The Impact of Android Based Assesment for Learning System Toward Students Self-Directed Learning Ability on Thermodynamic Matter

Hendri Prasetio[1], Undang Rosidin[2], Agus Suyatna[3]

[1] Physicx Education Graduate Program, Faculty of Teacher Training and Education, University of Lampung, Indonesia

Abstract.

Android can be used as a self-directed learning tool, to perform assessment of learning outcomes. The research aims to see practicality and effectiveness and present findings on the impact of android-based assessment for learning system to improve student self- directed learning skills. This research uses pretest-posttest control group design. The instrument is used in research using questionnaire and cognitive testing. The questionnaire is used to collect student response data, while the cognitive test is to collect students self-directed learning ability data. Student response results have a score of 81.6%. The test results of N-Gain self-directed learning ability in the experimental class (0.35) are greater than in the control class (0.22), and the test effect size gives a small influence (0.4697). Found indications have been the use of android cheating by students as a self-directed learning assessment tool so that student learning outcomes were not optimal. This is because the smart features on android make it possible to do the cheating. The results showed that Android based assessment for learning was practical and effective to improve student self-learning ability.

Keywords: android, assesment for learning, self-directed learning

INTRODUCTION

Learning is an activity to add to and enhance the knowledge we have. Self-directed learning is the most frequently used way of learning by humans. The ability to self-directed learning is an ability where an individual performs the learning process without the help of others. self-directed learning has a flexible nature, this is because learning can be done anytime and anywhere. self-directed learning is also seen as an effective way of learning for students, especially since learning in college that requires students to self-directed learning. Students need to be active in their own learning and able to do such learning anytime and anywhere (Cohen, 2012). Learning is basically involved, requires an environment where students are not controlled from the outside and they manage the learning process itself (Torabi, Gholamreza, AzarBahrami, 2013).

In self-directed learning activities a scoring system is needed as a tool that can be used to measure learning outcomes. There are several types of assessments, including assessment for learning. The purpose of assessment for learning is to direct and help develop the maximum ability of each student (Schuwirth & Cess, 2011). Assessment is needed to collect information then the teacher and students use the information to support improvements in learning, through which they are fulfilling educational goals through assessment (Pedder & Mary, 2012).

Self-directed learning for students need tools that can help students to learn flexibly wherever and whenever. Android is a device that can be used as a means of self-directed learning and for evaluating learning outcomes. Android is an open source software and operating system developed for smartphones and tablets. Android is the mobile operating system that is most many used by people in this age (Narmatha, 2016). Android is a collection

of open source software that can be downloaded for free for mobile devices that include its operating system, main middleware and applications based on Linux and Java (Bhardwaj et.al. 2013).

Smartphones with the android operating system are mobile phones that are easy to operate and many used because android provides a myriad of applications that can be downloaded for free. Android also provides applications that can be developed by developers as needed. The smartphone has a design that is not too heavy, thin, and can be inserted into the pocket so that it is easy to carry everywhere. This makes the android smartphone support to be used as a device for learning anywhere and anytime by students to self-directed learning.

Many students have used an android smartphone as a tool for learning. It is based on the results of a questionnaire that all students already have a smartphone. Gerlich et. al. (2010) found that many students use smartphones to help them learn. According to Calimag et. al. (2014) in his research stated that Android-based cellphones were chosen because more students were using Android-based smart phones. Students use their smartphones to access teaching materials or supporting information, which is usually accessible via the internet.

According to the research results of Martono and Nurhayati (2014) that 95% of students using android-based mobile learning were happy to use the learning application and only 5% of students were users who were not happy with the learning application. So that the use of android-based mobile learning applications can make the learning process more flexible. Machmud (2018) in his research found that students as research participants showed a positive perspective on smartphone use in schools. They argue that it can help them learn both at home and at school. The use of smartphones can also motivate them to self-directed learning. The purpose of this study is to find out the practicality and effectiveness of learning using an independent Android-based assessment system for learning.

METHOD

This assessment uses the experimental method with pretest-posttest control group design (Sugiyono, 2015: 112). The form of research design is shown in Table 1.

Tabel 1. Pretest-Posttest Control Group Design

Class	Pretest	Treatment	Posttest
Eksperimen	O_1	X_1	O_2
Kontrol	O_3	X_2	O_4

Keterangan:

X_1 : Treatment of learning using *assesment for learning* based *android*

X_2 : Treatment of learning not using *assesment for learning* berbasis *android*

The sampling technique used purposive sampling technique, the school was chosen based on the researchers' considerations regarding the location and quality of the school. Sample research to get practical data involving 30 senior high school students to fill out questionnaires. The product trial in this study involved 60 of 11-grade senior high school students Science in South Lampung, of which 30 students self-directed learning using development products in the form of an Android-based assessment for learning system and as a comparison 30 students self-directed learning did not use development products.

Research instrument

The research instrument used a questionnaire that was used to collect data on practicality analysis of android usage. As well as 10 essay-shaped questions are used to see students' self-directed learning outcomes.

Data analysis

Practicality is determined by students' responses to the android-based assessment for learning system used. The questionnaire results are calculated by the average score then interpreting the average score using interpretations based on Purwanto (2009) in Table 2.

Table 2. Practical categories

Practical Score (%)	Criteria
86 – 100	Very practical
76 – 85	Practical
60 – 75	Practical enough
55 – 59	Less practical
54	Very Less Practical

The effectiveness of android-based assessment for learning systems to improve students' self-directed learning abilities using analysis of average gain scores is then interpreted using classification according to Mudrikah (2016) as in Table 3.

Tabel 3. Classification N-gain

N-gain Value	Classification
$\langle g \rangle \geq 0{,}70$	Tinggi
$0{,}30 \leq \langle g \rangle < 0{,}70$	Sedang
$\langle g \rangle < 0{,}30$	Rendah

reference source : Mudrikah (2016)

Data analysis was also supported by the effect size test and t-test consisting of paired sample t-test to determine the increase in the value of the pre-test and post-test in the experimental class and the independent sample t-test to determine the difference in the average post-test test in the experimental class and the control class.

RESULT

The product practicality of the android-based assessment for learning system is obtained based on the results of the questionnaire on the use of products as a result of development in learning. Observations regarding students' responses to the practicality of product development involved 30 students who were given a questionnaire to assess the practicality of the product during use. The results of student responses to the practicality in using the product for android-based assessment for learning systems can be seen in Table 4.

Table 4. Practicality of using android-based assessment for learning systems

Aspect	Persentase	Criteria
Effective	80,84 %	Practical
Interactive	80%	Practical
Efficient	84,58 %	Practical
Self-directed	81 %	Practical

Average	81,6%	Practical

Based on the data in Table 4, it is known that students' responses to practicality in the use of products resulting from development in self-directed learning activities gained an average of 81.6% in the "Practical" category. This is based on the assessment of aspects of effective, interactive, efficient, and self-directed in the use of android-based assessment for learning systems. Android-based assessment for learning system development results received an assessment in the practical category due to its easy operation, students feel comfortable in self-directed learning because students are able to work on practice questions wherever and whenever and re-evaluate the results of the work based on the feedback provided. This is as revealed in the research of Ketheeswaran & Mukunthan (2016) that with smartphones students gain freedom in the learning environment. The results of this study are in line with the research of Anshari et al. (2017) in his research which found that students use smartphones as learning aids for many reasons such as giving them comfort, portability, a comprehensive learning experience, multi-source and multitasking, and environmentally friendly.

The product effectiveness of the android-based assessment for learning system is reviewed based on student learning outcomes in the experimental class and the control class which can be seen by comparing the pre-test and post-test values in both classes. The value of the N-Gain test results in the experimental class and control class can be seen in Table 5.

Table 5. The value of the N-Gain test results

	N-gain Average	Criteria
Experimental class	0,35	Medium
control class	0,22	Low

Based on Table 5. it can be seen that the results obtained by n-gain in the experimental class amounted to 0.35 so that it can be concluded that the increase in the ability of independent learning students in the criteria is being.

Hypothesis testing of paired data using paired samples t-test gives the final result in the form of SPSS output which shows the significance values summarized in Table 6.

Table 6. Paired Sample T-Test Test Results between pre test and post test

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest Posttest	-29,500	10,855	1,9819	-33,553	-25,446	-14,884	29	0,000

The statistical hypothesis test results on the testing of students' independent learning abilities obtained a significance value of 0,000 <0,05, it can be concluded that H0 is rejected and H1 is accepted which means that there are differences in students' independent learning abilities measured using the results of students' pretest and posttest.

The effect size test results using the Cohen calculator on http://www.uccs.edu/~lbecker/, the results shown in Figure 1 are obtained.

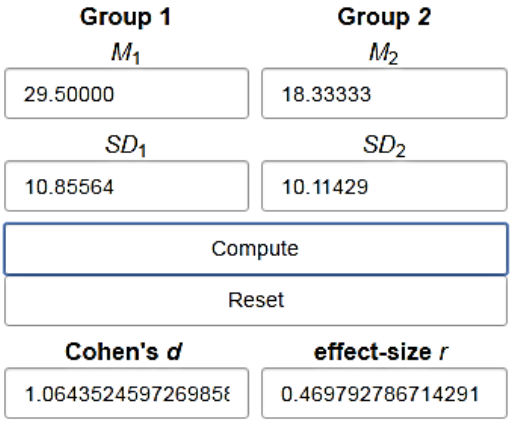

Figure 1. Effect size test on the ability to self-directed learning

An effect size of 0.4697 was obtained and interpreted based on Cohen's criteria with small effects. So it can be concluded that the use of an Android-based assessment for learning system has little effect on students' self-directed learning abilities.

The Independent Sample T-Test gives the final results in the form of SPSS output which shows the significance values seen in Table 7.

Table 7. Independent Test Results Sample T-Test values between the experimental class and the control class

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
N-Gain	Equal variances assumed	0,028	0,868	3,981	58	0,000	0,12767
	Equal variances not assumed			3,981	57,993	0,000	0,12767

The results of the statistical hypothesis test obtained the Sig. (2-tailed) of 0,000 <0,05; this shows that H0 is rejected and H1 is accepted so it can be concluded that there is a significant difference in the average independent learning ability of the experimental class and the control class.

FINDING

Based on the results of the pre-test and post-test stated with n-gain, the average n-gain difference is not too large in the experimental class (0.35) and the control class (0.22). Besides that, the effect size test shows the effect of using android-based assessment for learning on the ability to self-directed learning that the effect size of 0.4697 on Cohen's criteria has an effect with small effects. The results of statistical tests that have been carried out obtain unsatisfactory results, this shows that the product assessment system for Android-based learning still needs to be improved again but researchers find interesting things that cause the influence of the use of products to have an effect with small effects.

In the e-mail the report on the student's independent learning outcomes has been completed with data in the form of a user name, e-mail address, class, user score, maximum score, passing

score, quiz time, and the results of answers. From the results of the e-mail report received, it was shown that the average time used by students to do android-based assessment for learning was less than 3 minutes. This is very unnatural even though students are looking for answers on the internet or asking for help from friends will take more than 10 minutes to find answers to all the questions.

This finding was very surprising to the researchers because before the use of an Android-based assessment for learning system, rules had been agreed so that students worked on it independently and without asking for help from others. This is in line with Ansari et.al. (2017) which states that to avoid disruption in using a smartphone in the classroom environment, the right rules for using a smartphone in the classroom must be established before teaching, and students must comply with these rules. Barrs (2011) in his research, recommended that detailed guidance and an explanation of how to use a smartphone correctly in classroom settings is very important for meaningful learning.

In the Android-based assessment for learning products instructions have been given if students do not provide the right answers, so they can work on and find the right answers when working on the quiz. Screenshot of e-mail the results of student self-directed reports can be seen in Figure 2.

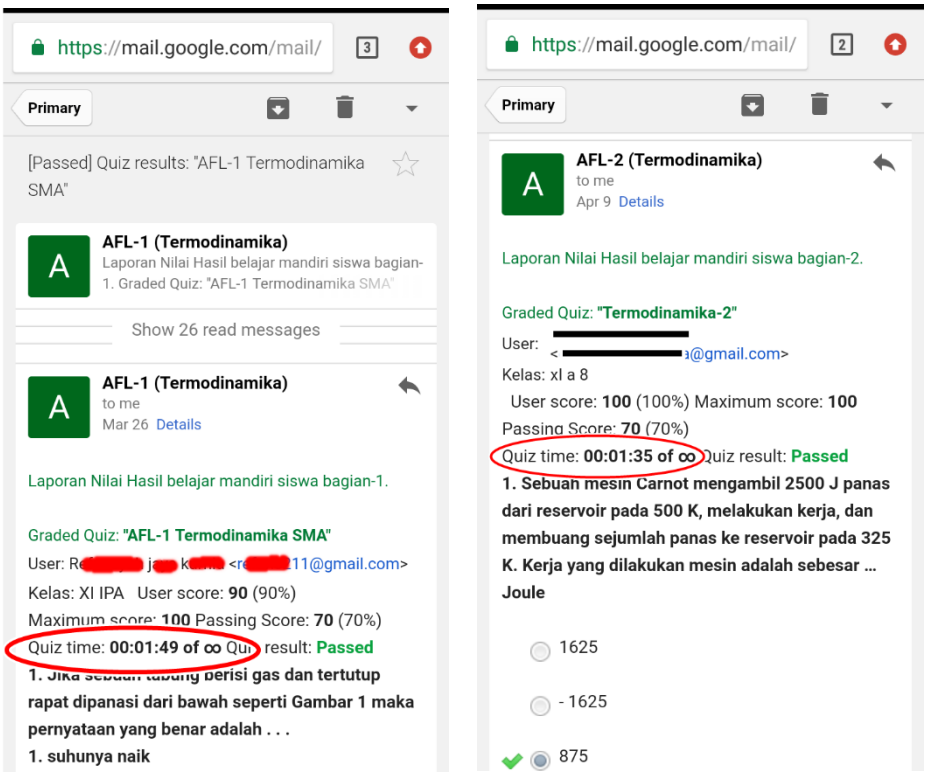

Figure 2. Screenshot of e-mail the results of student self-directed reports

With this finding, it is possible for students to violate the regulations on the use of Android smartphones that have been agreed upon so that the influence of the use of Android-based assessment products for learning is not too large and makes the product effectiveness of learning outcomes not optimal.

CONCLUSION

Based on the description in the results of the research and findings it can be concluded that the Android-based assessment for learning system to improve self-directed learning ability, 1)

can be seen practically from the results of student responses to the use of android-based assessment for learning systems, 2) quite effective in improving students self-directed learning ability are seen from the significant differences in the average self-directed learning ability of the experimental class and the control class. To prevent violations of established rules, there needs to be a warning system and students' self-awareness to be honest.

References

Ansari, M. et. al. 2017. Smartphones usage in the classrooms: Learning aid or interference?. *Education and Information Technologies,Springer*, 22(6), 3063-3079.Gerlich, R. N., Browning, L., & Westermann, L. 2010. The social media affinity scale: implications for education. *Contemporary Issues in Education Research*, 3(11), 35-42.

Barrs, K. (2011). Mobility in learning: The feasibility of encouraging language learning on smartphones. *Studies in Self-access Learning Journal*, 2(3), 228-233.

Bhardwaj, S. et.al. 2013. Android Operating Systems. *International Journal of Engineering Technology & Management Research*. 1 (1), 147-150.

Calimag, J. N. et. al. 2014. Ubiquitous Learning Environment Using Android Mobile Application. *IMPACT: International Journal of Research in Engineering & Technology (IMPACT: IJRET)*. 2 (2), 119-128.

Cohen. M. T. 2012. The importance of self.regulated for college student learning. *College Student Journal. 46(4),* 892-902.

Karmila, Machmud. 2018. The Smartphone Use in Indonesian Schools: The High School Students' *Perspectives. Journal of Arts and Humanities (JAH)*, 7(3), 33-40.

Ketheeswaran, K. & T. Mukunthan. 2016. Usage of the Smart Phones for Learning Purposes by Students Who Follows 'Diploma in Commonwealth Youth Development Programmes' in the Colombo And Batticaloa Centres of the Open University of Sri Lanka. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*. 21 (5), 75-78.

Martono, Kurniawan T. & Nurhayati, Oky Dwi. 2014. Implementation Of Android Based Mobile Learning Application As A Flexible Learning Media. *International Journal of Computer Science Issues*. 11 (1), 168-174.

Mudrikah, A. 2016. Problem-Based Learning Associated by Action-Process-Object-Schema (APOS) Theory to Enhance Students' High Order Mathematical Thinking Ability. *International Journal of Research in Education and Science (IJRES)*. 2 (1), 125- 135.

Narmatha, M. & S. Venkata K. 2016. Study on Android Operating System And Its Versions. *International Journal of Scientific Engineering and Applied Science (IJSEAS)*. 2 (2), 439-445.

Pedder, D. & Mary, J. 2012. Professional Learning as a Condition for Assesment for Learning. *Assesment and Learning*. 3 (2), 33-48.

Purwanto. 2009. *Evaluasi Hasil Belajar.* Surakarta: Pustaka Belajar.

Schuwirth, L. W. T., & Cess, P. M. V. D. V. 2011. Programmatic Assesment: From Assesment of Learning to Assesment for Learning. *Medical Teacher*. 2 (33), 478-485.

Sugiyono. 2015. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D)*. Alfabeta: Bandung.

Torabia, N., Gholamreza A., AzarBahrami. 2013. A study on self-directed learning among preliminary school teachers in Esfahan. *Procedia - Social and Behavioral Sciences (ELSEVIER)*. 83, 219–223.