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Needs Analysis for the Development of Mathematics Statistics I-Module Based on Schematic Representation

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Abstract
The purpose of this study was to analyze the need to develop a teaching material needed in mathematics statistics lectures I. This study used a qualitative descriptive method oriented to the development of a product. The subjects of this study were fourth semester mathematics education students who were taking mathematics statistics course I and lecturers of the mathematics education study program at the Muhammadiyah University of Metro. The research instrument used a questionnaire distributed using a google form. Data analysis was carried out with the stages of data reduction, data presentation, and drawing conclusions. The results obtained in this study are: 1) 61.5% of respondents stated that in mathematics statistics I lectures the lecturers have not used e-modules.

Keywords: E-Module, Mathematical Statistics I, Schematic Representation

1. Introduction

In learning mathematics in 21st century, students are expected to be able to have four skills which are often referred to as the 4Cs, namely creativity, critical thinking, collaboration and communication skills. By mastering these four skills, it is expected to have good skills in problem solving (As'ari, 2016). As prospective mathematics educators, students of the mathematics education study program must also be required to master these four skills. Therefore, in the lecture process they must also be involved in learning that leads to the mastery of the four skills.

One of the learning resources that can facilitate students in developing 21st century skills is an electronic module (e-module). Electronic modules are independent teaching materials that are systematically arranged into the smallest learning to achieve certain learning objectives which are presented in electronic form that is self instruction, self contained, stand alone, adaptive, and user friendly which contains one learning material (Prasetyowati & Tandyonomanu, 2015). In addition, the electronic module can display text, images, animations, and videos through electronic devices such as computers. Electronic modules can reduce the use of paper in the learning process. Electronic modules can also be used as an alternative to efficient and effective learning, as well as interactive. The existence of e-modules is expected to be a new source of learning for students which are then expected to improve understanding of concepts and learning outcomes (Putra, et al. 2017).

The results of field observations show that the learning resources used in the study of mathematics statistics course I still contain general material and have not provided a guide in the use of representations in building concepts and solving mathematical problems. So it is very necessary to arrange electronic modules (e-modules) to facilitate students in building concepts and ability to solve mathematical problems in the field of mathematical statistics using mathematical representations, especially during the COVID-19 pandemic. Because during the COVID-19 pandemic, lectures are held online, so learning resources in electronic form are needed that are easy to access and use anywhere.

The electronic module of mathematics statistics I based on schematic representation is a module that contains materials of mathematics statistics I, which are arranged electronically and accompanied by steps for solving problems and inculcating concepts using schematic representations. Schematic representation is a very important tool for solving complex problems, because students can illustrate the content of the problem in schema form (Fagnant & Vlassis, 2013). according to Hegarty & Kozhevnikov (1999), Thevenot & Barrouillet (2015) By using a schematic representation, students can extract the main data and find out the relationships between the information presented in the problem.

2. Method

This study uses a qualitative descriptive method oriented to the development of a product. The subjects involved in this study were fourth semester mathematics education students who were taking mathematics statistics course I and lecturers in mathematics statistics courses I. Students and lecturers were asked to fill out a questionnaire containing questions related to the need for e-module development based on schematic representation. Data analysis used in this study includes three things, namely data reduction, data presentation, and drawing conclusions.

This study begins with data collection by collecting the results of the questionnaire from the research subject. Furthermore, the collected data is reduced by classifying, directing, and removing unnecessary things in order to obtain data that is ready to be concluded. Next, describe the data that has been classified by taking into account the focus and objectives of the research. Finally, conduct a final analysis and conclude the results of the research in the form of a research report.

3. Results and Discussion

The needs analysis is based on the existing conditions in the mathematics education study program, Muhammadiyah University of Metro. This analysis is needed to find out whether or not it is necessary to develop an e-module of mathematics statistics I based on schematic representation. This needs analysis is carried out by providing a questionnaire that utilizes the google form. The subjects involved in this study were fourth semester mathematics education students who were taking mathematics statistics course I and several lecturers in the mathematics education study program at the Muhammadiyah University of Metro.
The results of filling in the questionnaire obtained the following data:

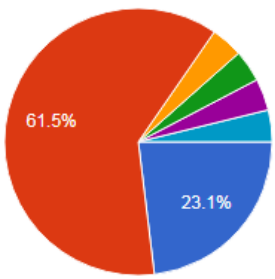

Diagram 1: What is the percentage of responses in the Mathematics Statistics I course already using the module?

Diagram 1 shows that 61.5% of respondents providing information on mathematics statistics I lectures have not used e-modules in the lecture process. In addition, information was obtained that in the lecture the lecturer used a summary of the material which was completed with student worksheets (Diagram 2). This is in accordance with the response of respondents who stated that the mathematics statistics lecture I used student worksheets.

Diagram 2: Percentage of responses what teaching materials are used in the course of Mathematics Statistics I.

The e-module that will be developed specifically contains materials in the scope of mathematical statistics I. This is done so that the resulting e-module will be more focused. Anderson (1987: 169-172) states that too much material in a lesson tends to reduce students' interest in learning and cause boredom.

Furthermore, it is very necessary to develop modules used in mathematics statistics lectures I. In accordance with the responses from respondents a number of 100% want the development of e-modules in mathematics statistics lectures I (Diagram 3). In line with the results of this study Ghavifekr & Rosdy (2015: 189) reveal that the use of information and communication technology (ICT) in the learning process aims to improve the learning methods and approaches that students want to achieve effective learning activities and to meet the challenges of 21st century teaching skills, namely creativity (creativity), critical thinking skills (critical thinking), cooperation (collaboration) and communication skills (communication).

Diagram 3: Percentage of responses Is it necessary to arrange an e-module of mathematics statistics I as a lecture teaching material?

In this study, the e-module that will be developed is the e-module of mathematical statistics I based on schematic representation. The schematic representation was chosen with the consideration that it can provide assistance to students in the process of understanding concepts and solving problems (Diagram 4). This is in line with some research results (Anwar, et al., 2019) reveal that mathematical representations can be considered as an important source for reducing word problem difficulties so that student success in solving word problems increases. The use of mathematical representations can reduce difficulties and help students succeed in solving word problems. This is also supported by respondents who stated that the e-module that will be developed provides instructions with certain strategies.

Diagram 4: What is the percentage of response agree if the modules compiled provide instructions with certain strategies in solving problems.

4. Conlusion

Based on the research carried out, the following results were obtained: 1) 61.5% of respondents stated that in mathematics statistics I lectures the lecturers had not used e-modules. 2) 100% of respondents stated that it was necessary to develop an e-module of mathematics statistics I which provided directions or strategies in understanding concepts and solving problems.

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