

The Influence of Using Plening Software toward the Enhancement of the Students' Understanding of Mathematics Concepts in Elementary Schools

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Abstract : The conventional learning that still occurs in the classroom is the basis of the study. The learning potentials with the mobile device is perceived to be one of the efforts in developing the alternative learning model. Some parties consider that mathematic is a difficult subject because mathematic is not apart from the calculating process whereas not all of the mathematic learning materials are related to the calculating process. The assumption also occurs due to the conventional learning model that tends to be one direction. The one direction learning is a learning that focuses on the teacher in the classroom. Therefore, the reseacher perceives that the mLearning might be implemented in the learning process. the principle of mobile is a mobile device that might be operated anywhere without being limited to the time and space. In relation to the principle, the sample selection should consider the population in the study which means that the samples should have the appropriate characteristics for the mLearning implementation. The study by means of mLearning implementation was to measure the influence of Plening mLearning implementation toward the students' mathematic concept understanding in the fraction topic. The study was conducted for five times in the first meeting and in the final meeting the students were given a test. The software might be implemented in the learning process and might also serve as the students' supporting learning set in recalling the materials that have been delivered in the school. The influence of the software has been found from the average normalized gain in the control class; the average normalized gain in the control class was 0.74, which was smaller than the average normalized gain in the experimental class was 0.83. The results of the study might be turned into a matter of reference for the future study, especially in relation to the development of mLearning use in the learning process, in order to improve the weaknesses that have been found in the study. In addition, the results of the study would be turned into the innovative and creative learning model.

Keyword : m-Learning, Plening, Software, Conventional, Concept Understanding.

1. INTRODUCTION

The information and technology communication that we have been operating nowadays has perceived to be very useful starting from reading the newspaper until doing business. The usefulness might be seen from several media that display those activities. In relation to these activities, the development of information technology is perceived to be so rapid that it influences all of the aspects in the human life including the educational domain.

In the educational domain, the information and communication technology is able to encourage the appearance of multiple innovation in the learning process that in turn will be the solution for facilitating the students and for assisting the students in order that the students might learn from anywhere and at anytime without having to be limited by the time and space.

The results of information and technology development efforts are the electronic learning manners or also known as the electronic learning (E-Learning). E-learning is one of the learning manners that might ease the students to learn by operator the computer software.

The operated software should be connected to the data package or the Internet and this action is perceived to take time. This has been one of the weaknesses from the use of E-Learning. The use of E-Learning should be considered highly because not all places do not have such facility.

From the situation, E-Learning then develops in accordance with the human paradigm which states that human will always want to be served optimally and immediately. Based on the paradigm, a service that might ease the other people to attain information immediately by means of Mobile Learning has been generated.

In the daily learning process, when the teachers deliver the learning materials to the students they are limited by the time; the available time might be insufficient for delivering the learning materials which in turn cause the teachers to focus on the learning materials accomplishment and the mere teaching activities. As a result, the students' understanding the in accepting the overall learning materials will be put aside. The situation might be worse because of the fact that the students are given less exercise or perform exercises outside the teaching-learning process. Therefore, the teachers should have more innovations or breakthrough in creating an interesting learning process. In brief, the delivered explanations or materials should be easily developed by the students under the teachers' guidance and supervision.

The presence of Mobile Learning is perceived to be an example of alternative problem solving efforts because the Mobile Learning heavily supports the learning process that might be accessed easily so that the users are enabled to learn from anywhere and at anytime under any situation. As a result, the difficult learning process will be practical and easy to understand and to implement.

On the other hand, the Mobile Learning that implements the mobile software has limited capacity in comparison to the E-Learning that makes use of PC which has quite bigger computation and data inventory. Therefore, the Mobile Learning application should be designed more effectively, efficiently and optimally in comparison to the application that has been designed for the E-Learning.

According to the name, Mobile Learning might be defined as learning and mobile in a complex manner. In other words, the users might keep learning without being limited by the time and space. Therefore, the Mobile Learning is possible to be found in the devices that have similar characteristic. The devices that might be used are cellphone or handphone.

Cellphone nowadays have not been unfamiliar anymore because over time it is very easy to afford a cellphone. The nowadays cellphones do not only serve as a communication device but also as an entertainment device because they have been equipped with the features such as music player, video player, games and more. Despite the additional features, the use of the cellphones have not been optimum. Due to the increasing development and purchase on the cellphones, in addition to the more sophisticated features, it is very possible to implement the learning process by means of cellphone.

Paying attention to such condition, the Mobile Learning therefore might be very easy to develop in the educational domain. The development, specifically, should be accompanied by softwares that might be operated in the Mobile Learning application because software is an important supporting factor in the learning process. Furthermore, the software developer should pay attention to the other factors that might influence the Mobile Learning application as well.

Due to the fact that software is one of the important factors in terms of user compatibility, the software development should pay attention to any aspect that will influence the achievement of user compatibility. Some of the considerations are that the intended software might be operated in any mobile device, that intended software should appropriate sharpness when it appears on the screen, the file size of the intended software should be comfortable during the application.

The software that has been designed intentionally in the application should not be limited by the learning activities with the allocated time and space.

There are many types of communication media that have been developing and the development should be adjusted to the appropriate learning pattern with the appropriate learning technology. However, the development is not equally disseminated to all people. Only few people have been able to benefit and to enjoy this type of learning. Therefore, in order that the learning might be consumed by all people and all parties there should be a socialization between the users and the technologies that serve as the learning materials in this era.

Based on the explanations, the researcher would like to perform a study that will be entitled *The Influence of Using the Plening Software toward the Students' Mathematic Concept Understanding in the Elementary School Mathematic Learning*.

2. THEORETICAL REVIEW

Definition of Mobile Learning

Mobile Learning is a type of learning in which the learner does not stay in the fixed location that have been decided or a type of learning that occurs when the learner benefit from the learning opportunities that have been offered by the mobile technology. In other words, by using the mobile device a learner, or in this case a student, might learn from multiple locations (available on January, 21st, 2013 <http://en.wikipedia.org/>). Clark Quinn (available on <http://blogzulkifli.wordpress.com/.../-mobile-Learning/>) on the other hand states that:

The intersection of Mobile computing and E-Learning: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-Learning independent of location in time or space.

In addition, Widodo (2012) states, "Mobile Learning as a learning technology that implements the mobile technology has been a developing aspect and, due to the rapid development, there have not been many people who review the technology theoretically." What have been the basis of the Mobile Learning application is the electronic learning or the e-learning.

Hultin (in Widodo, 2012) states

Based on what have been occurring in the learning process, the Mobile Learning might be viewed as a learning process that implements the mobile tools or devices such as notebook, PDA, smartphone and cellphone and that is intended for the remote learning process.

Looking at the name, the Mobile Learning enables the learner to use the device without any time and space limitation. In addition, the Mobile Learning also enables the learner to accept information in the form of knowledge personally.

Based on these explanations, it might be defined that Mobile Learning is a learning model that benefits the information and communication technology. In the practice, the Mobile Learning application is given directly to the students in order that the students will be able to search what have been available in the learning application.

Plening Software (*Pecahan Mobile Learning or Mobile Learning Fraction*)

In accordance with the learning type, the Mobile Learning or also widely known as the mLearning as a form of mobile learning is developed in the form of application that will be operated on the mobile device such as cellphones and the software will be named as Plening (*Pecahan Mobile Learning or Mobile Learning Fraction*). The application will present a fraction learning that will be performed in the asynchronous-type mLearning. The asynchronous-type mLearning is a learning type in which the learners or the mLearning users perform the learning process independently through the mobile device that they have.

As an independent learning model, Plening will be distributed via bluetooth connection to the students who become the users on their own device. After all of the stages have been completed in the installation, the mobile device will be ready to use.

Needs Analysis

The use of conventional learning model is perceived to be very traditional. Therefore, there should be an effort of improving the learning quality such as designing a learning model which process might be accessed anywhere without any time limit. Such learning model is usually called as mLearning and the system is expected to improve the learning quality without having to put aside the formal learning process such as the meetings in the classroom.

Program Design

This application is an application that have been developed and basically this application is a Java J2ME-based application. Such application is a Java developmental application for any environment that is smaller than the personal computer.

The application development is different than that of the personal computer (PC). The Java-based application is usually developed on the platform that has limited movement which definitely should be adjusted to the available device. The most apparent differences are in the resources and the processing capacity between the mobile device and the personal computer.

Interface Design

The interface design refers to the best possible layout design in order that the software might be operated in multiple screens and in multiple types of mobile devices. The followings are several interface layout in the Plening application:



Figure 1: Interface Design

M-Learning (Plening) Application Testing

The mLearning (Plening) application testing is divided into two stages and the test considers the test appropriateness and limitation. Therefore, the first stage of the test is to test the application on the supporting application called Kemulator Lite 0.9x not on directly on the mobile device. Then, the second test will be conducted toward the mobile device in order to see whether the system has been running well or not in the following mobile device: Blackberry, Nokia and Sony Ericsson.

The objective of testing the quality factors in the system is to identify whether the application has been running well in accordance with the needs analysis of the application that has been conducted. The followings are the quality factors that will be tested in the mobile learning system (Tampati, 2012, p.51):

- **Correctness:** The system is able to provide output that is appropriate to the needs specification.
- **Integrity:** The system has good security namely the setting of access right in order to avoid the damage in the mobile device that has been caused by the unauthorized people.
- **Efficiency:** The system has hardware power source that performs all system functions in order to serve the users' needs.
- **Portability:** The sytem has the capacity of adapting itself to multiple hardwares and operation systems.
- **Testability:** The system is able to perform a testing on the other related system.
- **Interoperability:** The system has the capacity of running the application in multiple types of mobile device.

For the test of system functionality, the researcher refers to the software testing methods that have been focused on the functionality of the sistem that has been established.

Testing Procedures

The procedures for testing the Plening software are as follows:

- Selecting the usecase that will be tsted and deciding the objective in test stage
- Creating the test design and deciding the test results
- Running the software testing
- Inspecting each process that refers to the software details that have been decided
- Drawing conclusions from the test results
- Usecase Selecting and Objective Deciding

The usecase that will be tested according to the needs analysis is as follows:

Table 1
The Objective of Plening Usecase Testing

<i>No.</i>	<i>Usecase</i>	<i>Objective</i>
1.	Plening	To test the layout of the initial page
2.	Main Menu	To test the layout of the main menu
3.	Plening Definition	To the test layout of Plening Definition page
4.	Application Procedures	To test the layout of Application Procedures
5.	Objectives	To test the layout of Objectives page
6.	Learning Menu	To test the layout of Learning Menu page
7.	Exercise	To test the layout of Test menu page

Testing Design and Results

The design testing consists of cases that will be displayed in the usecase table as the reference in performing the software testing. First, the researcher performs a test by running the Kemulator Lite 0.9x and then several other tests by running the applications on the other cellphones that supports the Java application.

Table 2
The Software Testing

<i>Test Code</i>	<i>Test Objective</i>	<i>Test Result</i>
P1	To test the layout of the initial page	Successful
P2	To test the layout of the main menu	Successful
P3	To the test layout of Plening Definition page	Successful
P4	To test the layout of Application Procedures	Successful
P5	To test the layout of Objectives page	Successful
P6	To test the layout of Learning Menu page	Successful
P7	To test the layout of Test menu page	Successful

Evaluation and Conclusion

Based on the above table, the researcher might conclude that the Plening software has been in accordance with the needs analysis that has been conducted and has shown its functionality.

Mathematic Concept Understanding

The term understanding in *bahasa Indonesia* will be referred to *pemahaman* and the meaning of *pemahaman* is derived from the word *paham*, which according to the *Kamus Besar Bahasa Indonesia* means to be right. A man is said to understand (*paham*) something if the man is able to totally understand a concept and to explain it.

Herdian (2010) states

The mathematic understanding capacity is one of the important objects in the learning process. the mathematic understanding capacity provides a definition that the learning materials are not only a mere memorization for the students but also a more profound understanding toward the concept of the learning materials itself.

On the other hand, Sanjaya (Siswoyo, 2013) states

Concept understanding is the students' capacity that takes the form of assignment on several learning materials. Here, the students should be able to accomplish the assignment and to restate the assignments into the other forms that might be easier to understand, to interpret the data and to apply the concept that is appropriate to the already possessed cognitive structure.

Concept understanding is a competency that the students display in understanding the concept and in performing the procedures (algorithm) fluently, accurately, efficiently and appropriately. The indicators that show the concept understanding are as follows:

- The student is able to re-state the concept.
- The student is able to classify the objects according to certain traits (according to the concept).
- The student is able to provide examples and non-examples of the concept.
- The student presents the concept in multiple forms of mathematic representation.

- The student develops the prerequisite of “necessary” category and of “sufficient” category toward a concept.
- The students uses, benefits and selects certain procedures or operations.
- The student applies a concept or an algorithm for the problem solving activities.

Based on the experts' statements, the researcher might define in general that concept understanding is a capacity of constructing the meaning or the definition of a concept based on the already possessed initial knowledge or on the insertion of new knowledge into the already existed scheme in the students' mind. From the seven criteria on the concept understanding, the study will focus on the three criteria namely the student is able to re-state the concept, the student is able to provide examples and non-examples of the concept and the students is able to compare the concept.

Method

In the practice, the study make use of experimental approach that divided the classroom into two groups namely the experimental class and the control class. The experimental class implemented the Mobile Learning model while the control class implemented the conventional expository learning model.

The description of the design in the study would be provided in the following flowchart:

Table 3
Purposive Sampling Group Pretest-Posttest Design

<i>Group</i>	<i>Subject</i>	<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
Experiment	Purposive	T ₁	X	T ₂
Control	Purposive	T ₁		T ₂

Note:

T = Pretest and Posttest on the control class and the experimental class

X = Learning by means of Mobile Learning Model in the experimental class

3. RESULTS AND DISCUSSIONS

Results of Students' Mathematic Concept Understanding Capacity after Implementing the Plening mLearning Model

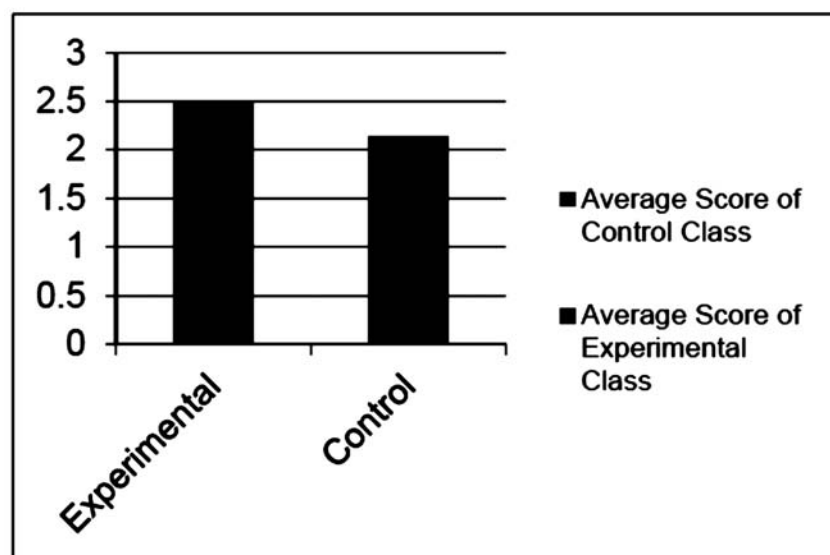


Figure 2: Pretest Average Score

Based on the initial data that had been attained, the control class and the experiment class had the low category of mathematic concept understanding capacity. The evidence was that there had been many students who provided answers shortly without any other explanation related to the learning materials. The problem might be caused by inappropriate learning model that had been implemented by the teachers. The one-sided learning interaction and communication that had been limited by the learning space typically occurred in the inappropriate learning model. The pretest average score might be viewed in the following figure:

From the above figure, the researcher found that the number of students who achieved the maximum score was still low. The maximum score of the pretest was 12.

Then, the researcher would like to provide the graphic of the posttest scores in the two classes as follows:

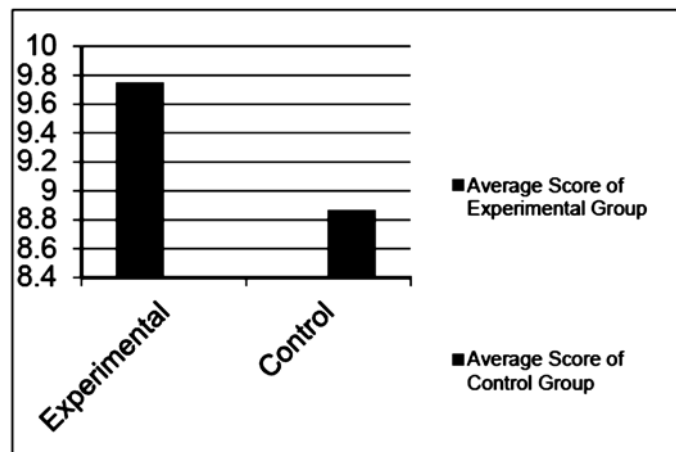


Figure 3: Posttest Average Score

From the above figure, the researcher might conclude that the students' concept understanding capacity in the control class and in the experimental class had been improved. The evidence was the improvement on the posttest average score from the pretest average score, namely 9.75 for the experimental class and 8.86 for the control class.

The data in the figure then would be processed by means of several tests, namely normality test, homogeneity test and t-test, in order to view the similarity on the average of both classes. After that, the researcher attained the data on the mathematic concept understanding that had been measured by means of gain index test. From these results of these tests, the researcher might conclude that there had been influence from the implementation of mLearning model toward the students' mathematic concept understanding. The test results would be presented in the following figure.

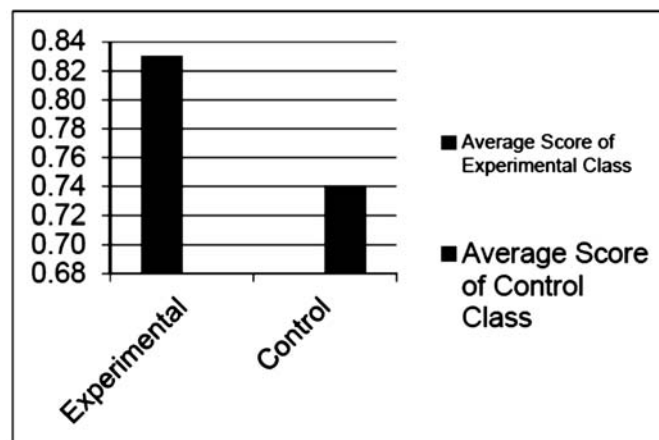


Figure 4: Graphic of Gain Achievements

From the above, the researcher might also conclude that the score of students' mathematic concept understanding in the experimental class was bigger than that of the control class. In short, the implementation of software application in the mLearning had an influence although the influence was not significant.

Results of Students' Responses on the Implementation of Mobile Learning during the Learning Process

During the learning process, the students seemed to be enthusiastic because the learning process was different than the one that had been usually conducted because the researcher implemented the Mobile Learning model. However, during the introduction of the Mobile Learning some of the students were still confused. The reason might be that the learning model was still unfamiliar or rare to be implemented in the previous learning process.

The learning process by means of Mobile Learning model implementation on the Fraction chapter in the fourth graders was perceived to be totally different than the situation and the condition in the usual learning model. Based on the situation, after the final test that was to identify the influence of Mobile Learning model implementation, the researcher performed an observation by distributing questionnaires to the students regarding the use of Mobile Learning model in the learning process.

The obstacle that appeared in the learning process by means of Mobile Learning model implementation was that not all students had been able to master the application of learning software immediately. The solution for the problem might be that the teachers provided good and detailed explanation toward each individual until the students had been able to master the application immediately.

Then, the researcher would like to provide the graphic of the students' response on the implementation of Mobile Learning model as follows:

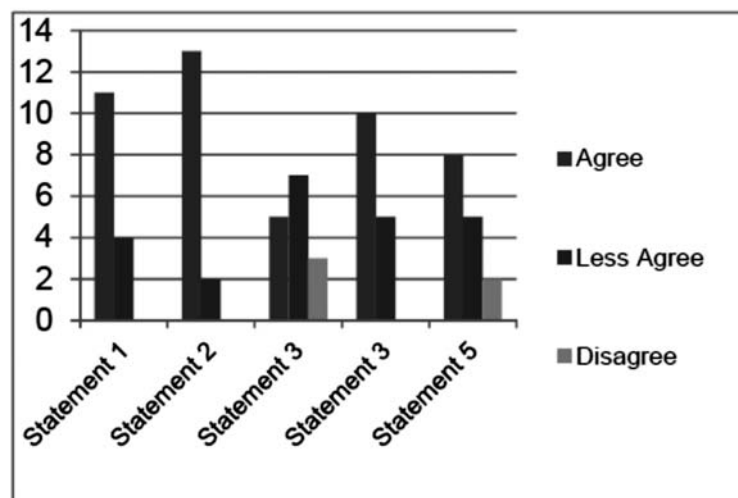


Figure 5: Graphic of Students' Responses on the Implementation of Plening Mobile Learning Model Implementation

4. CONCLUSION

After conducting the study for identifying the influence of Plening mobile learning software toward the students' mathematic concept understanding in the elementary school learning process, the researcher would like to draw the following conclusions:

The comparison of the mathematic concept understanding that has been done between the experimental class and the control class by comparing the pretest results and the posttest results shows an improvement with 0.83 point for the average score of the experimental class and 0.74 point for the average score of the control class. In brief, the researcher would like to state that there had been an influence of the Plening mobile software application toward the students' mathematic concept understanding in the elementary school's mathematic subject.

Based on the results of the questionnaires that have been distributed, the students' response toward the mathematic learning process by means of Mobile Learning model has been good. The reason is that the students perceive a new situation and have new experience during the learning process.

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