

An Analysis Conceptual Understanding and Student's Learning Self-Reliance in the New Normal Era Assisted by Photomath on SLETV Material

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ABSTRACT

This study is purposed to determine the student's conceptual understanding and learning self-reliance in New Normal era assisted by Photomath on SLETV materials. This study implements quantitative approach of quasi-experimental design and One Group Pre test-Post test Design. The population of this study is all 7th grade students in SMPN 3 Jeumpa, Bireuen. The sample is selected using purposive sampling, they are 29 of 7th grade students in SMPN 3 Jeumpa, Bireuen who attend when this study is conducted. The instrument adopted to measure the student's understanding level is a test. Meanwhile, to determine the student's learning self-reliance, this study uses questionnaire. N-Gain is calculated to know the student's conceptual understanding level, and the percentage technique is also applied to determine the student's self-reliance level. The research findings show that teaching and learning process assisted by Photomath on SLETV materials can improve the student's conceptual understanding, although the improvement is still considered in the low category. Besides, the improvement of the student's conceptual understanding achieves the middle category. Additionally, 80% students agree that Photomath use can create the students more self-reliant in mathematics teaching and learning process, particularly on SLETV materials.

Keywords: *Conceptual Understanding, Learning Self-Reliance, New Normal, Photomath, SLETV.*

1. INTRODUCTION

The new normal era is such a solution provided by the government which is purposed to give the society a chance to carry out their daily activities during Covid-19 pandemic with still paying a high attention on some health protocols. One of crucial activities that is affected by Covid-19 is the teaching and learning activities. In the new normal era, the teaching and learning process is conducted like during the normal condition, in which the students have face-to-face teaching and learning process with new behaviours that must always obey the health protocols. Consequently, the learning process is held in a limited time and condition. One of the differences between the process of teaching and learning in the new normal and normal era is that in the new normal era, the students are only given an individual assignment, they are not given such a group assignment. By this very limited situation, the teacher is hard to find the best way to give and explain the materials for the

students, especially on some lessons that need more explanations and examples. In addition, one of those kinds of lesson is mathematics. This lesson needs an extra effort to make the students understand.

Mathematics plays an important role to develop the student's mind-set so that the teaching and learning of mathematics is not measured based on the students' ability to calculate and memorize the formulas only, but it is basically measured by the students' ability to master concepts and materials, to solve the problems, and also based on the students' learning results. This matter is in line with what has been stated by [1] that mathematics is not focused on learning manifold formulas and solving various kinds of question only, but learning mathematics is also essential for some processes in which it can be seen the differences of its teaching and learning process whether it is done directly or indirectly. Mathematics lesson more emphasizes on the conceptual understanding where the students must understand mathematics concept first and then they can solve the

questions and also apply it around them. In addition to the conceptual understanding, the students' self-reliance in learning needs a serious attention too, because it is able to determine the students' achievement and provide a positive influence the learning process.

Based on the observation results and interviews with a mathematics teacher in SMPN 3 Jeumpa, Bireuen Regency, it is found that the students' conceptual understanding toward the mathematics teaching and learning process in the new normal era is 48,67%, whereas the students' self-reliance in teaching and learning process is 44,23%. Those data are caused by various factors, one of them is related to the matter where the students must adapt to the new normal era. In this era, there is such a change from face-to-face teaching and learning process into online teaching and learning process. Moreover, the teaching and learning process in this current time is still shifting from *teacher centred* to *student centred* paradigm [2]. In this kind of situation, the students do not only received the materials given by their teachers, but they must be able to build a great relationship on what the knowledge will be learnt. For, this can provide an influence toward the students to emerge their self-reliance in learning so that they will be able to actualize their needs according to the potentials they have [3]. The conceptual understanding and self-reliance in teaching and learning process which comes along with the students' activeness in sustaining the teaching and learning process highly depends on the current conditions. The development of communication technology such as handphone has developed into multi functioned smartphone [4].

The A phenomenon occurred in this new normal era is in line with the technology development of smartphone where the students will be closer to their smartphone than other learning media such as text books and so forth. However, the advantages of using a smartphone have not been optimally achieved in teaching and learning process. In fact, today, smartphone is more widely used for playing games or exploring social media. The problems mentioned before must be handling seriously, because in this current situation, smartphone is better to be optimally used in sustaining the teaching and learning process so that the students are able to learn independently through their smartphone they have by downloading various learning applications. Moreover, one of those applications provided in the students' smartphone that can support the mathematics learning process is Photomath application [5]. Additionally, one of this application advantages is that Photomath can provide the answer toward each mathematics question completed with the detailed steps, so the user will understand all steps of completion in each mathematics question.

There are some studies that have been conducted related the conceptual understanding and the students' self-reliance in teaching and learning process. First, the study conducted by [6] indicates that the conceptual understanding and the students' self-reliance in teaching and learning process are relatively balanced. Second, [7] stated that the students' conceptual understanding on trigonometry will be better if it is taught by implementing the teaching and learning collaboration model of Android based *Think Pair Share* and M-Learning compared to conventional learning (expository). Third, [8] stated that the learning through E-learning web-based model centric course is able to improve the conceptual understanding and the student's self-reliance in learning mathematics compared to the learning process using Power Point media. Fourth, the study done by [9] results that the use of Microsoft Mathematics can increase the conceptual understandings and the students' procedural skills on Differential Calculus. Fifth, [10] explains that the use of Android-based mobile learning affects the students' self-reliance in learning mathematics. Last, [11,12,13] state that there is a significant difference between experiment and control group toward the conceptual understanding ability. Therefore, from those studies, none has analysed the conceptual understanding and the student's learning self-reliance in the new normal era which is assisted by Photomath on System of Linear Equations in Two Variables (abbreviated as SPLDV in Indonesian, henceforth abbreviated as SLETV).

This study is going to utilize the Android-based smartphone that students already have in order to access the learning media in form of Photomath android application as the source of learning process on SLETV materials so that it can encourage the students to learn independently according to their own ability to understand SLETV concept. Because, the students' ability in conceptual understanding is actually supported by a good student's self-reliance in learning process, the better level of student's self-reliance in learning process, the better the student's ability in conceptual understanding [6].

2. METHOD

This research implements a quantitative approach in form of quasi-experimental research and applies *One Group Pretest-Posttest Design* as the research design. The population in this study is all students of 7th grade in SMPN 3 Jeumpa, Bireuen Regency. Meanwhile, the sample of this study is selected by implementing purposive sampling of 29 students of 7th grade in SMPN 3 Jeumpa, Bireuen Regency who have attended when the study was conducted. The instrument that is implemented to measure the level of the student's understanding is a test, while questionnaire is applied in order to measure the student's self-reliance. Besides, the

gain index (N-Gain) is calculated to determine the level of the student’s conceptual understanding and the percentage technique is also applied to determine the level of student’s self-reliance. Before beginning this study, the researcher provides pre-test to know the student’s initial capability, then it is given a treatment by applying the learning process assisted by Photomath application on SLETV materials. After the teaching and learning process is completed, it is given post-test and questionnaire to see the conceptual understanding and the student’s self-reliance in learning process.

To find out the number of grade VII students of SMP Negeri 3 Bireuen who completed learning after the teaching and learning process took place through assisted by Photomath learning on the SLETV material, it was determined by analyzing student learning completeness (individually) using the following equation:

$$\text{Learning Completeness} = \frac{\text{Total Score Obtained}}{\text{Total Score}} \times 100\% \quad (1)$$

Each student is said to be complete in learning (individual completeness) if the proportion of students' correct answers is $\geq 60\%$, and a class is said to have completed learning (classical completeness) if in the class there are $\geq 85\%$ of students who have completed their learning.

3. RESULTS AND DISCUSSIONS

This study is aimed to measure the conceptual understanding and the student’s learning self-reliance in new normal era that is assisted by Photomath on SLETV materials. Based on the data processing of the test result after conducting teaching and learning process assisted by Photomath on SLETV materials, it can be seen that there is an improvement of the students’ conceptual understanding on SLETV materials. This result is proven by the number of the questions that can be answered by the students after the process of teaching and learning. Consequently, the post-test is higher when it is compared to the students’ pre-test average. An overview of the students’ level understanding assisted by Photomath on SLETV materials can be seen in the following table:

Table 1. Overview of the Students’ Result Study

No	Value	Pretest	Post-test
1.	Highest	53	93
2.	Lowest	07	20
3.	Average	31,7	46,9
4.	Variance	121,70	137,70
5.	Standard Deviation	11,03	11,73

The improvement of the students’ conceptual understanding on SLETV materials assisted by Photomath was analyzed by means of the N-Gain calculation. This N-Gain calculation aims to determine the increase in the pre-test and post-test scores of the class under study, namely class VII SMP Negeri 3 Bireuen on the SLETV instrument material. In detail, can be seen in the detailed form below:

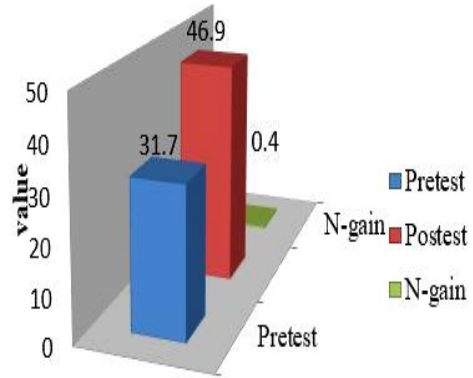


Figure 1. Improvement of Pre-test and Post-test Average and N-Gain in the Students’ Conceptual Understanding Test

Figure 1 shows that the teaching and learning process assisted by Photomath on SLETV materials can improve the students’ conceptual understanding. It can be seen from the high score of post-test average, it is 46,9 compared to the average of beginning score which is only 31,7 and N-Gain improvement reaches 0,4 with the medium improvement category.

According to the instruction of the implementation teaching and learning process in which the students will be considered that their learning process is complete when they get the score above 65% from the specified maximum score. On the other hand, based on the classical completeness, it is considered complete when 85% students get 65% score or 85% students are able to answer the questions provided above 65%. The percentage of the completeness level after teaching and learning process which is assisted by Photomath can be seen in the following table:

Table 2. Percentage Matrix of the Student Completeness

No	Category	Completeness Percentage	
		Number of Students	Percentage
1.	Complete	19	65,52
2.	Incomplete	10	34,48

Table 2 shows that the implementation of teaching and learning process assisted by Photomath can improve the students’ conceptual understanding, it can be seen

from the students' level of learning completeness in which there are 19 students or 65,52% who are able to complete SLETV materials after having teaching and learning process that is assisted by Photomath. In SLETV materials, there are some sub-concepts consisting of substitution method, elimination method, Gaus Jordan method, Cramer method, and comparative method. Data are collected by giving pre-test and post-test toward the students which consists of 15 questions. Each of those questions consists of 3 question items for each sub-subject.

The improvement of the students' conceptual understanding in 7th grade of SMPN 3 Jeumpa, Bireuen on SLETV materials is analysed through the calculation of gain index. This calculation is aimed to know the improvement of the students' value of pre-test and post-test that have been observed, that is 7th grade on SLETV materials through the teaching and learning process sustained by Photomath. Those results can be seen in Table 3 below:

Table 3. The Improvement of Students' Conceptual Understanding

No	Sub-Concepts	N-Gain	Category
1.	Substitution Method	0,01	Low
2.	Elimination Method	0,20	Low
3.	Gaus Jordan Method	0,03	Low
4.	Cramer Method	0,00	Low
5.	Comparative Method	0,66	Medium

According to Table 3, it can be seen that there is an improvement of the students' conceptual understanding after teaching and learning process supported by Photomath on SLETV materials. However, the improvement achieved by the students is included in low category and only on sub-material of comparative method the students' improvement of conceptual understanding is included in a medium category. This happens because the students may be familiar with the use of Photomath. As a result, they are able to implement Photomath well so that it influences the students' conceptual understanding.

Next, in order to find out the students' self-reliance in learning, the researcher provides the questionnaire consisting 15 statements with 4 indicator the students' self-reliance learning, they are asked to fill out that questionnaire honestly. Furthermore, their answer are then analysed in form of percentage technique. Therefore, the result analysis of the students' learning self-reliance can be seen in the Figure below:

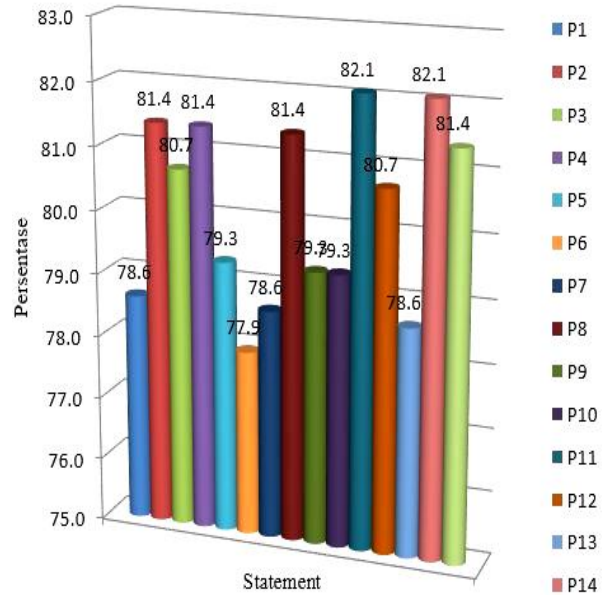


Figure 2. Analysis of the Students' Learning Self-Reliance

Where:

P1 - P4 :indicator has confidence in yourself

P5 - P8 :indicators have a sense of responsibility

P9 - P12:indicators have their own initiative

P13 - P15:indicators are happy with problem centered learning

The figure above shows that the statement with indicators of having confidence in yourself gets an average score of 80.53%. The indicator having a sense of responsibility gets an average score of 79.30%, the indicator having its own initiative gets an average score of 80.35%. The indicator of being happy with problem centered learning gets an average score of 80.70%. The average student response is in the agree category. All in all, 80% students agree with the teaching and learning assisted by Photomath.

The result of the study indicates that after implementing the teaching and learning process which is assisted by Photomath on SELTV materials, there is an improvement of the students' conceptual understanding, although that improvement is still in low category. Only on sub-material of comparative method the improvement of the students' conceptual understanding is in the medium category, it may be affected by the fact that the students' are already familiar with the use of Photomath. Consequently, the students are able to operate Photomath well, so it can influence the students' conceptual understanding. In addition, 80% students agree with the use of Photomath in the process of teaching and learning on mathematics, particularly on SELTV materials, is able to make the students more self-reliant. Because, by using Photomath, the students become more active to learn and solve all kinds of question and more competent in

taking the good advantages of smartphone. Moreover, Photomath is also able to provide answers in each mathematics question with its detailed steps. As a result, the students will easily understand each step in the completion question of mathematics. These findings are in line with the study conducted by [14] which results that there are 61% students have already operate Photomath application and this application is also able to support students in learning mathematics so that the students will easily understand and be more self-reliant to learn mathematics.

4. CONCLUSION

Based on findings and discussions explained above, it can be concluded that the teaching and learning process assisted by Photomath on SELTV materials is able to improve the students' conceptual understanding, although the improvement is still considered in the low category. Moreover, only on sub-material of comparative method, the improvement of the students' conceptual understanding is in the medium category. Furthermore, 80% students agree with the use of Photomath that can make them become more self-reliant in the process of teaching and learning on mathematics, particularly on SELTV materials. The result of this study is better to be used as such a consideration about the importance of taking advantages toward smartphone technology in teaching and learning process in order to make the students easier to get the materials, improve the result of teaching and learning process, and be able to improve the students' conceptual understanding and self-reliance in learning process.

ACKNOWLEDGMENTS

The researcher would like to thank the principal and students of SMPN 3 Jeumpa, Bireuen Regency who have facilitated this research activity so that it can be carried out well.

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