Analysis Strategy Online Learning of Applied Mathematics at Civil Engineering of Politeknik Negeri Malang

Mutia Lina Dewi[1, a)], Rif'atul Khusniah[1,b)], Rofila El Maghfiroh[1, c)]

[1]*Politeknik Negeri Malang, Indonesia*

[a)]*mulinde13@gmail.com*
[b)]*rifatulkhusniahkurniawan23@gmail.com*
[c)]*rofila.elma@gmail.com*

Abstract. This study used a qualitative approach with the object of research was the second semester students of the Construction Engineering Management for the 2021/2022 academic year, class 1TRKJJ1 as the research subject. The research instrument consisted of test scores, questionnaires, and discussions between mathematics lecturers from the other departments. The purpose of this research is to find the online mathematics learning strategy. The results showed that the average score of the mathematics test for class 1TRKJJ1 was Test 1 = 98 by random multiple choice questions and Test 2 = 76 by essay questions. Many students cheat, it can be seen from the same answers. Mathematics lecturers are required to provide a variety of applications, correcting carefully because many answers are correct but the process are mistakes due to writing errors. The results of the mathematics lecturer's questionnaire were 42.9% math allocation 2 hours/semester, 85.7 % zoom meetings, 71.4% making learning videos, 0% you tube, 71.4% discussing questions with student presentations, 100% experiencing internet network problems, and 57.1% giving essay test questions. The results of the discussion between mathematics lecturers about assessment were that students presented individual presentations when answering practice questions, different test questions, handwritten answers, many questions are given, and students choose their own questions, each answer has the student's signature. The learning strategy are (1) use various applications such as zoom, google. meet, and google classroom, (2) use application facilities such as white board, share, and video, (3) give a test with different questions and handwritten.

INTRODUCTION

Almost two years of the covid-19 outbreak coming in the world, many victims, vaccine administration is in progress but the outbreak does not know when it will end. It's not easy teaching math during a pandemic. In normal times, many students have difficulty in mathematics. Lecturers are required to provide appropriate models, strategies, and learning methods during the COVID-19 pandemic. Various learning models had been provided as an effort to improve students' abilities, such as the Polya Model (Dewi, 2005); STAD Cooperative Learning Model (Mudjiono, 2006); and Jigsaw (Dewi, 2009); and Mathematical Incubation (Dewi, 2019); with students as research objects. All of these learning models are in normal times, no Covid-19 outbreak. During the Covid-19 pandemic, there was leadership suggestion to use the LMS (Learning Management System) application facilitated by the institution. Unfortunately, this LMS has many problems, especially interruption network, and frequent errors. Therefore, there are many variations of applications used by lecturers starting from SMS, email, whatsApp, zoom, google meet, and google classroom. This study aims to find an online learning strategy for Applied Mathematics during the COVID-19 pandemic. Data collection from the results of questionnaires, test scores, and discussions with mathematics lecturers. The expected benefits are that mathematics lecturers teach easily according to the curriculum targets and students enjoy learning Applied Mathematics.

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RESEARCH METHODS

The focus of this research is to find the online learning strategy of Applied Mathematics during the Covid-19 pandemic. Thus, relevant research is qualitative approach. This is because the study focuses on the acquisition of data that is factual, natural, and more directed to the process than the result. According to Bogdan and Biklen (in Mujianto: 2007) states, that qualitative research has characteristics: (1) natural, (2) researcher as the main instrument, (3) descriptive, (4) more verbal data, (5) more emphasizing on the process than the outcome, and (6) the analysis is inductive. The design of this study uses Classroom Action Research (PTK), because the research is conducted based on the problem of learning in the class.

The presence of researchers in this study is very important, because they act as teachers, observers, and data collectors. To obtain optimal observation, field notes are added. Thus there are no missing data which may be useful for supporting research problem solving.

The data collections in this research are as follows: (1) the results of a questionnaire about the online learning process, (2) the results of math test scores using Google Form, and (3) sharing with mathematics lecturers from the other department by Zoom Meeting. The data source of this research is one class out of seven classes of D4 Civil Engineering students, which is 1TRKJJ1 in even semester of 2020/2021. This is based on the consideration, that this class schedule goes first as Monday.

Data analysis was performed using qualitative data analysis techniques developed by Miles and Huberman (in Mujianto: 2007) consisting of three steps of activities performed sequentially are reducing data, presenting data, and draw conclusions and verify data. The description is as follows.

1. Reduce Data

   Reduce the data is an activity to do the selection and simplification of all data from the beginning to the preparation of reports in order to obtain accurate conclusions.

2. Presentation of Data

   The presentation of data is done by arranging the narrative reduction result, which is described in verbal sentences so as to enable to make conclusion and take action.

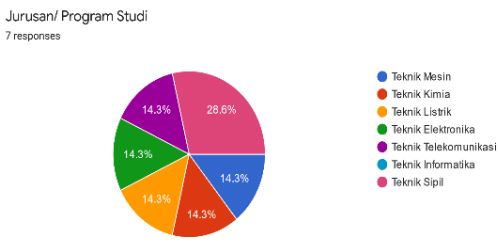
3. Conclusions and Verify Data

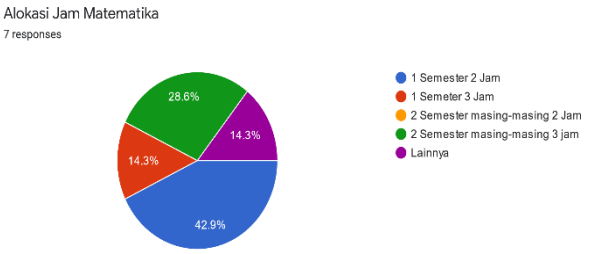
   Drawing conclusions is an activity in giving conclusions to the results of interpretation and evaluation. This activity includes searching the meaning of data along with explanation, while data verification is an activity to test the validity of data

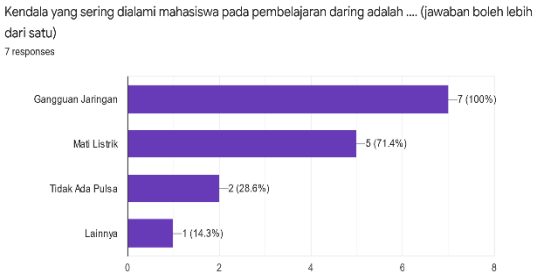
RESULTS AND DISCUSSION

The results of the mathematics lecturer's questionnaire for all majors are as follows:

Conclusion







The results of Mustakim's research (2020) stated that students rated learning using media as very effective (23.3%), most of them rated it as effective (46.7%), and rated it as average (20%). For mathematics, it is not easy to provide online learning. There are many problems, such as limited exercises and material, time allocation, network interruption, and others. Fitriyani (2020) stated that in the midst of the covid-19 pandemic that hit the world, there was no reason for students to have high learning motivation.

At the Civil Engineering Department, mathematics is given one semester with an allocation of 2 hours/week with the subjects of Real Number System, Determinant, Equation, Trigonometry, Geometry, Derivative, and Integral. During online learning, use the zoom meeting and google classroom. There are many problems but online mathematics learning must continue with all the lack. Lecturers are required to choose the appropriate learning strategy during a pandemic. Online learning is a dilemma for mathematics lecturers, a difficult and unfavorable situation. When learning in class, many students have difficulties in solving math problems, especially virtually with many limitations. This is a challenge for mathematics lecturers, how to improve students' abilities during a pandemic. According to the Indonesian Dictionary, the meaning of a dilemma is a difficult situation that requires people to make a choice between two possibilities that are both unfavorable; difficult and confusing situations. Research results (Irfan, 2020); who stated that the most widely used system-based learning management platform was google classroom, zoom video conferencing was the second choice, while the LMS on campus was less attracited to lecturers.

The results of the discussion of the mathematics lecturer from the Department of Civil Engineering, Electrical Engineering, Mechanical Engineering, and Chemical Engineering obtained the following suggestions.

1. Students answer practice questions with individual presentations one by one.
2. The questions are made differently based on the NIM number or attendance number
3. If there is the same answer that is corrected, the one who collects it first
4. Answers are handwritten
5. The questions are given many number, students choose the questions themselves.
6. Answers are sent via email with a time limit.
7. Each answer has the student's signature.
8. Different questions for each student

CONCLUSION

Based on the description of the research results above, the conclusions are described as follows.

1. Online learning of applied mathematics in the Civil Engineering through zoom meetings and google classroom.
2. Assessment based on presentation of practice questions, test scores, and assignments. The form of multiple choice and essay tests with on camera provisions and time restrictions.
3. The average results of the math test scores for class 1TRKJJ1 are Test 1 = 98 random multiple choice questions and Test 2 = 76 essay questions.
4. The results of the mathematics lecturer's questionnaire (7 respondents) were taken from the largest percentage, obtained as follows.
   42.9% math allocation 2 hours/ semester
   85.7% online learning through zoom meeting
   71.4% make learning videos
   0% you tube
   71.4% discussion of questions with student presentations
   100% experiencing internet network problems
   57.1% gave essay test questions
5. The results of the discussion between mathematics lecturers about assessment are students presenting individual presentations when answering practice questions, different test questions, handwritten answers, if there is the same answer, it is corrected to collect it first. questions are given, quite a lot of students choose their own questions, answers are sent via email, each answer has the student's signature.
6. The learning strategy is (1) use various applications such as zoom, google. meet, and google classroom, (2) use application facilities such as white board, share, and video. (3) give a test with different questions and handwritten answers.

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