The Need Analysis for Developing Digital Teaching Materials Based on Case Method in the Basic Physics Course for PESP Students of the FMIPA Bilingual Program of Unimed

Motlan[1], Karya Sinulingga[2], Jurubahasa Sinuraya[3],Albert Pauli Sirait[4]

{ motlan@unimed.ac.id[1], Karyasinulinggakarya@yahoo.co.id[2], jurubahasa@unimed.ac.id[3], albertpaulis@gmail.com[4] }

State University of Medan, Willem Iskandar Road.. Deli Serdang, North Sumatra[1234]

Abstract. The purpose of this study was to determine the needs of students regarding the availability of digital teaching materials based on the case method in the General Physics course. This study is a qualitative study that uses a questionnaire instrument to obtain research data. Based on the needs questionnaire analysis results, the author concluded that on average students stated that there was a significant need to develop digital teaching materials based on the case method in the General Physics course for PESP Bilingual Program students. The development of digital teaching materials for the General Physics course based on the Case Method is expected to overcome difficulties in understanding the material, increase interest in learning, and meet the demands of the OBE-based curriculum and the development of technology-based teaching materials in English.

Keywords: Digital Book, Case Method, General Physics, OBE.

1 Introduction

21st-century education is marked by the era of the Industrial Revolution 4.0 which provides big data that has facilitated the use of digital teaching materials (BAD) and Case-Method (CM) programs which ultimately facilitate the implementation of Outcome Based Education (OBE). BAD, CM and OBE are three keywords that have received a lot of attention from educators lately. The development of the curriculum in learning technology and the significant shift in learning paradigms from teacher-centered to student-centered as well as rapid developments in internet capacity require lecturers to facilitate digital-based learning devices (teaching materials). These digital-based teaching materials can be easily accessed by students without being limited by space and time. The independent learning curriculum of the independent campus (MBKM) which gives students the freedom to take courses at other universities and from industry will also be greatly assisted by the availability of these digital-based learning devices.

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BAD is a learning resource that is produced, distributed and applied with the support of information and communication technology (ICT). BAD must be used by lecturers and students to significantly improve learning. This BAD category includes presentation materials such as powerpoint (PPT), interactive materials such as materials that support interaction between students, application materials such as digital devices, etc.

Case-Method has had a long journey and was initially in the fields of business, medicine, law and other disciplines. However, this approach has also been used in Physics learning. Case method is a way of teaching material through case flow. The consideration of using this Case-Method is a shift from traditional learning with a lecturer format that tends to be patronizing and dominates lectures to learning that facilitates more dominant student activities and this is in accordance with the demands of OBE. This Case-Method is also a Higher Education IKU.

OBE is a student-centered learning method where lectures, assessments are planned to achieve stated goals and outcomes. The outcomes in question include knowledge, skills and attitudes. OBE focuses on measuring student performance, namely results at different levels. Outcome Based Education (OBE) is an approach in education that focuses on learning outcomes that students want to achieve. According to Spady, OBE means centering and organizing the entire education system around what is important for all students to be able to do successfully at the end of their learning experience. The main characteristic of OBE is that it focuses on clear and measurable learning outcomes. The curriculum, teaching, and assessments are specifically designed to achieve the learning outcomes that have been set. OBE also provides flexibility in the learning process with an emphasis on demonstration of competence, and provides opportunities for students to progress according to their respective abilities.[1].

Basic Physics or General Physics or Introductory Physics is very important and must be mastered thoroughly in order to be able to understand advanced Physics because the concepts learned in this course are still needed to understand the next Physics courses so that it is a foundation, like a building if the foundation is not right then no matter how strong the building above it is, it can collapse. Failing to master this course will make it very difficult to understand advanced Physics courses. Therefore, the enthusiasm and motivation of students are needed to be fully involved in studying this course. Stephen Hawking said "Science is beautiful when it makes simple explanations of phenomena or connections between different observations" which means that the ability is needed so that students can explain simple relationships between the phenomena they observe that researchers believe. Bilingual program students need learning resources that are in accordance with the demands of the OBE-based curriculum and the development of ICT in English which has not existed until now [2].

In the context of Physics learning, the Case Method involves the presentation of a realistic or authentic Physics situation to students. Students are then asked to analyze the case, identify relevant physics principles, and apply their knowledge to solve the problem or explain the phenomena presented in the case [3].

Based on the above explanation, the author believes that there needs to be a research that produces digital teaching materials based on the case method that can be used in learning General Physics courses. However, before conducting research and development, it is necessary to conduct a needs analysis of the development of digital teaching materials based on the case method in the General Physics course for students of the Bilingual Program at the State University of Medan.

2 Method

This study uses a qualitative research design. The research technique was carried out through interviews assisted by Google Form to analyze the needs of digital teaching materials based on the case method in the General Physics course. Participants in this study were lecturers and students of the PESP Department of the Bilingual Program, State University of Medan. Data were analyzed using inductive analysis techniques [4] and thematic analysis to identify, evaluate, and create themes expressed by participants [5]. The data was then concluded as the final stage of data analysis.

3 Results

To obtain research data, the author created an instrument of the need for digital learning media based on the case method. There were 40 PESP students of the Bilingual Program at Medan State University who were the subjects in this study. The results of the questionnaire analysis are described as follows:

A. Aspects of Difficulty in Understanding General Physics Courses

In further research, the author wants to develop teaching materials that can make it easier for students to understand the materials contained in the General Physics course. Therefore, the author conducted an in-depth study of the difficulties experienced by students in learning the General Physics course. The results of the questionnaire analysis are shown in Table 1 below.

Table 1. Results of Questionnaire Analysis on the Aspect of Difficulty in Understanding the General Physics Course

NO.	Statement	Response	Percentage (%)
1	General Physics sub-material is difficult to understand	Yes	60%
		No	40%
2	Difficulty understanding the presentation techniques for General Physics teaching materials provided by lecturers so far	Yes	62.5%
		No	37.5%

The results of the questionnaire on the statement item regarding the difficulty in learning the General Physics course contained in Table 1, show that there are 60% of students who stated that the sub-material contained in the teaching material is difficult to understand while those who stated it is not difficult are as many as 40%, it can be concluded that most students stated that the sub-material contained in the General Physics course is difficult to understand. Then on the statement item regarding the difficulty in understanding the presentation of teaching materials, there are 62% of students who stated that they find it difficult to understand the presentation technique of General Physics teaching materials that they have been using. Based on these data, the author concludes that it is necessary to develop teaching materials that can make it easier for students to understand the sub-material of learning the General Physics course.

B. Aspects of the Need for Digital Teaching Materials.

There are 5 statements that the author uses to explore students' needs for digital teaching materials. The results of the questionnaire analysis of needs in the Digital Teaching Materials Aspect are shown in Table 2 below.

Table 2. Results of Questionnaire Analysis on the Aspect of Digital Teaching Material Needs.

NO.	Statement	Response	Percentage (%)
3.	Digital teaching materials make it easier to use	Yes	92%
		No	8 %
4.	Digital teaching materials have never been used in teaching General Physics courses	Yes	100%
		No	-
5.	Videos that can be accessed in digital teaching materials can make it easier for me to understand the learning material.	Yes	95%
		No	5%
6.	Digital teaching materials can increase interest in learning General Physics courses	Yes	100%
		No	-
7.	Use of digital teaching materials in learning General Physics courses	Agree	100%
		Don't agree	-

Table 2 above shows the percentage of student responses on the Aspect of the Need for Digital Teaching Materials. In statement item number 3, there are 92% of students who stated that digital teaching materials can make it easier for them to use teaching materials, in statement item number 4, there are 100% of students who think that digital teaching materials have never been used in learning General Physics courses. Furthermore, in statement item number 5, there are 95% of students who stated that videos that can be accessed in digital teaching materials can make it easier for them to understand learning materials. For statement item number 6, there are 100% of students who stated that digital teaching materials can increase their interest in participating in learning. Then in statement item number 7, as many as 100% of students stated that they agree with the use of digital teaching materials in learning General Physics courses. Based on these data, it can be concluded that on average students stated that they need digital teaching materials that can make it easier and more interested in participating in learning General Physics courses.

C. Aspects of Learning Models

The use of learning models or methods in the teaching and learning process is very important in achieving learning objectives. However, something that is also important is the existence of teaching materials that in presenting the material have models/methods that are in accordance with the learning models/methods used in the teaching and learning process. Therefore, the author also explores the needs of students for learning models/methods in presenting teaching

materials. The results of the questionnaire analysis on the aspect of the use of Learning Models/Methods are shown in Table 3 below.

Table 3. Results of Questionnaire Analysis on Learning Method Aspects

NO.	Question	Response	Percentage (%)
8.	Have you ever been taught the case method in General Physics courses?	Once	85%
		Never	10%
		Don't know	5%-
9.	Are the teaching materials you have been using based on learning models/methods?	Yes	8 %
		Don't know	2 %
		No	90%
10.	Do you agree that the presentation of material in teaching materials uses the case method?	Yes	100%
		No	-
11.	Do you agree that learning assessment is used based on the case method?	Yes	100%
		No	-

Table 3 above shows the data from the needs questionnaire on the Learning Method Aspect. In questionnaire items number 8 to number 11, the author presents the questionnaire in the form of questions. For questionnaire item number 8, namely regarding the use of the case method in implementing the General Physics course, there are 85% of students who stated that they had been taught using the case method in learning the General Physics course, while there are 10% who stated that they never did and 2% of students who stated that they did not know. Then in questionnaire item number 9, there were 90% of students who stated that the learning material in the General Physics teaching material was not presented using a learning model, as many as 8% stated that it was presented using a learning model and 2% stated that they did not know. For questionnaire item number 10, there were 100% of students who stated that they agreed with the use of the case method Learning Model in presenting teaching material in the General Physics teaching material. Then in questionnaire item number 11, as many as 100% of students stated that they agreed with the creation of a case method-based learning assessment.

4 Discussion

Basic Physics or General Physics or Introductory Physics is very important and must be mastered thoroughly in order to be able to understand advanced Physics because the concepts learned in this course are still needed to understand the next Physics courses so that it is a foundation, like a building if the foundation is not right then no matter how strong the building

above it is, it can collapse. Failing to master this course will make it very difficult to understand advanced Physics courses. Therefore, the enthusiasm and motivation of students are needed to be fully involved in studying this course. Bilingual program students need learning resources that are in accordance with the demands of the OBE-based curriculum and the development of ICT in English that has not existed until now. Based on the explanation above, the author believes that there needs to be a study that produces digital teaching materials based on the case method that can be used in learning the General Physics course. However, before carrying out research and development, it is necessary to carry out a needs analysis of the development of digital teaching materials based on the case method in the General Physics course for students of the Bilingual Program at the State University of Medan. In terms of the difficulty in learning the General Physics course,There are 60% of students who stated that the sub-material contained in the teaching material is difficult to understand while those who stated that it is not difficult are as many as 40%, so it can be concluded that most students stated that the sub-material contained in the General Physics course is difficult to understand. Then in the statement item regarding the difficulty of understanding the presentation of teaching materials, there are 62% of students who stated that they found it difficult to understand the presentation technique of General Physics teaching materials that they have been using so far. Based on these data, the author concludes that it is necessary to develop teaching materials that can make it easier for students to understand the sub-material of the General Physics course. This is in line with John Sweller's opinion that the presentation of teaching materials that are easy to understand reduces extrinsic cognitive load, allowing more cognitive resources for processing relevant material [6]. In the Aspect of the Need for Digital Teaching Materials. In statement item number 3, there are 92% of students who state that digital teaching materials can make it easier for them to use teaching materials, in statement item number 4, there are 100% of students who think that digital teaching materials have never been used in learning General Physics courses. Furthermore, in statement number 5, 95% of students stated that videos that can be accessed in digital teaching materials can make it easier for them to understand learning materials. For statement number 6, 100% of students stated that digital teaching materials can increase their interest in participating in learning. Then in statement number 7, 100% of students stated that they agreed with the use of digital teaching materials in learning General Physics courses. Based on these data, it can be concluded that on average, students stated that they needed digital teaching materials that could make it easier and more interested in participating in learning General Physics courses. The results of Hwang et al.'s research show that the use of interactive digital teaching materials increases students' interest and motivation in learning science. Students who use digital teaching materials show a significant increase in learning outcomes compared to conventional methods [7]. The results of the needs questionnaire on the Learning Method Aspect in questionnaire items number 8 to number 11, the author presents the questionnaire in the form of questions. For questionnaire item number 8, namely regarding the use of the case method in implementing the General Physics course, 85% of students stated that they had been taught to use the case method in learning the General Physics course, while 10% stated that they had never done so and 2% of students stated that they did not know. Then in questionnaire item number 9, there were 90% of students who stated that the learning material in the General Physics teaching material was not presented using a learning model, 8% stated that it was presented using a learning model and 2% stated that they did not know. For questionnaire item number 10, there were 100% of students who agreed to the use of the case method Learning Model in presenting teaching material in the General Physics teaching material. Then in questionnaire item number 11, 100% of students stated that they agreed with the creation of a case method-based learning assessment. The conclusion from the results of this needs analysis is that there is a significant

need to develop digital teaching materials based on the case method in the General Physics course for PESP Bilingual Program students. This development is expected to overcome difficulties in understanding the material, increase interest in learning, and meet the demands of the OBE-based curriculum and the development of technology-based teaching materials in English.

5 Conclusions

In terms of the difficulty in learning the General Physics course,There are 60% of students who stated that the sub-material contained in the teaching material is difficult to understand while those who stated that it is not difficult are as many as 40%, so it can be concluded that most students stated that the sub-material contained in the General Physics course is difficult to understand. Then in the statement item regarding the difficulty of understanding the presentation of teaching .

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There is a significant need to develop digital teaching materials based on the case method in the General Physics course for PESP Bilingual Program students. This development is expected to overcome the difficulty of understanding the material, increase interest in learning, and meet

the demands of the OBE-based curriculum and the development of technology-based teaching materials in English.

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