

Analysis of Student Needs for Development of Innovative Learning Media E-Module on Linear Equations Mathematical Physics

Shella Maryani^{1*}, Astalini², Dwi Agus Kurniawan³^{1, 2, 3} Universitas Jambi, Indonesia

Corresponding Author ✉ shellamaryani27@gmail.com

ABSTRACT

One of the teacher's roles as a learning resource is that it is hoped that the teacher can create a learning resource that can facilitate students in the learning process. This study aims to analyze student needs for learning resources for Mathematics Physics I on Linear Equation material. The method used is a mix method research with an explanatory design research design. The results of this study indicate that the student's need for e-modules in the category of moderate need has a percentage of 7.1%, in the category of need it has a percentage of 28.6%, while the category in dire need obtains a percentage of 64.3%. The results of the quantitative data are supported by the results of interviews that Physics education students have obstacles in learning Mathematics Physics I, including the difficulties of students in understanding literature in foreign languages and understanding the concepts. Therefore, the development of the E-Module in Mathematical Physics on Linear Equation material must be carried out, in order to solve the problem of student difficulties in understanding the topics of discussion that are presented in general. So it is hoped that with this research, there will be follow-up research in the form of developing E-Module-based teaching materials on the Linear Equation material for the Mathematics Physics I course

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INTRODUCTION

Education is a conscious effort to create a learning atmosphere while the learning process aims to make students actively develop their achievements to have spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, the nation's community and the state (Nadeak, 2019). The learning process will take place well, if the teacher uses technology as a learning medium, because the use of technology as a learning medium will make it easier for teachers to deliver material (Shahrial et al., 2019:167). Learning can involve two parties, namely students as learners and teachers as facilitators. The most important thing in learning activities is the learning process (Riyana, 2012). In implementation Current learning needs to be supported by technology-based learning media because it can make students adapt to the current developments in the IT field (Hendri and Anugrah, 2019:274).

The rapid development of technology has an impact on education. The use of technology in education can realize quality education (Sudarsana et al, 2018). The quality of education is something that must be considered and strived to be achieved (Judge, 2017: 22). One of the efforts in achieving school quality is learning facilities which are facilities and infrastructure used by educators in the teaching and learning process so that they can achieve educational goals (Azhari, 2016: 27). The aims and functions of education which have been described in Law no. 20 of 2003 concerning the national education system, which aims to prepare a better generation of the nation (Sujana, 2019:30). One way to prepare a better generation of the nation is to pay attention to the role of the teacher.

The teacher is the main pillar in the implementation of education. One of the teacher's roles as learning resources will be closely related to the teacher's ability to master the existing subject matter (Yestiani & Zahwa, 2020: 42). These abilities will support the role of teachers in the 21st century. The demands of the 21st century, which consist of (1) life and career skills, (2) learning and innovation skills, and (3) information media and technology skills (Septiana, 2018:442). Teachers in the 21st century will face more complex work challenges, one of which is to improve the quality of higher education (Andriani, 2010: 78). 21st century teachers must have knowledge as well as skills in using various technological devices, both traditional and modern to facilitate learning and improve learning outcomes (Rahmadi, 2019: 65). One of the learning media that utilizes the role of technology is e-module (Okdriani & Fauzi, 2019:1)

E-modules are electronic-based teaching materials that can be used as learning resources. Learning resources are everything that can facilitate students in obtaining a number of information, knowledge, experience, and skills in the teaching and learning process (Darmaji et al. 2019:5). According to Yusuf et al (2020) the advantages of e-modules make students able to learn independently, interactive learning, user friendly display, easy access using the cloud, practical to read, and do not require paper as printed media. text, images, games and animation (Putra, Wirawan, and Pradnyana, 2017:45). So that e-module can be a learning media that helps students during the teaching and learning process (Haspen & Syafriani, 2020:1).

Mathematical physics is a combination of physics and mathematics subjects which are compulsory subjects for physics education students with the aim that students have the ability to formulate various physical processes into mathematical statements and be able to solve them analytically, quantitatively, and predictively. on the model of reasoning formulated in advance (Ellianawati & Wahyuni, 2012: 34). According to research conducted by Saputri et al., (2019:16:8) Lack of students' understanding of the material and problems provided is the cause of low student motivation. One of the solutions to motivate students to learn Mathematics Physics is to create teaching materials in the form of E-modules so that students can study independently, interactive learning, user friendly display, easy access to the cloud, practical to read, and does not require paper as media. Print (Yusuf et al. 2020).

From the preliminary statement that has been described, the researcher intends to see how the level of students' need for the E-Module in mathematics physics I. Therefore, the researcher intends to conduct a study entitled "Analysis of Student Needs Against the Development of Innovative Learning Media E-Module on Linear Equation Materials in Mathematics Physics"

METHOD

The research method used in this research is a mix method research method. Mix method research is research that uses qualitative data and quantitative data (Masrizal, 2011). With an explanatory design research design, which begins with quantitative data analysis using descriptive quantitative techniques, followed by an explanation and elaboration of the quantitative findings using qualitative data collections that have been obtained with qualitative techniques (Isnaeni & Kumaidi, 2015). This research was conducted in July-August 2021 for the Physics Education Study Program, Faculty of Teacher Training and Education, Jambi University for students of the Jambi University Physics Education study program. The subject of this research is the 2019 Jambi University Physics Education Student who has or is contracting the Mathematics Physics I course. The sampling technique used is the total sampling technique where the researcher conducts research on all samples where the research sample is the Jambi University physics education student.

This data was obtained from filling in quantitative data in the form of a needs analysis questionnaire and qualitative data in the form of interviews as supporting data from quantitative data. This research is an initial observation in the development of the E-Module in Mathematical Physics I material on Linear Equations. The initial observations made by the researchers aimed to determine the constraints felt by the research subjects on the need for additional teaching materials in the form of e-modules. Research questionnaires in the form of questionnaires and interviews with research subjects are research instruments used to determine the follow-up efforts to handle the problems expected by research subjects regarding the need for additional teaching materials for students in the Linear Equation material for the Mathematics Physics I course.

Data analysis uses the Mix Method, so that the data obtained from qualitative and quantitative data. Qualitative data were obtained from interviews with students while quantitative data were analyzed using descriptive statistics, where this quantitative data represents a class because each class contains many analytical approaches that can be further divided into certain types of analysis. Quantitative data from this study was obtained from questionnaires. The questionnaire used by the researcher used a Likert scale approach. The Likert scale used as a rating scale, has criteria Strongly Agree (SA)

= 5, Agree (A) = 4, Disagree (D) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1 (Pranatawijaya et al., 2019).

Table 1. Student Needs Analysis Questionnaire

No.	Indicator	No. Item
1	Student Difficulties in mathematics physics lecture material I	1, 2
2	The need for learning simulation	3
3	Instructional Media	4
4	Learning media development	5
5	Interesting learning media	6

Table 2. Range of Student Needs Analysis Questionnaire

Range	Criteria
6 - 10.8	Really Don't Need
10.9 - 15.6	No need
15.7 - 20.4	Enough
20.5 - 25.2	Need
25.3 - 30	Really Need

In the analysis of quantitative data for interviews with informants, the questions are as follows:

Table 3. Interview Grid

No.	Indicator	No. Item
1	Following the process of mathematics physics lectures I	1, 2, 3
2	Teaching materials used in lectures	4, 5
3	Constraints or problems in lectures	6, 7
4	Solutions expected by lecture participants	8
5	If a module is made, what kind of module is expected by the lecture participants?	9, 10, 11, 12

RESULT AND DISCUSSION

There are already teaching materials for the Mathematics Physics I course used during the teaching and learning process by physics education students at the University of Jambi, namely a book entitled *Mathematical Methods in the Physical Sciences* written by Mary L, but the teaching materials are written in English, therefore, The researcher intends to conduct preliminary research in the form of initial observations to see the student's needs for the Mathematics Physics I teaching material on the Linear Equation material.

By observing and observing during the Mathematics Physics I lectures, it is known that there are several obstacles felt by students, to analyze the truth of the data, the researcher intends to analyze student needs for teaching materials in the form of E-modules in Mathematics Physics I by distributing research instruments in the form of quantitative data and data. qualitative. The quantitative data in the form of questionnaire data analysis of student integrity which consists of 6 statements. The results of data analysis using descriptive statistics. The results of the student needs analysis are explained in table 4.

Table 4 of Results of Quantitative Data Analysis of Student Needs

Interval	(%)	Category
6.0 - 10.8	0%	Very Unnecessary
10.9 - 15.6	0%	No Need
15.7 - 20.4	7.1%	Just Need
20.5 - 25.2	28.6%	Need
25.3 - 30.0	64.3%	Really Need

Based on the descriptive statistical analysis table regarding the analysis of student needs, it was found that in the interval 15.7 – 20.4 with the category of moderate need having a percentage of 7.1%, at intervals of 20.5 – 25.2 with the category needing having a percentage of 28.6%, while at intervals of 25.3 – 30.0 with category desperately need to get a percentage of 64.3%. From this statement, it can be seen that physics education students for the Class of 2019 need teaching materials in the form of e-modules in the Linear Equations material for the Mathematics Physics I course.

After analyzing quantitative data, the next researcher will conduct qualitative data analysis. Qualitative data analysis serves as a supporting material for the results of quantitative data. Quantitative data were obtained from the results of interview instruments to students regarding the needs of students with teaching materials. The samples used in the interviews were 3 students representing the three categories of assessment intervals. From the results of these interviews, it can be summarized in table 2 regarding the results of the interviews of student needs analysis.

Table 5. Results of interviews with students

No	Question	Answer
1	Have you taken mathematics physics class I?	Yes
2	Is this the first time you have attended a physics-mathematical class I?	Yes
3	How many times have you attended physics and mathematics class I?	16 Meetings
4	Do you have literacy in mathematics physics class I?	Yes, namely the book entitled Mathematical Methods in the Physical Sciences written by Mary L
5	What do you think about the literacy used in mathematics physics lectures I?	Easy to understand but having problems translating into Indonesian It's hard to understand because it's in English Easy enough to make me understand
6	Do you have any problems or problems during the physics lecture of mathematics I?	Constrained Not
7	What is one of the obstacles or problems in mathematics physics lectures I?	Difficult to understand in analyzing questions Lack of understanding the concept of using

8	What do you expect from mathematics physics teaching materials I?	equations There should be other teaching materials in Indonesian More creative to make it more interesting Better teaching materials so they are easy to understand
9	Would you like it if the physics of mathematics I was in the form of an electronic module?	Yes
10	What do you think if mathematics physics I was made an electronic-based lecture module?	I agree to make it easier to learn Very helpful Very interesting
11	If there is an electronic module in mathematics physics I, what do you think can help the process of studying mathematics physics I?	Yes Very helpful
12	If there is an electronic module in mathematics and physics I, what do you expect from the electronics module?	The teaching materials are made more interesting so that they are more enthusiastic to learn Speaks Indonesian and can be understood easily Can explain in detail and easy to understand

Based on the descriptive statistical analysis table regarding the analysis of student needs, it was found that in the interval 15.7 – 20.4 with the category of moderate need having a percentage of 7.1%, at intervals of 20.5 – 25.2 with the category needing having a percentage of 28.6%, while at intervals of 25.3 – 30.0 with category desperately need to get a percentage of 64.3%. From this statement, it can be seen that physics education students for the Class of 2019 need teaching materials in the form of e-modules in the Linear Equations material for the Mathematics Physics I course.

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Based on the results of interviews with Physics education students, various results were found, the results of these interviews are summarized in table 4. From the results of the analysis there are student obstacles in learning Mathematics Physics I, including student difficulties in understanding literature in foreign languages and understanding concepts. This supports the results of the quantitative data that has been carried out, which shows that in the category of moderate need it has a percentage of 7.1%, in the category of need it has a percentage of 28.6%, while the category in dire need obtains a percentage of 64.3%. Learning media are all forms of physical equipment designed in a planned manner to convey information and build interaction (Yaumi, 2018).

The limitations of print media such as student textbooks in their effective use open opportunities for the integration of a supplementary teaching material with the latest information technology to support the achievement of 21st century skills (Kimianti and Prasetyo, 2019). According to Rahmawati et al (2020) The quality of the development of learning tools used by teachers must pay attention to many aspects in their preparation. Therefore, learning tools must be designed appropriately and in line with the learning objectives to be achieved. Learning resources are anything that can facilitate students in obtaining a number of information, knowledge, experience, and skills in the teaching and learning process (Darmaji et al, 2019).

Therefore, the development of the E-Module in Mathematical Physics on Linear Equation material must be carried out, in order to solve the problem of student difficulties in understanding the topics of discussion that are presented in general. Many factors cause students to have difficulty understanding the material of Physics Mathematics I, these difficulties include the explanation of formulas and less detailed material, the use of formulas in examples and practice questions is still difficult to understand when related to physical phenomena, difficulty understanding the meaning of writing on teaching materials in English, English and the lack of references or teaching materials that support the main book.

CONCLUSION

This study has conclusions from the analysis of quantitative data and qualitative data. In the quantitative analysis of student needs questionnaires, it was found that the moderate need category had a percentage of 7.1%, the needy category had a percentage of 28.6%, while the urgently needed category got a percentage of 64.3%. The results of the quantitative data are supported by the results of interviews that physics education students have obstacles in learning Mathematics Physics I, including students' difficulties in understanding literature in foreign languages and understanding concepts. Therefore, the development of the E-Module in Mathematical Physics on Linear Equation material must be carried out, in order to solve the problem of student difficulties in understanding the topics of discussion that are presented in general.

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This research was conducted by Shella Maryani (SM), Astalini (A), and Dwi Agus Kurniawan (DAK). SM has conducted research and processed the data, and then completed the revision process in improving the manuscript

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