Mobile Learning Application for Personal Computer Assembly Techniques as Learning Media in Vocational High School

ISSN : 2549-5399 (online)
ISSN : 2549-5380 (print)

Muhammad Yusro¹*, JusufBintoro², EkaDinarya³
Department of Electrical Engineering, Faculty of Engineering, UNJ¹,²
myusro@unj.ac.id
Department of Computer Engineering and Network, SMK 1PerguruanCikini, Jakarta³
eka.dimarya@gmail.com

Received February 2017; accepted April 2017; published online may 2017

Abstract. In the globalization era, innovation in hardware and software of ICT in mobile-learning (m-learning) could be an alternative to a learning model. M-learning system uses a handheld and mobile device, such as smartphones, PDAs, laptops, and tablet computers for learning what can be done everywhere, every time and everyone. This research aims to develop an application based on the Android operating system as learning media on a personal computer (PC) assembly techniques for vocational high school students. This research is using research and development method. The subject matter in this application includes the PC introduction, PC assembly, PC maintenance and exercises of the subject. M-learning application was examined to class X Computer Engineering and Network (CEN) with 40 students as samples. The data collection technique is conducted with pretest and posttest. Data were analyzed by using Paired Samples T-Test. The research concludes the application used by teachers and students in the learning process and run by off-line in devices mobile with the Android operating system. The result shows that the average value of student learning outcomes is 68.25 (pretest) and 72.75 (post-test). After the hypothesis test obtained the score of $t_{count}=3.306$ and $t_{table}=2.042$ ($t_{count}>t_{table}$). From this study, it can be concluded that there is a significant learning outcome assembly of personal computers after using m-learning application. 

Keyword: Android, m-learning, PC assembly.

1. INTRODUCTION
The rapid development of Information and Communication Technology (ICT) has penetrated in all areas of human life. Education is an area that is experiencing significant change and progress as the development of ICT. Therefore, education based on ICT is a means of interaction that can be used by teachers, educators, and learners in improving the effectiveness, quality, productivity, and
access to the education. In addition, ICT-based education also offers a variety of shapes and models of creative, innovative and interesting learning.

Currently, the development of ICT-based education in Indonesia is still not optimal perceivable compared to the other countries, although with neighboring countries such as Malaysia and Singapore. Some of the causes are due to policy, standardization, network infrastructure, content and readiness of the human resources (HR) which has not fully support the ICT-based learning. Everything becomes a challenge and an opportunity for governments and communities to make changes and improvements in the quality of education in Indonesia, moreover, Indonesia is already joined the era of the ASEAN Economic Community (AEC).

One of the factors that determine the quality of teaching in schools is a means of learning media that serves as a tool in the learning process. Media is one component of communication, namely as a messenger from the communicator to the communicant. Based on these definitions, it can be said that the learning process is a process of communication. By choosing the right type of media that will affect student learning outcomes even though there are several other factors that need to be considered. ICT developments have also encouraged the emergence of learning mobile media by using mobile phones media. The rapid development of information technology mobile gave improvement to a new term in the learning-called mobile learning (m-learning).

M-learning refers to the use of handheld and mobile devices, such as PDAs, mobile phones, laptop, and tablet PC in learning. M-learning is the intersection of mobile computing and e-learning that provides resources accessed from anywhere, the ability of the search system is powerful, rich interaction, and full support for effective learning and assessment based on performance (Quinn, 2000). M-learning is becoming an alternative model of learning that is independent of time and place, also expected and be able to provide the facility of knowledge sharing and its visualization so that the knowledge becomes more attractive and easy to understand. Its concept is expected to promote the establishment of a conducive learning atmosphere and to motivate student learning and teacher explanation.

The utilization of m-learning as a learning medium has been widely used both in formal and non-formal. The variety of mobile applications today is very easily found and downloaded by users. Support android operating system is one of a mobile application which made to penetrate a very massive network and evenly to penetrate into the world communities. Android is a Linux-based operating system that is open (open source) and is designed for touchscreen mobile devices such as smartphones and tablet computers (Cabanban, 2013).

Vocational High Schools / SMK 1 Perguruan Cikini is one of the Technology School with several majors in it, namely: Computer Engineering and Networking, Automotive Engineering, Audio Video Engineering, Industrial Electronics Engineering, Engineering Machinery and Mechanical Power Installation. In the implementation of the learning activities process, SMK 1 Perguruan Cikini is already using curriculum 2013. The subjects that have been established in accordance with curriculum 2013 at the Department of Computer Engineering and Networks (CEN) are assembly techniques personal computers (PCs), computer systems, operating systems, basic networking, basic programming, and others. The implementation of the curriculum 2013 at SMK 1 Perguruan Cikini was supported by the school readiness of facilities and infrastructure which provide adequate learning among network lab, laboratory software, laboratory hardware and operating systems laboratory and other facilities.

The observation results of learning process in the classroom and the learning outcomes of students in SMK 1 Perguruan Cikini as follows 1) students tend to be passive and the teacher becomes the main source of learning materials for students, 2) lack of concentration and students focus on the subject matter, 3) many students do not perform the duties from the teacher as the subject matter homework, 4) lack of students understanding of the subject matter, 5) many students whose value is less enough than the value of the minimum completeness criteria (KKM). Table 1 shows the average value of PC assembly competence.

<table>
<thead>
<tr>
<th>Value</th>
<th>KKM</th>
<th>Number</th>
<th>Student%</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-79</td>
<td>80</td>
<td>22</td>
<td>55%</td>
<td>Not Completed</td>
</tr>
<tr>
<td>80-100</td>
<td>80</td>
<td>18</td>
<td>45%</td>
<td>Completed</td>
</tr>
</tbody>
</table>

Table 2 shows the average value of basic competencies PC assembly obtained from the value of the task and the daily quiz grade X Department of Computer Engineering and Network (CEN) in SMK 1 Perguruan Cikini.
The problem shows that the student learning outcomes are not optimal in PC assembly lesson, the teacher seeks to improve the quality of learning and to push the student interest. One way to do is to make learning innovation through the development of the instructional media so that students have the interests and motivation of the subject matter.

This study develops a learning media (m-learning) assembly of PC-based operating system Android with installed App-Inventor on the smartphone as a means of information and video tutorials simulation in assembling a PC. It is expected to use this learning media because it will be able to improve students’ motivation in learning and improving student learning outcomes of PC assembly techniques subjects.

2. Methods
This study is conducted by quasi through two stages which the first stage related to the development of m-learning and the second phase of trials related to the effectiveness of m-learning. The development of m-learning was done through the Research and Development Method (R&D) while experiments conducted on the effectiveness trials.

The experiments conducted on student number of SMK 1 Perguruan Cikini Jakarta with 40 student sample. The sample was taken by purposive sampling in class X Department of Computer Engineering and Network (CEN).

The study begins by developing the media of m-learning subjects PC assembly techniques. The subject matter in this application includes the introduction of the PC, PC assembly, PC maintenance, and exercises. In the initial design phase of learning media, the steps that undertaken at this stage are:

- Selection of prepared materials in the media that according to the syllabus, core competence and basic competences (KI/KD) and e-book learning materials PC assembly odd semester and the results of discussions with subject teachers.
- Manufacture and collection of pictures and videos.
- Making quizzes or exercises.

Media content is validated by the students, subject matter experts, and media experts. Validation of the material and m-learning media was conducted on 20 students of class X Department of Computer Engineering and Network (CEN) uses a questionnaire to obtain student assessment of the content and media display. Validation of material is done through 10 questions covering two indicators: the suitability of the content/purpose and suitability of learning materials. While media experts validate with 10 questions covering three indicators of the suitability of the content/purpose, appropriateness, and suitability of learning technical (design). Scale assessment by students, material experts and media experts using a Likert scale.

To determine whether the Android application was calculated according to the formula stated by SuharsimiArikunto or not, it’s done by dividing the score of the assessment results with the maximum score:

\[
\text{Score} = \frac{\text{Maximum Score}}{100}
\]

The quality of the media that have been made, interpreted by grouping the quality categories based on the scores below:

<table>
<thead>
<tr>
<th>Score</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>56-70</td>
<td>Good Enough</td>
</tr>
<tr>
<td>71-85</td>
<td>Good</td>
</tr>
<tr>
<td>86-100</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

The next, a test conducted pre-test and post-test to 40 students of class X Computer Engineering and Network (CEN) SMK 1 Perguruan Cikini Jakarta. Type of instrument used is an objective test (multiple choice) with the number of items 20 items with 5 possible answers. Each correct answer is coded 1 and the wrong answers were coded as 0 to facilitate further data processing.

This matter of testing instruments used to determine the average of student learning outcomes. In the first phase, the students are given the pre-test to determine the extent of the student's knowledge. In the second stage, each student is given the opportunity to learn the material that is available in m-learning application. Then the students work on the problems of post-test that prepared to evaluate the student learning outcomes. Analysis of the data used is the t-test(paired sample-test).
3. Results and Discussion

Testing media expert for m-learning applications on a PC assembly technique subjects obtained a score of 46 out of a maximum score of 50 (92%). According to Arikunto (2003), rating scale with values ≥ 86 categorized as very good (Arikunto, 1996). Similarly, the results of the validation subject matter experts who give a score of 43.5 out of a maximum score of 50 (87%).

The media of m-learning tested to 20 students of class X CEN. In this test, the students were asked to assess the visual from media applications which used the assembly learning personal computer (PC) based on Android that aims to find out how effective the learning process for the students in the classroom. The results of m-learning testing to the students’ rating scale gained 73.47% with both categories.

Based on the validation results by student, subject matter experts, and media experts can be concluded that the instructional m-learning media on PC assembly technique is feasible for the use as a medium of learning support for students.

After the validation test is done, the next test is the effectiveness of using m-learning media in learning with the following results:

Table 3: Pre and Post-Test of students’ knowledge

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Min</th>
<th>Max</th>
<th>Average</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>45</td>
<td>85</td>
<td>68.25</td>
<td>3.306</td>
</tr>
<tr>
<td>Post-test</td>
<td>45</td>
<td>90</td>
<td>72.75</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows that the maximum value is obtained by students has increased. Student learning outcomes can be seen in the average value of pre-test and post-test group. The results of pre-test study average value are 68.25, while the average value of post-test is 72.75. From the results of t-test obtained t-count t-table 3.036 and 2.042 then 3.036 > 2.042. That is, the learning outcomes using m-learning can significantly improve subject knowledge PC assembly techniques.

Learning using multimedia will be more effective and efficient in conveying information. Multimedia uses a combination of several different media in the form of text, audio, graphics, animation, and video. Multimedia technology can be used to study PC assembly techniques media. Submission of materials can be easily accepted by the audience because of the use of multimedia can meet someone to save 90% of what they read, hear, see, say, and do.

The use of multimedia can solve saturation for students to learn because it involves the students cognitive, affective, and psychomotor. Especially with today's technological developments that led the use of the PC which has become the daily needs of students.

Some studies have also shown differences in the average knowledge for the use of interactive learning media. The research conducted in class XII Department of lightweight Vehicle Engineering, SMKN 2, Depok, Sleman, Yogyakarta, the result shows that effective and interactive multimedia learning products improve student learning outcomes with an average assessment of student learning outcomes when the pre-test was 63.75 with the lowest score of 50 and the highest value of 75. While the average value of 78.75 post-test with the lowest value and the highest value 65 90. the study concluded that the use of multimedia in teaching to make students feel happier, more motivated to learn, and more interactive according to the speed of student understanding in order independent learning.

Another study conducted at SMA Negeri 11 Yogyakarta against chemical-based learning media android developed positively influences cognitive learning motivation and achievement of learners. The average post-test score for a class experiment that uses media products amounted to 80.31 with the score increased the motivation of 0.31 while the average post-test scores for the class of controls that do not use the product media of 77.81 with the score increased motivation 0.16.

As a means of information technology, the use of m-learning will attract student interest and make learning an active and fun. Excess earnings media (m-learning) subjects PC assembly techniques are:

1. This learning media can be viewed over and over again, wherever and whenever.
2. This learning media can be used independently anywhere and anytime.
3. This learning media can facilitate students in getting information about the computer assembly.
4. This learning media can be used offline and does not require the internet connection.

The limitations of this study media are:

1. This learning media can not be installed on smartphones that are not based on Android.
2. The learning media only contains material on PC assembly.
3. The questions/exercise has not been made randomly.
4. The learning media needs to be tested to the general public so that it can be produced in a mass public.

4. Conclusion

The learning media (m-learning) subjects PC assembly techniques can increase the average knowledge of vocational students. The learning media on a PC assembly techniques based on the android system has the feasibility to become a medium of learning support for students. Learning outcomes achieved by students using instructional media PC assembly obtain an average value of 72.75.

The result of the student validity test shows that the subject matter experts and the media experts get good grades; media experts scored 92 (excellent), a material value is 87 (very good), and the students scored 73.47 (good). From the overall assessment given by students, material experts and media experts concluded the learning media (m-learning) on a PC assembly technique is already feasible to use by students and teachers.

Acknowledgements

Acknowledgments submitted to the Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Jakarta and the Department of Computer Engineering and Network (CEN), SMK 1 Perguruan Cikini Jakarta Utara.

Bibliography


Sugiyono. (2009). Quantitative Methods, Qualitative and R&D, Bandung: Alfa Beta


