JEGYS

Research Article

The Implementation of Mobile Seamless Learning Strategy in Mastering Students' Concepts for Elementary School

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Abstract

The aim of this study is to know the effect and implications of the Mobile Seamless Learning Strategy on students' concept mastery ability. The research conducted at an Elementary School in Jepara Central Java, Indonesia. The study was quantitative using a quasi-experimental with non-equivalent control group. The participants were student IV class. Subject were selected by classing cluster random sampling. As a results of study, implementation of the mobile seamless learning strategy had a significant impact on students' concept mastery ability. Mobile seamless learning also has advantages 1) students are able to learn unlimited classrooms and time, 2) students can learn anytime and anywhere, 3) integrated learning between formal education and non-formal education, 4) students are digital native so they are very familiar with the world of mobile phones, 5) students can learn both personally and socially, 6) students are able to learn both digitally and physically.

Keywords:
mobile seamless learning, students' concept mastery, elementary school

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Introduction

The rapid development of technology recently has a substantial influence on the learning process regard to media use (Degeng, 2013). Father of Indonesian Education, Dewantara (2004) argues that education will succeed if there is a continuing cycle among education in the family, schools and environmental climate. Mobile technology can help to synchronize formal, unformal and informal learning (Herrington & Herrington, 2006; Quinn, 2011; Traxler & Wishart, 2011; Valk, Rashid, & Elder, 2010; H. Zhang, Chan, & Boyle, 2014).

In the digital technology, learning is not limited around classroom and school, instead learning can be done anytime and anywhere (Chen, Chang, & Wang, 2008; Malandrino et al., 2015; B. H. Zhang & Looi, 2011), Answering the foregoing requires, an integrated and linked education with *mobile* is needed (Spiegel & Rodríguez, 2016) so that learning can be done seamlessly (Mike Sharples, n.d.; Toh, So, Seow, & Chen, 2017; Toh, So, Seow, Chen, & Looi, 2013; Wong & Looi, 2011; Wong, Milrad, & Specht, 2015; B. H. Zhang & Looi, 2011), *seamless learning* means continuity of learning experiences across contexts (Wong, Milrad, & Specht,, 2015) and enables learning anywhere and anytime (Wong & Looi, 2011).

The utilization of technology for learning is not only done in both high schools and universities but also in elementary schools. The utilization of *mobile* technology in elementary schools classroom is increasing rapidly (Carlos Sanchez-Prieto, Olmos-Miguel, & García-Pe, 2016; Domingo & Garganté, 2016; Sharples, Taylor, & Vavoula, 2007; Siswono, Kohar, Rosyidi, & Hartono, 2017; Song, 2014). The limitation of time and space is the main reason for this matter.

Public awareness about the importance of qualified education is increasing from time to time. However, people understand that education is a crucial investment for children development. Future internal factors need to be considered such as student characteristics, potential, passion, talent, and interests (Zakaria, Setyosari, Sulton, & Kuswandi, 2019: 541). Religious education that underlies children's morals becomes very important in the era of big data so that the integration of formal education and religious education becomes a significant collaboration. It takes such a long time to build the student's character, moreover an environment and habits that support even needed integrated education between formal education in schools, and informal education in families and communities. Eventually, the good news is *mobile* seamless learning can be the real solution for the qualified education (Costa et al., 2016; Raymond, 2009; Sung, Chang, & Liu, 2015).

Sekolah Unggulan (which later on, will be abbreviated to SU) *Bumi Kartini* is a school that is founded based on the main reason that there is still limited qualified school in Jepara district. Due to the limitation infrastructure especially the building, this school only accepts a few numbers of students. This school integrating qualified formal education with religious education using the Yanbu 'a method. Yanbu'a method is one of the quick methods of reading the Qur'an from *Sekolah Islam*

Yanbu'ul Qur'an Kudus. Based on the previous background of the study this research will answer 3 research questions, 1) how is the acceptance of students relatrd the utilization mobile technology in the learning process? 2) how is the design and development of mobile seamless learning? 3) what are the supporting and inhibiting factors in utilizing mobile seamless learning?

Mobile Seamless Learning is defined as *soft learning*, learning that is carried out continuously and not limited to the classroom, but also outside the classroom, not only in schools but also in families and communities (Ng & Nicholas, 2013; Seow, Zhang, Chen, Looi, & Tan, 2009; Wong et al., 2015). Whereas, Zhang & Looi (2011a) state that in the seamless learning, the learning occurs because of both individual and collective efforts and across all different contexts. A research on seamless learning was done by Yancy Toh et al. (2012) contaon inquiry learning used to study the theories and discussion methods. Seamless learning based on the use of *mobile* devices in accordance with nowadays development.

Foomani & Hedayati (2016) used seamless learning and utilizes mobile in the language learning. Classroom setting in teaching and learning is very limited in space and time for students while learning that leads to character building requires continuous learning and learning support, not only in schools but also in the context of family and community (Hamid, 2017; Larry Nucci; Darcia Narvaez, 2014).

There are ten dimensions of Mobile Seamless Learning (MSL), namely: (1) includes both informal and formal teaching, (2) social and individual teaching, (3) across place/locations, (4) across time, (5) access knowledge/resources everywhere, (6) covers both digital and physical world, (7) combined use of several types of devices, (8) switch between several tasks, (9) knowledge synthesis, (10) includes several models of pedagogical activities (Wong et al., 2015).
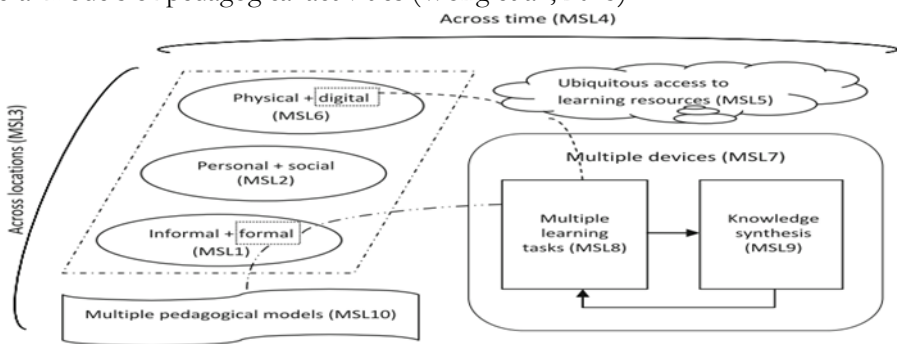

Figure 1.

Visualization of the 10D-MSL dimensions (Wong 2012, p. E20)"

Learning and access to knowledge which connected to the seamless connection (Ng & Nicholas, 2013; Seow et al., 2009). Another study mentioned a mobile-based language learning design that focuses on contextual creative content for students

who have an unlimited learning approach. This study uses the treatment of 24 students by conducting several cycles ending in reflection. This study also uses interviews as a data collection technique. The results of this study indicate that they support greater learner autonomy achieved by the context of the resulting learners (LGC) that bridge teaching process both in the classroom and outside the classroom.

This study also highlights the need for reconciliation both students' and teachers' perceptions (Foomani & Hedayati, 2016). The research findings from Ulfa (2017) at Malang State University about the perceived ease of use CBT (Computer Based Test) has a positive influence on perceptions of benefits, whereas perceived ease of use and perceived benefits of CBT have a direct effect on attitudes towards use and attitudes influence behavioral intentions (Ulfa, 2017).

An intervention study on ICT level 5 students in Singapore is mediated by learning Chinese idioms. The study introduces seamless learning, namely learning a design that links both social and personal teaching or informal and formal teaching. This is as harmonize with current trends in language learning that emphasize more communicative learning and authentic learning activities. This study is a study to find out the usefulness of wiki technology which is supported by a seamless learning approach in learning Chinese. The finding of the study show that the new ICT form of technology wiki supported by seamless learning can effectively help students synergize formal and informal learning as well as language learning spaces both individually and socially (Karimi, 2016; Wong & Looi, 2011; Wong et al., 2015).

In Indonesia, teachers have a positive perspective of mobile learning utilization and engagement in mobile learning. Teachers' obstacles participate in a mobile learning environment are not in the financial problems and device problems. Moreover, the knowledge and readiness for mobile learning from teachers who teach ICT subjects are lower than teachers who teach mathematics, science, and other subjects. The study's results are used for teachers' training about ICT (Yusri, Goodwin, & Mooney, 2015).

Technology using *mobile* is very suitable for individual learning and seamless learning. This study aims to develop continuous innovation in seamless learning for the transformation of school teaching and practice. This research has been carried out for three years using development research at Singapore's Primary School. The analysis shows that the leadership, trust of teachers and students, curriculum material, strong support, epistemological change in knowledge, available to work with technology, valid assessments are needed in managing this continuous innovation (B. H. Zhang & Looi, 2011).

Method

Research Design

This study uses experimental research to examine the effect of independent variables on the dependent variable. Design uses quasi-pretest-posttest nonequivalent control group design (Tuckman, 1999; Tuckman & Harper, 2012; Sung et al., 2015).

Quantitative research is generally separated based on its work on the belief that facts and feelings can be separated, and the field of study is a single reality which is formed from facts that can be found. In this study, researchers did not choose randomly to determine the subjects involved in treatment. Researchers use existing classes. This constraint because the researcher cannot possibly randomize structured classes (Setyosari, 2012).

This is quantitative research conducted using a quasi-experimental with non-equivalent control group. The participant was a student IV class (Makkah, Jeddah, Madinah, Yunani) in elementary school SDU Bumi Kartini Jepara, Central Java, Indonesia. The subject was selected by classing cluster random sampling.

Participants

This study involved students of class IV (four) Elementary Schools of Kartini, Jepara Regency, Central Java, consisting of the Makkah class, Medina Class, Jeddah Class, and Greek Class. This class has the same academic quality, teacher quality, facilities, and infrastructure and management. The homogeneous subject in terms of classroom conditions, age and learning ability, with the homogeneity is assumed to provide opportunities that are not different for all individuals to become subjects.

Four classes VI Primary School Bumi Kartini Jepara, from these four classes we have determined two classes as experimental classes (i.e classes that apply Mobile Seamless Learning strategy) namely Makkah and Jeddah classes and two other classes as control classes (i.e classes that apply Non -Mobile Seamless Learning) namely Medina and Greek Classes. Determination of the experimental class and the control class is done through cluster random sampling techniques with the assumption that all subject classes are homogeneous. The distribution of research subjects after randomization is like the following Table 1:

Table 1.
Research Subjects Distribution

Class	Gender	N
Experiment	Male	23
	Female	31
	Total	54
Control	Male	19
	Female	30
	Total	49
Total	Male	42
	Female	61
	Total	103
Age		21-23 years old

Data Collection Process

The researcher done several step to collect the data as follows: (1) pretest both groups of the class, both the experimental class and the control class, (2) identify

the digital literacy of the two groups using a digital literacy questionnaire, (3) carry out learning activities with predetermined learning strategies, (4) making observations and (5) doing posttests.

The pre-test was applied to 102 students (51 experiments and 51 controls), treatment was given after the pre-test, and the experimental group was given a seamless mobile learning model while the control group uses conventional learning (non-mobile seamless learning).

The step-in research;

- In the experimental class, students use mobile seamless learning model, teachers use Google classroom.
- In the control class, teachers use conventional learning, teachers use classical strategy

Posttest was conducted to observe the ability to master students' concepts (posttest) after five-week programs.

Table 2.
Procedure for Implemental and Control Classes

				Meeting to				
Weeks	1	2	3	4	5	6	7	8
Class	O_1			Experiment				O_2
				Control				O_2

Keterangan:
O_1 = Measurement of effective teaching behaviour (pretest)
O_2 = Measurement of effective teaching behaviour (posttest)

The steps of the research in the experimental class and control class can be seen below:

Table 3.
The Steps of Learning Activities

Experiment Class	Control Class
In experimental class research, the teacher uses a mobile seamless learning model	In control class research, the teacher uses a non-mobile seamless learning model
Using syllabus and lesson plans (*RPP*) that adjust to the syntax of mobile seamless learning strategies	Using syllabus and lesson plans that adjust to the syntax of non-mobile seamless learning models
Learning is carried out according to the *RPP*	Learning is carried out according to the *RPP*
Learning using mobile seamless learning by using Google classroom and then sending learning tasks through the media also	Not use mobile seamless learning
The meeting held for 8 times and implemented for six weeks starting 02/25/2019 until 04/04/2019	The meeting held for 8 times and implemented for six weeks starting 02/25/2019 until 04/04/2019
Do an observation test of students' learning outcomes (posttest) was conducted.	Do an observation test of students' learning outcomes (posttest) was conducted.

Data Collection Tools

The research instruments consisted of: (1) the ability test of mastery of concepts of Islamic Religious Education subjects (pretest and posttest), (2) digital literacy questionnaire. 1) Concept Mastery Ability Test, the concept mastery ability test that used in this study is based on the fourth grade Islamic Education subject which given as this study been conducted, the test is used to measure concept mastery by the students using two types of tests namely multiple-choice tests and description test, multiple-choice test consist of four choices answer, the test consists of 20 questions as score 1 for the correct answer and 0 for the wrong answer. The total multiple-choice score is then multiplied by 5 so that the highest score for multiple choice is 100 and the lowest score is 0. For the description test consist of 10 questions, if the answer is perfect the score is 2, if it is not much perfect the score is 1, if there is no answer at all scores the score is 0, the total score of description test is multiplied by 5 so that the maximum score achieve 100 and the lowest score is 0. The test given to students is the same before treatment and after treatment. The concept mastery test was adjusted to the subject to make it easier to see the development of learning outcomes and so as not to be overwhelmed by answering a large number of questions.

Table 4.

Grid of Questions in Concept Mastery

Basic Competencies	Question code multiple choice	Description
• Believing, Showing, understanding and exemplifies that frugal behavior (perilaku hemat)	1,2,10, 11, 12, 20	1,2,3
• Show an example of the meaning of the prayer (salat) and tell the experience of performing prayer (salat) at home and in the mosque	3,4,8,9, 13,14, 18,19	4,5,6,7
• Understanding the exemplary Walisongo story	5,6,7, 15, 16, 17	8,9,10

Data Analysis

This research is quantitative research with a descriptive approach. The Validity and reliability have been analyzed by Independent sample T-Test to see the difference in the average value-effective mobile seamless learning outcomes between the experimental class and control class. The research data were analyzed using SPSS 24.0 statistical tools with a statistical significance value of 0.05. Before T-Test, it must pass the homogeneity test and normality test.

Results

In this research found interesting results is Mobile Seamless Learning (MSL) answers education in the era of big data that can be integrated (Mohammadi, 2015) and connected to mobile (Spiegel & Rodríguez, 2016) so learning is connected seamlessly. Seamless Learning is a continuous learning strategy across contexts of the *continuity of the learning experience across contexts* (Wong et al., 2015)*,* and allows learning anytime and anywhere (Wong & Looi, 2011).

In the learning process, mastery of concepts is useful for increasing students' intellectual abilities and helping to solve problems that faced as well as giving rise to meaningful learning. One sign of concept mastery is marked by the activeness of students towards activities and the development of ideas in the learning process. In mastering the concepts that mature students can solve problems, acquire and communicate knowledge to achieve success in learning (Anderson & Krathwohl, 2001). In learning, mastery of concepts focuses on the cognitive process that is compiled based on Bloom's taxonomic indicators starting from understanding, applying, analyzing, evaluating, and creating. Mobile Seamless Learning (MSL) emphasizes knowledge to the stage of knowledge Synthesis (creating) that has been through the process of prior knowledge (understanding, applying, analyzing, and evaluating).

The result of this research that the average score of the experimental group pretest learning outcomes was 65.16 with a standard deviation of 10.54 while the mean pretest value of the learning outcomes control group was 67.29 with a standard deviation of 9.12. Both were not different, means that the two groups of the homogeneous subject. Then after being given the treatment the average value of the posttest experimental group learning outcomes are 74.39 with a standard deviation of 7.02 while the mean value of the learning outcomes control group was 64.65 with a standard deviation of 8.79**.**

Table 5.

The Results of the Mean Value of Pre-test and Post-test

	Mean	SD
Pre Test Experiment	65,16	10,54
Pre Test Control	67,29	9,12
Post Test Experiment	74,39	7,02
Post Test Control	64,07	8,79

Figure 3 sounds that the average difference between the posttest and pretest in the experimental group was 18.87 while the average difference for the control group was 12.68.

Test of Normality

Data normality test is an assumption test conducted to determine the normality or symmetry of the distribution of research data obtained. Testing the normality of

data with *Kolomogrov Smirnov and Shapiro-Wilk* goodness of fit test on the observed variables. The results of normality test data are presented in the following table.

Table 6.

The Results of Normality Test Data by using Kolmogorov-Smirnov Test

	Kolmogorov-Smirnov			Shapiro-Wilk		
Class	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test (Experiment)	.095	51	.200*	.960	51	.082
Pre Test (Control)	.134	51	.022*	.957	51	.065
Post-test (Experiment)	.089	51	.200*	.981	51	.588
Post Test (Control)	.118	51	.075*	.963	51	.110

The results of the normality test of the research data as presented in table.2 above show that the significant number in *Kolmogorov-Smirnov* for the experimental pretest class was 0.200 and the experimental posttest was 0.200 while the pretest control class was 0.022 and the posttest control was 0.075. The significance of *Shapiro-Wilk* for the experimental pretest class was 0.082 and the experimental posttest was 0.588 while the pretest control class was 0.065 and the posttest control was 0.110. In other words, the significance value of each data is greater than 0.05, so it can be stated that the research data is normally distributed.

Homogeneity Test

The homogeneity test is conducted in two classes, that is the experimental class and the control class using Levene's test.

Table 7.

The Analysis Result of Homogeneity Data (Test of Homogeneity of Variance)

	Levene Statistic	df1	df2	Sig.
Pretest	2.036	1	100	.157
Posttest	2.369	1	100	.127

Based on the data presented in table.3 above, it is known that the sign value (p-value) from the Levene's test for the pretest and posttest results respectively 0.157 and 0.127 (Sign p-value> 0.05). So it can be concluded that the variety of learning outcomes data both pretest and posttest are homogeneous.

Hypothesis Test

Hypothesis test in this study was conducted using the independent samples t-test to determine the difference between before and after treatment in each group, namely the experimental group and the control group.

Table 8.

Test Analysis Results T Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Differ ence
Post -test	Equal variances assumed	2.369	.127	6.183	100	.000	9.745	1.576
	Equal variances not assumed			6.183	95.332	.000	9.745	1.576

Based on the test results the value of the Levene Test as presented in table 6 above, shows that the class is homogeneous. Therefore, the results of the *independent sample test* on the posttest value of the experimental and control classes are used in the first line (*equal variances assumed*), known as Sig's value. *Levene's Test for Equality of Variance* is 0.127> 0.05, so it can be interpreted that the data variance between the experimental group and control is homogeneous or the same. So the interpretation of the Independent Samples Test output table above is based on the values contained in the "*equal variances assumed*" table. Based on the output table of the Independent Samples Test in the *equal variances assume'* section known Sig's value. (2-tailed) of 0,000 <0.05 then as the basis for decision making in the independent sample t-test, it can be concluded that H0 is rejected and Ha is accepted. Thus it can be concluded that there is a significant (real) difference between the average student learning outcomes in the mobile seamless learning experimental group and the non-mobile seamless learning control group. Then, by looking at the p-value (Sign.2-Tailed) in table 9 above, it is known that the P-Value (Sign. 2-Tailed) value is 0,000 <0.05. Therefore, the difference is significant at probability 0.05. The magnitude of the difference in mean values as shown in the mean column is 9,745. means because T Tabel (1.98) <from Thit = 9,745 then Ha is accepted, there is an effect of different MSL strategies on students' concept mastery ability, meaning that the experimental group has an average value higher than the control group so that it can be concluded that the mobile seamless learning strategy applied the experimental group is more effective than the non-mobile seamless learning strategy that is applied to the control group in terms of student learning outcomes.

Discussion

Based on the calculation results and data analysis from this quasi-experimental study, it shows that the average student learning outcomes in the experimental class

that uses a mobile seamless learning strategy are higher than the control class that uses non-mobile seamless learning. Learning in Islamic education subjects using a mobile seamless learning strategy provides a real effect in mastering the concepts of fourth-grade students of the Unggulan Bumi Kartini Elementary School in Jepara.

The value of the pre-test and post-test results of normality data show that the results are far from the average value and the standard deviation, many differences (see table 6). And from the results of the hypothesis test using the Independent Sample Test, there are high differences, H0 is rejected and Ha is accepted meaning there are significant differences from the two experimental and control class groups. Contributing factors include Islamic learning that utilizes technology, the use of mobile seamless learning utilizing Google classroom, the principle of integrated learning has advantages, *firstly* students are able to learn unlimited classrooms and time, *second* students can learn anytime and anywhere, *third* integrated learning between formal education and non-formal education, *fourth* students are digital native so they are already very familiar with the world of mobile phones, *fifth* students can learn both personally and socially, *the last* students are able to learn both digitally and physically.

Islamic lessons are not limited to the area of cognitive knowledge, but also effective and psychomotor, in the dimensions of cognitive processes (Krathwohl, 2002; Peter W. Airasian, Kathleen A. Cruikshank; Richard E. Mayer; Paul R. Pintrich, 2001) not limited to knowledge but to the practical stage, so that media is needed that can connecting education in a very limited classroom with mobile seamless learning. Why mobile because millennial generation and Z generation are Digital Native (Çoklar, Yemen, & Yurdakul, 2017; Ng, 2012; Shariman, Razak, & Noor, 2012).

This study supports previous research such as Wong's (2010) research on 10 dimensions of Mobile Seamless Learning (MSL), that are: (1) Covering formal and informal learning; (2) personal and social learning; (3) across time; (4) crossing locations; (5) *ubiquitous* knowledge access (a combination of context-aware learning, expanded *reality learning*, and Internet access everywhere); (6) covering the physical and digital world; (7) Combined use of several types of devices (including "stable" technologies such as desktop computers, interactive whiteboards); (8) Switch between several tasks (such as data collection, analysis, presentation and communication); (9) knowledge synthesis (integrating new knowledge and previous, abstract and concrete knowledge, and multi-disciplinary learning), (10) Involve several models of pedagogical activities (Daniello, Gaeta, Loia, Orciuoli, & Sampson, 2015; Mike Sharples, 2015 ; Wong et al., 2015; Xie, Cao, Wang, & Wen, 2016; Ye & Hung, 2010), interestingly in Indonesia, not all places of students or schools have high quality mobile phones and have sufficient memory so that they are still utilizing the *google classroom* application for a while. They have not created

own seamless learning mobile application. The results of this study indicate that learning using mobile seamless learning strategies has a significant effect than learning with non-mobile seamless learning strategies.

Conclusion

Based on the pre-test and post-test values, the value is far adrift, the mean value and the standard deviation is large adrift seen a large range of mean values between the experimental pretest and control pretest, along with between the experimental post-test and control post-test. The trial results mention that Ha is accepted and H0 is rejected with the conclusion that there are significant (real) differences between the experimental class and the control class.

Mobile seamless learning also has advantages, among others, *first* the student is able to learn unlimited classrooms and time, *second* the student can learn anytime and anywhere, *third* integrated learning between formal education and non-formal education, all four students are digital native so they are already very familiar with the world of mobile phones, *fifth* the student can learn both personally and socially, *sixth* the student is able to learn both digitally and physically.

This recommendation will be conveyed to Islamic education teachers in primary schools to use mobile seamless learning strategies for students' mastery of concept skills, headmasters and stakeholders are expected to provide maximum support for the improvement and implementation of innovative and integrated learning by utilizing mobile.

Further research needs to be carried out on the use of mobile seamless learning for subjects other than Islamic Education which require synchronization of learning inside the classroom and outside the classroom then requires further research on mobile seamless learning for schools that do not have fast internet access / rural areas because this method requires strong internet connection support.

Acknowledgements

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