile Learning,” in IOP Conference Series: Materials Science and Engineering, 2018.
[2] F. S. Irwansyah, Y. M. Yusuf, I. Farida, and M. A. Ramdhan, “Augmented Reality ( AR ) Technology on The Android Operating System in Chemistry Learning,” in IOP Conference Series: Materials Science and Engineering, 2018.
[3] T. Wang, “Developing a Web-based Assessment System for Evaluating Examinee ’ s Understanding of the Procedure of Scientific Experiments,” EURASIA J. Math. Sci. Technol. Educ., vol. 14, no. 5, pp. 1791–1801, 2018.
[4] Mansyur, Syahrial, and A. Iskandar, “Assessing the Critical Thinking Ability of Junior High School Students in Makassar and Gowa in South Sulawesi,” Int. J. Assess. Eval., vol. 24, no. 3, pp. 25–35, 2018.
[5] A. Iskandar, E. Virma, and A. S. Ahmar, “Implementing DMZ in Improving Network Security of Web Testing in STMIK AKBA,” Int. J. Eng. Technol., vol. 7, no. 2.3, pp. 99–104, 2018.
[6] J. M. A. Antequera, “Assessment of the Intercultural Competence in Primary Education : A comparative view between CLIL and non-CLIL contexts,” pp. 2015–2016, 2016.
[7] I. M. A. Wirawan and I. B. M. L. Paryatna, “The Development of an Android-Based Anggah-Ungguhing Balinese Language Dictionary,” Int. J. Interact. Mob. Technol., vol. 12, no. 1, pp. 4–18, 2018.
[8] M. N. Hudha, S. D. Aji, and C. Huda, “E-Rubric : Scientific Work Based on Android for Experimental Physic,” in IOP Conference Series: Materials Science and Engineering, 2018.
[9] F. S. Arista and H. Kuswanto, “Virtual Physics Laboratory Application Based on the Android Smartphone to Improve Learning Independence and Conceptual Understanding,” Int. J. Instr., vol. 11, no. 1, pp. 1–16, 2018.
[10] P. Cerna, “Mobile Computing Framework for Student Engagement System in Ethiopian Higher Educational Institution,” Mob. Comput. Framew. Student Engagem. Syst. Ethiop. High. Educ. Inst., vol. 6, no. 1, pp. 10–19, 2018.
[11] E. A. Alghamdi and S. R. Shah, “Exploring the Effects of Mobile-Based Audience Response System on EFL Students ’ Learning and Engagement in a Fully Synchronous Online Course,” Int. J. English Linguist., vol. 8, no. 3, pp. 92–100, 2018.
[12] Y. Rathod, M. Dighole, and R. Sharma, “IMPLEMENTATION OF CHILDREN TRACKING SYSTEM ON ANDROID MOBILE TERMINALS,” Int. Res. J. Eng. Technol., vol. 5, no. 3, pp. 441–445, 2018.
[13] A. Yadav and S. Maheshwari, “A comparative scrutiny of smartphone Operating Systems,” Int. J. Ser. Eng. Sci. Arch. Comput. Eng., vol. 2, no. 5, pp. 15–25, 2016.
[14] D. E. Gajanan, G. G. Shankar, and G. V. Keshav, “Detection of Leaf Disease Using Feature Extraction for Android Based System,” IJSRST, vol. 4, no. 2, 2018.
[15] M. S. Malkar, P. R. Gopalan, G. N. Basutkar, R. D. Garud, and P. P. Rukari, “An Android Application for Smart College,” Int. Res. J. Eng. Technol., vol. 5, no. 2, pp. 2199–2201, 2018.