The Effect of Online Learning Using Zoom on Undergraduate Students’ Ability to Understand Mathematical Concepts

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Abstract

The purpose of this study was to find out the effect of online learning using the zoom application on statistics course towards the undergraduate students ability of Plantation Product Processing Technology Study Program at Politeknik Negeri Ketapang to understand the mathematical concepts. The study used the associative type of the quantitative research one group pretest-posttest design using the measurement technique towards the ability on understanding the mathematical concept and analysis t-test. The result showed that there was significant effect on online learning using zoom application on statistic course using 10 sample of undergraduate students towards the ability on understanding the mathematical concept.

Keywords: Mathematical Understanding, Online, Zoom,

INTRODUCTION

The condition of Covid 19 has changed the teaching and learning system, namely towards online learning. Where the teaching-learning process requires electronic devices (android cellphones or computers) as a means of learning and signals (data packages or wifi) are the infrastructure. According to Sanjaya (2020), during Covid 19 the activities were limited, so that to prepare for learning, technology was needed. The definition of online is is connected to the internet such as: youtube, instagram and others (Rosidah and Wulandari, 2019). Initially, researchers taught during covid pandemic using google classroom, but the interaction was felt to be less than optimal. It is because researchers cannot see directly the learning process that has been done by these undergraduate students. In the end, researchers used the zoom application in the teaching and learning process.

In an article written by Aprilliana (2018) using the Zooming User Interface (ZUI) media, the results showed that learning devices were categorized as valid, with completeness of learning outcomes in the cognitive domain of 86%, psychomotor domains of 87%, and the implementation of learning tools was categorized as very good with a presentation of 92%. The hope of researchers in the Covid 19 condition, by using the Zoom application in learning statistics courses to undergraduate students, especially the XII batch of Plantation Processing Technology Study Program, can have a good impact on understanding mathematical concepts.

According to Kilpatrik's opinion in Nasution (2018) the ability to understand mathematical concepts, namely: restating a concept that has been learned, using it in other examples, applying it
and comparing it by presenting it in a form of representation. According to Gilbert in Nasution (2018) the ability to understand mathematics is: being able to explain cases with different sentences, interpreting and drawing conclusions. Thus this study will measure the ability to understand mathematical concepts based on indicators: (1) working on test questions in the form of sentences or real cases to the concept of the formula, (2) finding other examples of using concepts, (3) comparing one example and another, and (4) concludes from the results of indicator (3). Based on Nasution's research (2018) that understanding mathematical concepts on the ability to use the SPSS application in statistics shows significant results, namely $H_0$ is accepted.

**METHOD**

The type of the research used associative, namely measuring the effect of online learning using the zoom application in statistics on the ability of undergraduate students to understand mathematical concepts. According to Setiawan (2017) the associative type is a study of the relationship between one (independent) variable and another (dependent) variable. There are three forms of relationship, namely: symmetric (the relationship of two variables with the same nature (parallel), casual (a cause-and-effect relationship) and interactive (the relationship between variables that influence each other). The relationship categories in this study were symmetrical relationships, namely the One Group Pretest-Posttest Design.

![Fig. 1 Research Design](image)

Information:
- X1: Pretest of the ability to understand mathematical concepts (before zooming application)
- X2: Posttest the ability to understand mathematical concepts (after zooming application)
- Y: online learning using the zoom application

From a population of 29 people selected only 10 undergraduate students of the Ketapang State Polytechnic, especially the XII batch, A class. The sample was selected randomly.

The data collection techniques and tools used were measurement by test in accordance with the indicators of undergraduate students ability to understand mathematical concepts. The test items through validation (3 experts) and trials (test validity, reliability, difficulty level and distinguishing power).

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicators</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Undergraduate students can work on test questions in the form of sentences or real cases to the concept of the formula.</td>
</tr>
<tr>
<td>2</td>
<td>Undergraduate students can find other examples in the test questions with the use of concepts.</td>
</tr>
<tr>
<td>3</td>
<td>Undergraduate students can compare examples from one another</td>
</tr>
<tr>
<td>4</td>
<td>Undergraduate students can conclude based on the results of indicator</td>
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</tbody>
</table>

The data analysis used the pretest and posttest scores. The pretest was obtained from the test score of the undergraduate students ability to understand mathematical concepts by online learning without the zoom application. The posttest was obtained from the test score of the undergraduate students ability to understand mathematical concepts by online learning using the zoom application.
Then tested for normality and homogeneity. If the distribution is normal and the variance is both homogeneous, the t-test can be used.

RESULTS AND DISCUSSIONS

During the Covid pandemic the researcher taught using the google classroom application and provided material in the form of files and gave examples of videos on YouTube.

Based on the observation during teaching learning process, the undergraduate students lack interaction in the teaching-learning process. Then the learning activities were invisible, so it can reduce their ability to understand mathematical concepts. The researcher conducted online learning steps using the zoom application as a tool in the teaching and learning process.

The test to investigate the undergraduate students' ability to understand mathematical concepts in the descriptive analysis material, namely the average concept. The form of test items based on indicators of the ability to understand mathematical concepts can be seen in Table 2.

*Table 2. The Pretest and Posttest Items*

<table>
<thead>
<tr>
<th>Test Items</th>
<th>Indicator</th>
<th>Test Assessment Indicators</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>The lecturer brings 10 bags of sweet oranges each 1 kg. If there are 10 college undergraduate students who will be distributed sweet oranges are as follows: A gets 1 kg = 8 pieces</td>
<td>Undergraduate students can calculate results based on fruit size, with the concept of mean.</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>Undergraduate students can calculate the results with the</td>
<td>45</td>
</tr>
</tbody>
</table>
(category: 6 medium fruit and 2 small fruit)
B gets 1 kg = 10 pieces
(category: 5 medium fruit and 5 small fruit)
C got 1 kg = 12 pieces
(categories: 1 large fruit and 11 small pieces)
D gets 1 kg = 6 pieces
(category: large fruit all)
E gets 1 kg = 8 pieces
(category: 6 medium fruit and 2 small fruit)
F gets 1 kg = 8 pieces
(category: 6 medium fruit and 2 small fruit)
G got 1 kg = 11 pieces
(category: 2 large and 9 small pieces)
H gets 1 kg = 10 pieces
(category: 5 medium fruit and 5 small fruit)
I got 1 kg = 7 pieces
(category: 6 medium fruit and 1 large fruit)
J gets 1 kg = 8 pieces
(category: 6 medium fruit and 2 small fruit)

Note: Suppose that each orange has 10 contents
In order to be fair to combine the sweet oranges, then distribute them equally and generously! Observe which part belongs to the concept of average (weight of sweet oranges or lots of sweet oranges)? What if both mean the concept of mean is used? After that, give an explanation!

Posttest questions
The lecturer brings 10 bags of sweet oranges each 1 kg. If there are 10 college undergraduate students who will be distributed sweet oranges are as follows:

A gets 1 kg = 7 pieces
(category: 5 medium fruit and 2 large fruit)
B gets 1 kg = 7 pieces
(category: 5 medium fruit and 2 large fruit)
C got 1 kg = 20 pieces
(category: all small fruit)
D gets 1 kg = 7 pieces

concept of mean without fruit size.
Undergraduate students can use the average concept but do it wrongly. 20

Indicator (2)
Undergraduate students can find the average computation of the weight of an orange and practice the calculation. 15
Undergraduate students can find the average calculation of the weight of an orange without practicing the calculation. 10
Undergraduate students were able to relate this but did not determine the concept of mean weight of citrus fruit. 5

Indicator (3)
Undergraduate students can compare the number of oranges and the weight of oranges, according to the concept of mean with the calculation. 15
Undergraduate students can compare the number of oranges and the weight of oranges according to the concept of average without calculation. 10
Undergraduate students were able to relate to but not compare the concept of mean weight of oranges. 5

Indicator (4)
Undergraduate students can deduce the concept of the average weight of citrus fruit and size of citrus fruit. 20
Undergraduate students can deduce the average concept from one of the weight of an orange or the size of a citrus fruit. 10
(category: 5 medium fruit and 2 large fruit)
E gets 1 kg = 8 pieces
(category: 6 medium fruit and 2 small fruit)
F gets 1 kg = 8 pieces
(category: 6 medium fruit and 2 small fruit)
G got 1 kg = 18 pieces
(category: 2 large and 16 small pieces)
H gets 1 kg = 10 pieces
(category: 5 small and 5 medium fruits)
I got 1 kg = 10 pieces
(category: 5 small and 5 medium fruits)
J gets 1 kg = 7 pieces
(category: 5 medium fruit and 2 large fruit)
Note: Suppose that each orange has 10 contents
In order to be fair to combine the sweet oranges, then distribute them equally and generously! Observe which part belongs to the concept of average (weight of sweet oranges or lots of sweet oranges)? What if both mean the concept of mean is used? After that, give an explanation!

<table>
<thead>
<tr>
<th>Table 3. Results of Pretest and Posttest</th>
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<tbody>
<tr>
<td>Indicator</td>
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<td>(1) Score: 50</td>
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<tr>
<td>Pretest</td>
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<tr>
<td>A</td>
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<td>B</td>
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<td>C</td>
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<tr>
<td>Y</td>
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<td>Z</td>
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</table>
Based on the results of Table 4, the pretest of the undergraduate students ability to understand mathematical concepts before using the zoom application on the average concepts obtained by the analysis that, (1) the average undergraduate students can work on test items in the form of sentences or real cases to the concept of the formula with a score of 35 from 50 (70%), (2) the average undergraduate students found other examples in the test items using the concept of obtaining a score of 8 out of 15 (53.3%), (3) the average undergraduate students compared between samples one and the other with a score of 5 out of 15 (33.3%) and (4) the average undergraduate students can conclude based on the results of indicator (3) with a score of 6.5 out of 20 (32.5%).

Based on the results of Table 5, the pretest of undergraduate students ability to understand mathematical concepts before using the zoom application on the average conceptual problem obtained by the analysis that, (1) the average undergraduate students can work on test items in the form of sentences or real cases to the concept of the formula with a score of 45.5 out of 50 (91%),
(2) the average undergraduate students found other examples in the test items using the concept of obtaining a score of 8 out of 13.5 (90%), (3) the average undergraduate students comparing between one example and another with a score of 9 out of 15 (60%) and (4) the average undergraduate students can conclude based on the results of indicator (3) with a score of 16 out of 20 (80%).

The results of the normality test based on Kolmogorov-Smirnov obtained sig = 0.200 (pretest test) and sig = 0.025 (posttest test), when compared with significance 5% (0.05) then the pretest sig test is higher while the posttest sig test is lower, so it can be concluded that the pretest test data is normally distributed while the posttest test is not normally distributed. The results of the normality test based on the Shapiro-Wilk obtained sig = 0.720 (pretest test) and sig = 0.060 (posttest test), when compared with the significance of 5% (0.05), the pretest and posttest sig tests are higher, so it can be concluded that pretest and posttest are normally distributed.

The results of the homogeneity test between the pre test and posttest tests using the SPSS 17 program. The results showed that the Levene's Test sig = 0.966, when compared with the significance of 5% (0.05) it is higher. So it can be concluded that the pretest and posttest tests are homogeneous.

To measure the effect using the paired t-test, the data are normally distributed and homogeneous, then determine the formulation of the hypothesis.

Research Hypothesis Formulation:
Ho = There is no average difference between the pretest and posttest results, meaning that there is no effect of online learning using zoom on the test of the ability to understand mathematical concepts.

Ha = There is an average difference between the results of the pretest and posttest, meaning that there is an effect of online learning using zoom on the test of the ability to understand mathematical concepts.

The correlation value between the pretest and posttest tests, with a result of 0.330 means that the relationship is weak and positive. The result of the Paired T Test = 0.002, when compared with the significance of 5% (0.05) it is lower, it means that there is an average difference between the results of the pretest and posttest tests. So that there is an effect of online learning using zoom on the test of the ability to understand mathematical concepts or H₀ rejected and Hₐ accepted.

CONCLUSIONS
Based on the results and discussion that has been analyzed Hₐ are accepted. There is a significant effect of online learning using the zoom application in statistics on the ability to understand mathematical concepts in 10 samples of Ketapang State Polytechnic undergraduate students in the Plantation Product Processing Technology Study Program XII batch.

REFERENCES


