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Mobile Learning to Improve Student Collaborative Skills: An Alternative to Online Learning in the Era of Covid-19 Pandemic

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Abstract

This research aimed to produce a valid and effective mobile learning model and tools as an alternative to online learning solutions in the era of the Covid-19 pandemic. The tutorial tools are: tutorial activity design, tutorial activity unit, student activity sheet, and collaborative ability test. The trial design used a Pre-Experiment with a one group pre-test and post-test design. The research subject was the Pre-service Primary Teachers (PPTs) programming the elementary concept science course for the registration period of 2020. The data collection instruments included: (1) tutorial tool validity assessment sheet and (2) collaborative ability test. The research data were in the form of pre-test scores and post-test scores after going through a series of prerequisite tests: normality test and homogeneity test which were then analyzed using paired t-test. The mean level of improvement in the pre-test and post-test scores were calculated using the gain score. The results showed that: (1) the development of mobile learning which was included in the content and construct in the valid category, and supported by tutorial tools was included in the valid category and (2) the developed mobile learning was included in the effective category because of the significant increase in student collaborative abilities in limited trials and extensive trials in moderate criteria and students respond positively to the tools and tutorial processes. Based on the results above, it can be concluded that the development of mobile learning was valid and effective to improve student collaborative abilities.

Keywords: online; mobile learning; collaborative; Covid-19

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INTRODUCTION

The era of the industrial revolution 4.0 demands human resources who have the skills to compete for excellence in the times based on the Internet of Things (IoT) and big data. The Indonesian national qualification framework curriculum as the foundation of education in Indonesia equips students to have 21st century skills with the term 4C (Communication, Collaboration, Critical Thinking, and Creativity). The demands of curriculum and globalization require educational institutions to make innovations that are beneficial to the 21st century skills-based education world (Griffin & Care, 2015; Turiman et al., 2012; Zulkarnaen et al., 2017). Regulation of the

Minister of Education and Culture No. 73 of 2013 concerning that the Indonesian national qualification framework curriculum in the field of higher education requires universities to compile a curriculum so that students have superior competencies with various skills that are in line with the demands of the 21st century, including scientific creativity, critical thinking skills, collaborative skills, literacy, skills to utilize ICT, and problem-solving skills (Ministry of Education and Culture, 2013; Jatmiko et al., 2018; Suyidno et al., 2018; Suyidno et al, 2019; Dwikoranto et al., 2020).

The Mobile Learning model is implemented through online learning. The Covid-19 pandemic in 2020 will be a year of mourning for all citizens of the world which affects all elements of human life, one of which is education. Worldometers data until Friday morning (17/4/2020) showed cases of new types of coronavirus infection were recorded 2,178,848 cases, as many as 145,359 people died, and patients recovered as many as 546,743 people. A number of countries still report a high increase in the number of cases, while several countries in Europe are experiencing a downward trend. The Indonesian government, through the Task Force for the Acceleration of Handling Covid-19, again recorded the results of the recapitulation of data stating that patients recovering from Covid-19 increased to 607 after the addition of 59 people. This number at the same time keeps away from the patient death rate as of today Friday (17/4/2020) as many as 520 after there were addition of 24 people.

The increasing development of the Covid-19 case in Indonesia has prompted the President to issue an activities and Work From Home (WFH) policy. This WFH policy is related to the application of social distancing which is considered the most effective way to prevent the spread of the coronavirus. The World Health Organization (WHO) has started using the term physical distancing or physical distance as a way to avoid the wider spread of the coronavirus. Besides that, there is also a new policy, namely social distancing. Social distancing or social distancing sounds like people need to stop communicating with each other. Instead, we must maintain as many communities as possible during physical distancing or physical distancing. WHO certainly has its own reasons for changing the phrase social distancing to physical distancing. One of them is so that everyone can strengthen and relate to each other, even though they cannot physically be close together. A positive response by the Open University (OU) by issuing policies related to lectures with Deputy Chancellor's Circular Information Systems and Student Affairs regarding Face-to-Face tutorial replacement services regarding prevention measures for the spread of Covid-19 in OU students and tutors. Face-to-face lectures were eliminated, replaced by online lectures, and continued study at home guided by tutors.

Apart from being positive, it still creates new problems, namely that not all students and tutors are ready to study online. In addition, the collaborative abilities of Pre-service Primary Teachers (PPTs) also need to be improved, but students must stay at home because face-to-face lectures are eliminated and replaced by online. It is necessary to find a solution to solve the problem so that there is no decrease in the quality of the OU PPTs graduates' quality. Therefore, researchers implemented the mobile learning model as online learning to improve student collaborative abilities.

The problems in this study were limited, namely: (1) the research subjects were taken at PPTs in Bojonegoro during 2020, who took the elementary science concept course, (2) mobile learning used was Zoom Meeting & Webinar with WhatApp

Group app for added ease of communication and delivery of tasks in lieu of a final exam. This research is expected to produce an innovative tutorial model in the form of the implementation of online learning using an effective mobile learning model to improve the collaborative abilities of PPTs.

The research problems of this study were (1) How about the validity of the tutorial tools in the elementary science concept course with the mobile learning model to improve the collaborative abilities of PPTs, which include: tutorial activity design, tutorial program unit, student activity sheet, and collaborative ability test?; (2) How was the effectiveness of the mobile learning model in online learning to improve the collaborative abilities of PPTs?.

The objectives of this study were as follows: (1) Describe the validity of the tutorial tools in elementary science concepts courses with the mobile learning model to improve the collaborative abilities of PPTs, which include: tutorial activity design, tutorial program unit, student activity sheet, and collaborative ability test. (2) Analyze the effectiveness of the mobile learning model in online learning to improve the collaborative abilities of PPTs.

LITERATURE

Mobile Learning Model

As the effect of the Covid-19 pandemic, Indonesia has also issued several appeals to the public, one of which is the work from home and calls for online tutorials carried out by almost all universities in Indonesia. Mobile learning tutorial is the tutorials that are done without doing face-to-face through existing platforms. Here are some platforms that are relatively common in the community:

a) WhatsApp Group via smartphone or WhatsApp Group app: https://web.whatsapp.com
b) Google Group: https://groups.google.com/forum/#loverview.anj
c) TeamLink: https://teamlink.co/index.html
d) Microsoft Teams Tuweb: https://you.tube/Pxq45oADuOg
e) Yammer Microsoft: htpps://products.office.com/en-us/yammer/yammer-overview
f) Kaizala Microsoft: https://manage.kaiza.la/Home/Index
g) Zoom Meeting & Webinar: https://zoom.us/

The platform used in the research on elementary science concepts lectures uses tutors to carry out tutorial activities via Microsoft Teams (Tuweb) and supporting communication with WhatsApp Group via smartphone or WhatsApp Group app. This was chosen because of the emergency situation and the urgency of its implementation and students and tutors were quite familiar with this platform. Through the WhatsApp Group app, the tutor interacts with students by delivering tutorial activity design, tutorial program unit, main teaching materials, discussing, delivering assignments to students, assessing participation, delivering the final exam as the end of lectures.

WhatsApp is an instant messaging application that is connected to the internet network that can be operated on Android smartphones, iPhones, and also on computers. WhatsApp has almost the same function as the messaging application on previous cellphones. WhatsApp is the most phenomenal application by having the most users in the world, the WhatsApp beats the Blackberry Messenger messaging

application and also other messaging applications in terms of the largest number of users in the world.

The WhatsApp is currently popular with smartphone users. WhatsApp users around the world have even recorded around 1 billion users every day and there are also around 1.3 billion who use this application every month. The ease of communicating through this application makes it easier for users to exchange messages, send pictures, send voice, send documents, to send the location where we are. Considering that this application is one of the applications that are very easy to use, such as the function of a mobile phone in general, its utilization needs to be optimized. In the field of education and work, WhatsApp is often used for communication. Whether it is used for interest or is used for entertainment or ordinary communication. In addition, there are many other advantages that can be used through this application. Because of its simplicity, this application is very popular, especially in the world of education. In fact, each person in the world of education makes smartphones a must-have means of communication, especially communication via WhatsApp.

The abilities of WhatsApp are easily sent documents, images, photos, audio, etc. and very supportive of the remote guidance process. The role of WhatsApp here is very clear in bringing distance and time closer so that in an instant the information needed between tutors and students is conveyed properly. Students with tutors can communicate cheaply and it's easy to just make a commitment.

Collaborative Skills

Collaborative problem-solving skills are individual capacities to be effectively involved in a process in which two or more students attempt to solve academic problems as well as problems of daily life (authentic) by sharing understanding, to produce solutions, and pooling their knowledge, and social skills to achieve solutions the problems they face (OECD, 2015a; OECD, 2013). Collaborative problem-solving is a problem-solving approach combining cognitive and social competencies with proactive and responsiveness through collaboration and building ideas between two or more people (Care & Griffin, 2014). Collaborative problem-solving builds mutual understanding in a collaborative manner in supporting the process of solving academic problems or complex problems (authentic) (Mercier & Higgins, 2014).

Indicators of collaborative problem-solving skills in this study, namely participation, sharing views (perspective taking), social regulation, learning, and knowledge building, and task regulation (Hesse, Care, Buder, Sassenberg, & Griffin, 2015).

METHOD

General Background

The design of this study was the Educational Design Research (EDR). Educational design research is the systematic study of designing, developing, and evaluating educational interventions as solutions for complex problems in educational practice, which also aims at advancing our knowledge about the characteristics of these interventions and the processes of designing and developing them (Nieveen, McKenney & Akker, 2007). The research objective was to produce an effective mobile learning model in online learning to improve the collaborative

abilities of PPTs in the era of the Covid-19 pandemic. This study also produced tutorial tools as an operational form of the mobile learning model, namely: tutorial activity design, tutorial program unit, student activity sheet, and collaborative ability test.

The preparation of a mobile learning model-based tutorial tool in online learning refers to Generic Design Research Model (GDRM) according to Wademan. GDRM steps are: 1) problem identification, 2) tentative identification of product and design principles, 3) tentative theory and product, 4) prototyping and assessing products, and 5) improving product quality. The mobile learning model based tutorial tool preparation stage in online learning by modifying the GDRM (Plomp & Nieveen, 2013). The method of this research was a pre-experimental study with a one-group pre-test design (Fraenkel et al., 2012).

Population and Sample

The research subjects with the mobile learning model were Pre-service Primary Teachers (PPTs) in 2020, who took the elementary science concept course. The sampling technique used was purposive sampling. This technique was chosen because in the condition of the Covid-19 pandemic the existing tutorials were not optimal and included PPTs who were not all active populations and supported the internet network.

Instrument and Procedure

The time of this research was from March to June 2020. The research site was carried out at UPBJJ Open University (OU) in Surabaya, Pokjar Bojonegoro. The considerations for choosing Pokjar Bojonegoro as a trial site were: 1) The academic community was ready to accept and support the implementation of the mobile learning model and 2) The collaborative abilities of PPTs in general still need to be improved.

The validity of the mobile learning model tutorial tool in online learning was the quality of the mobile learning model tutorial tool which includes: tutorial activity design, tutorial program unit, student activity sheet, and collaborative ability test, by minimum criteria valid in terms of content and construct validity. The validity score of the mobile learning model tutorial tool was obtained from the assessment of three experts using the mobile learning model tool validation sheet instrument.

The effectiveness of the mobile learning model in online learning was the success of the mobile learning model in online learning to improve student collaborative abilities, in terms of: 1) There was an increasing of the student collaborative abilities which statistically significant at α=5%; and 2) The average gain score of student collaborative ability was at least moderate.

To collect data in the form of pre-test scores and post-test scores for student collaborative abilities, before doing a tutorial with the mobile learning model. Students were given an initial test (pre-test) of student collaborative abilities, after the tutorial was done, students were again given the same test for the last test (post-test).

The instruments used in collecting data in this study included: (1) The validity assessment sheet of the mobile learning model tutorial tool and (2) the collaborative ability test instrument.

Data analysis

Research data in the form of pre-test scores and post-test scores that have been collected after going through a series of prerequisite tests, namely: the normality test and the homogeneity test were, then analyzed using paired t-test, which was to determine the differences in the pre-test and post-test scores. After got a significant difference between the pre-test score and the post-test score of collaborative ability. Followed by calculating the mean level of increase in the pre-test score and post-test score using the normalized gain calculation (gain score). The research data was in the form of a score of the results of the assessment of the validity of the tutorial tools by three educational experts and analyzed using the single measure interrater coefficient correlation (r) to determine the validity and using Cronbach's alpha (α) to determine the reliability of the tutorial tools.

RESULTS AND DISCUSSION

The Validity of Mobile Learning Model Tool

The development of mobile learning model tools was tutorial activity design, tutorial program unit, student activity sheet, and collaborative ability test. The developed tools were reviewed by educational experts and peers to determine the adequacy of supporting theories and the consistency of their construction. The validity of the mobile learning model was determined by three validators. The results of the validation of the model device validity were following.

The Validity of Tutorial Activity Design for Mobile Learning Model

In the basic concepts of science in elementary school, the material related to the field of study is divided into three groups, namely: Biology, Chemistry, Physics. In the limited trial of tutorial activity design developed the results are presented in Table 1.

Table 1. Tutorial activity design validity

Tuweb	Assessment aspects							
	Tutorial activity design identity				Tutorial activity design format			
	Validation score	Criteria	Reliability Coefficient	Criteria	Validation score	Criteria	Reliability Coefficient	Criteria
1	4.00	VV	100%	R	3.92	VV	98.21%	R
2	4.00	VV	100%	R	3.92	VV	96.43%	R
3	4.00	VV	100%	R	3.92	VV	96.43%	R
4	4.00	VV	100%	R	3.88	VV	96.43%	R

Information: VV = Very Valid, R = Reliable

The results of tutorial activity design validation include aspects of identity assessment and the tutorial activity design format gets very valid and reliable assessment criteria. Each tutorial activity design has met the components in the preparation of identity and format.

The Validity of Tutorial Program Unit for Mobile Learning Model

The material used in the development of the tutorial program unit on the topic of physics, the results of the validation of the tutorial program unit are presented in Table 2.

Table 2. Tutorial program unit validity

Tuweb	Assessment aspects							
	Tutorial program unit identity				Tutorial program unit format			
	Validation score	Criteria	Reliability Coefficient	Criteria	Validation score	Criteria	Reliability Coefficient	Criteria
1	4.00	VV	100%	R	3.95	VV	97.71%	R
2	4.00	VV	100%	R	3.99	VV	99.43%	R
3	4.00	VV	100%	R	3.99	VV	99.43%	R
4	4.00	VV	100%	R	3.85	VV	93.37%	R

Information: VV = Very Valid, R = Reliable

Table 2 shows that the results of the tutorial program unit scenario validation include aspects of the tutorial program unit identity assessment and tutorial program unit systematics have very valid and reliable criteria. Suggestions for improvement from the validator are that Indonesian national qualification framework curriculum core competencies were written in the tutorial program unit and the objectives of the tutorial were not written in the tutorial program unit but in the specification table and clarify the activities of tutors and students.

The Validity of Student Activity Sheet

Development of student activity sheet adapted to the material Tuweb 1, Tuweb 2, Tuweb 3, and Tuweb 4. Table 3 below presents the results of the student activity sheet validation that has been carried out.

Table 3. Student activity sheet validity

Assessment aspects	The result of student activity sheet validity							
	Part 1		Part 2		Part 3		Part 4	
	$\bar{V}$	Note	$\bar{V}$	Note	$\bar{V}$	Note	$\bar{V}$	Note
Design	3.74	VV	3.81	VV	3.78	VV	3.89	VV
Format	3.93	VV	3.93	VV	3.87	VV	3.93	VV
Theory	3.78	VV	3.83	VV	3.83	VV	3.94	VV
Language	4.00	VV	4.00	VV	4.00	VV	4.00	VV
Presentation	3.47	VV	3.47	VV	3.93	VV	3.67	VV
Innovation and quality	3.76	VV	3.76	VV	3.81	VV	3.90	VV
Reliability Criteria	Reliable		Reliable		Reliable		Reliable	

Information: $\bar{V}$ = average validation score, VV = Very Valid

The results of the student activity sheet validity include design, format, material, language, presentation, support for innovation, and the quality of teaching and learning activities. The assessment criteria were very valid and reliable. The suggestions for improvement from the validator are clarity of drawings, tools, and materials.

The Validity of Collaborative Ability Test

Development of a collaborative ability assessment sheet with research indicators: participation, sharing views (perspective talking), social regulation, learning by building knowledge (learning and knowledge building), task regulation. (Hesse, Care, Buder, Sansenberg & Griffin, 2015). Table 4 below presents the validity results.

Table 4. Collaborative ability test validity

Material	Indicators	Content validity				Language and writing			
		Validation score	Criteria	Coef. R (%)	Criteria	Validation score	Criteria	Coef. R (%)	Criteria
Tuweb 1	1	4.00	VV	100	R	4.00	VV	100	R
	2	4.00	VV	100	R	4.00	VV	100	R
	3	4.00	VV	100	R	4.00	VV	100	R
	4	4.00	VV	100	R	3.67	VV	85.71	R
	5	4.00	VV	100	R	4.00	VV	100	R
Tuweb 2	1	4.00	VV	100	R	4.00	VV	100	R
	2	4.00	VV	100	R	4.00	VV	100	R
	3	4.00	VV	100	R	4.00	VV	100	R
	4	3.67	VV	85.71	R	3.67	VV	85.71	R
	5	4.00	VV	100	R	4.00	VV	100	R
Tuweb 3	1	4.00	VV	100	R	4.00	VV	100	R
	2	4.00	VV	100	R	4.00	VV	100	R
	3	4.00	VV	100	R	4.00	VV	100	R
	4	3.67	VV	85.71	R	3.67	VV	85.71	R
	5	4.00	VV	100	R	4.00	VV	100	R
Tuweb 4	1	4.00	VV	100	R	4.00	VV	100	R
	2	4.00	VV	100	R	4.00	VV	100	R
	3	4.00	VV	100	R	4.00	VV	100	R
	4	3.67	VV	85.71	R	3.67	VV	85.71	R
	5	4.00	VV	100	R	4.00	VV	100	R

Information: VV = Very Valid, R = Reliable

Table 4 shows that the results of the validity of each item on the collaborative ability test on physics, biology, and chemistry have received very valid and reliable assessment criteria.

Validity of Mobile Learning Model Research Instrument

The results of the validation of several research supporting instruments with the mobile learning model are presented in Table 5.

Table 5. Results of research instruments validity

Instrument	Content validity				Language and question writing			
	Validation score	Criteria	Coef. R (%)	Criteria	Validation score	Criteria	Coef. R (%)	Criteria
Completion of tutorial activity design and tutorial program unit	3.78	VV	90.48	R	3.75	VV	89.29	R
collaborative ability test	3.89	VV	95.24	R	3.83	VV	92.86	R
student activity sheet	3.89	VV	95.24	R	3.83	VV	92.86	R
Student Response	3.75	VV	91.07	R	3.75	VV	89.29	R

Information: VV = Very Valid, V = Valid, R = Reliable

Table 5 shows that the results of the validation supporting instruments validity obtained very valid and reliable criteria, so that it was worthy of being used as an instrument to obtain the necessary research data.

The Effectiveness of Mobile Learning Model

The effectiveness of the mobile learning model was viewed from the components of increasing collaborative skills and student responses to the mobile learning model and the supporting devices developed.

Collaborative Ability

Collaborative ability test measures collaborative abilities with research indicators: participation, sharing views (perspective talking), social regulation (social regulation), learning by building knowledge (learning and knowledge building), task regulation. The results of the collaborative ability score analysis before and after students follow the tutorial process are presented in Table 6 below.

Table 6. Results of collaborative ability analysis

Indicators	Description	Pre-test			Post-test		
		ΣN	Completeness of Indicators	x̄	ΣN	Completeness of Indicators	x̄
Participation	T	10	33.33	50.40	27	90.00	9060
	TT	20			3		
Share views	T	8	26.67	48.60	27	90.00	88.60
	TT	22			3		
Social regulation	T	10	33.33	48.50	26	86.67	88.50
	TT	20			4		
Learn and build knowledge	T	10	33.33	44.12	26	86.67	89.12
	TT	20			4		
Assignment regulation	T	14	46.70	62.50	25	83.33	84.50
	TT	16			5		

Information: x̄= Average score, ΣN = Number of students, T = Complete, NT = Not Complete

Based on Table 6, students' collaborative ability before attending the lecture process is generally still low because it has not been completed. Participation and sharing views of the lowest completeness. Some students experience difficulties in social regulation, learning, and building knowledge. Assignment regulation requires more attention from the tutor. While the gain score and the sensitivity of the collaborative ability items can be seen in Table 7 below.

Table 7. Gain score and collaborative ability test item sensitivity

No	Indicators	Gain score		Sensitivity	
		Coefficient	Description	Coefficient	Description
1	Participation	0.81	High	0.48	Sensitive
2	Share views	0.78	High	0.64	Sensitive
3	Social regulation	0.78	High	0.67	Sensitive
4	Learn and build knowledge	0.81	High	0.54	Sensitive
5	Assignment regulation	0.59	Moderate	0.38	Sensitive

Table 7 shows that the increase in collaboration skills in terms of participation, sharing views, social regulation, learning and building knowledge is in high criteria, while task regulation is in medium criteria. Collaboration skills used are generally good and sensitive to the tutorial process.

Students' Responses

The results of students' responses after implementation with the mobile learning model tutorial are presented briefly in Table 8.

Table 8. Students' responses analysis

Student response components	"Yes"		"No"	
	Total	%	Total	%
Newly tutorial process				
a. How the tutor teaches	28	93.0	2	6,7
b. collaborative ability test language and content	27	90.0	3	10.0
c. Language and content of the student activity sheet	27	90.0	3	10.0
d. Learning atmosphere	29	96.7	1	3.3
Clarity in the submission of tutorial activity design by the tutor				
a. Participation	29	96.7	1	3.3
b. Share views	29	96.7	1	3.3
c. Social regulation	29	96.7	1	3.3
d. Learn and build knowledge	29	96.7	1	3.3
e. Assigment regulation	29	96.7	1	3.3
Clarity of tutorial program unit delivery by the tutor				
a. Participation	29	96.7	1	3.3
b. Share views	29	96.7	1	33
c. Social regulation	25	83.3	5	16.7
d. Learn and build knowledge	23	76.7	7	23.3
e. Assigment regulation	23	76.7	7	23.3
Ease of working on the assessment sheet				
a. Student activity sheet	24	80.0	6	20.0
b. Collaborative ability test	20	66.7	10	33.3
Interested if the Mobile Learning model is applied to:				
a. Next material	28	93.3	2	6.7
b. Other courses	24	80.0	6	20.0

Table 8 shows that most students feel new to the tutorial process that has been carried out, are clear about the information provided by the tutor, find it easy to learn and work on student activity sheet, collaborative ability test, and are interested if the mobile learning model is applied to other materials. Addiction to gadgets has a big influence in their lives and can even change their mindset, personality, and behavior (Nursyifa, 2018). This causes a person to have introverted, antisocial behavior and find it difficult to join the real world (Nursyifa, 2018). The influence of these behaviors will have an impact later when they are in the world of work, when they are required to be able to interact with others competently and with mutual respect (Redhana, 2015, Zubaidah, 2016). One of the provisions for dealing with these problems is with collaborative skills. It is important to have these skills so that humans are able to socialize, be sensitive to the surrounding environment, and control ego and emotions (Tama, 2018; Rahmawati et al., 2019). Specifically, the potential for reward is clearly to increase motivation, and help teachers to influence the process and learning outcomes. Gadgets and games have a positive impact on the world of education (Yunita et al., 2018; Fawareh & Jusoh, 2017).

CONCLUSION

The development of the mobile learning model has included the content and construct a valid category, and supported by tutorial tools, including the valid category. This model was included in the effective category because of the increase

in students' collaborative abilities in limited trials and extensive trials in moderate criteria and also the students' responses have positively to the tools and tutorial process. Based on this study, it can be concluded that the development of the mobile learning model was valid and effective to improve student collaborative abilities.

RECOMMENDATION

The benefit of this research was as reference material in improving the quality of PPTs graduates. Besides that, it can also be used as an alternative to innovative tutorial models in online learning in the era of Covid-19 pandemic. Future research can use more sample and another subject.

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