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Needs Analysis of The Development of Digital Teaching Materials Using Moocs to Improve Students' Concept Understanding of Temperature and Heat Materials at SMAN of Bengkulu City

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Abstract

This study aims to describe the feasibility of digital teaching materials using MOOCs to increase students' conceptual understanding of temperature and heat materials and to obtain good perceptions from students. This research was conducted at SMAN 2 Bengkulu City, SMAN 5 Bengkulu City, and SMAN 10 Bengkulu City. This research was conducted in October 2022 with a research sample of 3 physics teachers and 100 class XI MIPA students. The instruments used in this study were observation, interviews, and questionnaires. Data analysis and data collection techniques used were observation, interviews, and questionnaires. This research is research and development (R&D) with the 4D model which in this study is only the Define stage. The results of the data obtained from the responses of 72.41% of students with the agree category and 71.42% of teacher responses with the category of strongly agreeing is needed development of digital teaching materials using MOOCs to improve students' understanding of the concept of temperature and heat.

Keywords*: Development, Digital Teaching Materials, MOOCs, Temperature and Heat*

A. Introduction

The development of information and communication technology (ICT) can improve the quality of human resources if implemented properly, correctly and intelligently and the existence of technology has made enormous progress, especially information and communication networks which are marked by the emergence of various IT devices such as cellphones, computers and laptops as well as the development of the Internet network globally [1] . Along with the development of information technology today, internet connection is no longer an expensive thing but a necessity, even advances in the development of information and communication technology (ICT) have a special impact on the learning process [2]. Activities in the learning process are not just interactions between teachers and students, where one of the interactions used today is in the form of teaching materials or media between teachers and students [3].

Physics is one of the majors in the abstract science family that can develop inductive and deductive analytical thinking to solve problems related to natural phenomena around it so that media and teaching materials are needed so that students can understand a concept being studied [4]. The identified material often contains misconceptions, namely heat and thermodynamics, where the material of heat and thermodynamics includes a discussion of the concepts of temperature and heat in the material temperature and heat [5]. Learning physics is a subject that can be considered difficult and most avoided by students [6]. This is supported by the results of interviews that were conducted previously at 3 Bengkulu City Public High Schools. There are still some students who avoid studying physics and still find it difficult to understand physics, especially in the subject of temperature and heat.

Media or teaching materials are tools or instruments used by teachers to convey a particular subject in the form of transferring information through certain media and this makes it easier to retrieve learning messages from teacher to student [7]. Media or teaching materials that can be used to support the learning process in schools are in the form of digital and non-digital media or teaching materials. learning [8] . However, in the 4.0 era, teachers are required to package learning materials to make them more interesting, because students who are faced with a media or digital learning material can make learning

easier, broader, and more unique so as to create a fun learning atmosphere and generate further curiosity. and high curiosity [9] .

Massive Open Online Courses (MOOCs) is a phenomenon that represents one of the most impressive educational initiatives aimed at adopting and effectively using the most popular functions of digital technology, the result of which is open e-learning with unlimited participant capacity [10] . By using MOOCs, learning can be done effectively and efficiently [11] . The presence of MOOCs can reach all groups in order to get quality learning students do not need to go to far away schools to study the things they like, the appearance of the material presented is attractive so that it can reflect student interest, arouse and help students understand the concepts in the material presented through the material digital open in the form of video [12] .

H5P Interactive is an open-source HTML5 based module developed by online learning for interactive education community, whose teaching method is proven and very popular used in online learning [13]. H5P is designed to share, create, reuse interactive content and e-learning content that is created usually contains interactive learning material to increase msotivation in learning activities so that appropriate media is needed with this content [14] .

Based on the results of observations and interviews at SMAN 5, SMAN 2, SMAN 10 Bengkulu City, it was found that the teaching materials used were not interactive and seemed boring because they still used printed books, looked for sources from the internet and YouTube on certain subjects. It causes students who are less interested and not enthusiastic in participating in the learning process and there are students who think that physics subjects are still difficult to understand. In addition, most students prefer digital teaching materials that can make it easier for students to learn anytime and anywhere. This was also proven through data on student responses in filling in the goods needed by students. Due to the use of modern digital teaching materials with an attractive and unique appearance, new innovations have emerged for the development of digital teaching materials using digital media.

In previous research [15] which stated that students and teachers strongly agreed and needed digital teaching materials using MOOCs which were presented in the form of interactive videos that looked more attractive than printed books. The difference between previous research and this research is in terms of the variables used, the previous research variables were used to increase learning motivation while the variables used in this study were to increase conceptual understanding.

Based on some of the problems above, the solution to overcome them is to find and prepare media or digital teaching materials that are in accordance with the portion of the material provided so that students are more interested in participating in the learning process and carrying out innovations so that students can learn independently with teaching materials used to increase understanding of concepts. . , So by developing MOOCs as digital teaching materials. Based on what was obtained above, the formulation of the problem is what is the feasibility of digital teaching materials using MOOCs to increase students' conceptual understanding of the material temperature and heat? And aims to describe the feasibility of digital teaching materials by using MOOCs to increase students' conceptual understanding of the material temperature and heat.

B. Research Methods

Research uses R&D (Research & Development) research with descriptive research, the model used in this research is the 4D model (1) *Define* ; (2) *Design* (design); (3) *Develop* (development); and (4) *Deployment* (deployment) [16] , with the image in figure 1 4D Model [17] . In this study, it was only carried out until the definition stage (define) [18] . This is because it is in accordance with the research objective, namely to find out the response of students' needs to digital teaching materials using MOOCs on material temperature and heat.

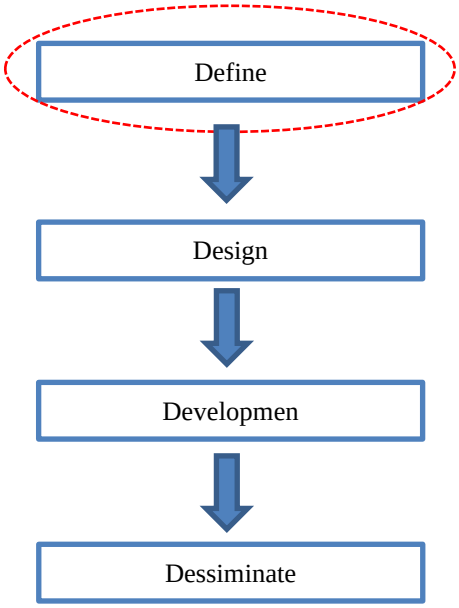

Figure 1. 4D Models

Information :

: Part Focus Of Research

This research was conducted at 3 public high schools, namely SMAN 5, SMAN 2, SMAN 10 Bengkulu City with a sample of 100 students in class XI MIPA and 3 physics teachers. The data collection techniques used were observation, interviews and questionnaires. The instruments used were observation sheets, interview sheets, needs questionnaire sheets for the development of digital teaching materials. With the grid of the needs questionnaire sheet contained in table 1 of the needs questionnaire grid

Table 1. Requirements Questionnaire Grid

Indicator	Number	Scale Value
Student response	1,2	2
Physics Learning Experience	3,4,20,8,9,21	6
The Need for Digital Teaching Materials	5,6,7,10,11,12,13,14,15,16, 17,18,19	13

The data analysis technique used is quantitative analysis because the point sheet needs to be analyzed using a Likert scale. Likert scale is a scale used to measure attitudes, opinions, and perceptions of a person or group of people. With the scale used in the study contained in table 2 of the Likert scale assessment.

Table 2. Likert Scale [19]

Statement	Score
Strongly agree	4
Agree	3
Don't agree	2
Strongly Disagree	1

The data obtained was analyzed by calculating the rating score of the items for each statement. The needs questionnaire was also tested for validity and reliability. Validity and reliability testing can be done using the SPSS application [20] . The basis for decision making in the reliability test is if the value of Cronbach's Alpha > 0.60 then the item is declared reliable and if the value of Cronbach's Alpha <0.06 then the item is declared unreliable [21] . Analysis of the results of the needs questionnaire is carried out quantitatively using the formula:

$$p = \frac{n}{N} \times 100\% \quad (1)$$

Where P is presenting the results of the needs analysis, n is the total evaluation score, and N is the maximum score that can be achieved. The assessment criteria in table 1 are interpreted referring to table 3, namely the Criteria for Validity Results.

Table 3. Table of Likert Scale Interpretation [22]

Percentage	Interpretation
0% - 25%	Strongly agree
26% - 50%	Agree
51% - 75%	Don't agree
76% - 100%	Strongly Disagree

C. Results and Discussion

Results of Student Responses

Based on filling out student needs data for the development of digital teaching materials using MOOCs to increase conceptual understanding of temperature and heat material. Validity and reliability tests will be carried out at each port to determine whether it is valid or invalid to use according to the desired data. As for the results of the acquisition of respondents from the student questionnaire validity test the analysis of student needs shows that of the 21 statements in the questionnaire are included in the valid category by obtaining a percentage of r-count 0, which is contained in table 4 validity test results.

Table 4. Instrument Validity Test Results

The amount of goods	Present	r-count	Information
1	0.217		Legitimate
2	0.363		Legitimate
3	0.178		Legitimate
4	0.345		Legitimate
5	0.220		Legitimate
6	0.273		Legitimate
7	0.167		Legitimate
8	0.444		Legitimate
9	0.284		Legitimate
10	0.559		Legitimate
11	0.457	0.163	Legitimate
12	0.573		Legitimate
13	0.639		Legitimate
14	0.407		Legitimate
15	0.500		Legitimate
16	0.501		Legitimate
17	0.3 90		Legitimate
18	0.321		Legitimate
19	0.467		Legitimate
20	0.597		Legitimate
21	0.515		Legitimate

After that, validity and reliability tests were carried out on the instrument obtained from the case processing summary showing that a total of 100 respondents were valid with a percentage of 100% as shown in table 5.

Table 5. Summary of Case Processing

		N	%
Case	Legitimate	100	100.0
	Excluded	0	.0
	Total	100	100.0

Furthermore, the Reliability Statistics test was carried out which obtained Cronbach's Alpha data results which were 0.633 for a total of 21 statement items. It is shown that the results obtained are > 0.60 which can be interpreted that the instruments used are reliable as table 6.

Table 6. Reliability Statistics

Alpha Cronbach	N of Items
0.633 _	21

As for data analysis to be able to find out students' needs for the development of digital teaching materials using MOOCs to increase students' conceptual understanding of the material temperature and heat can be seen in table 6.

Table 6. Data Results and Student Responses

Present	Total Score (n)	Maximum Score	Percentage
100 students from SMA N Bengkulu City	6083	344	72.41 %

Based on the results from table 6 listed above, it shows that students at SMAN 5 Bengkulu City, SMAN 2 Bengkulu City, and SMAN 10 Bengkulu City strongly agree with the use of digital teaching materials using MOOCs for temperature and heat material. This is indicated by the percentage displayed reaching 72.41% of the maximum percentage which is 100%.

Teacher Interview Results

In addition to the research needs questionnaire data, this research also conducted interviews with 3 physics subject teachers at SMAN 5, SMAN 2, SMAN 10 Bengkulu City. From the results of the interviews that have been conducted, the results are based on the first indicator, namely regarding facilities and infrastructure in which each school already has an internet network such as wifi, but not all of them are provided to the public only in certain places such as offices, administrative rooms, and head rooms. school . In that classroom, wifi is not available so students must use their respective card data to be able to access the internet. There is also a physical laboratory in each school, it's just that there are those who already use the laboratory properly and there are still schools that have never used the laboratory. As for the tools facilitated by the school, you can say that they are all still good, such as Infocus. This is also obtained from the teacher's explanation that they are currently still pursuing theory and are more focused on learning in the classroom than doing practicums by utilizing Infocus, LCD and other supporting media.

The second indicator is about the learning process related to the subject matter which results show that the learning process in each school is evenly distributed. In this interview, the average teacher stated that the initial material used still used printed books, PowerPoint, and sources from the internet or YouTube. For the learning method still uses the lecture method, question and answer, discussion. The teacher also said that there was still a lack of students' conceptual understanding of the material being taught, such as the sushu and heat material, this was due to the lack of student interest in the learning process and the lack of interesting teaching materials to use during material assistance.

From the results of interviews conducted by researchers, the teacher gave a positive response to developing digital teaching materials using MOOCs related to the concept of physics, especially on temperature and heat material which is expected to be able to assist teachers in conveying learning to their students.

The results of this study are in line with previous research [15] with results stating that students and teachers strongly agree and need digital teaching materials using MOOCs which are presented in the form of interactive videos that look more attractive than printed books. The difference between previous research and this research is in terms of the variables used, the previous research variables were used to increase learning motivation while the variables used in this study were to increase conceptual understanding.

D. Conclusion

Based on the results carried out on observations, interviews, and analysis of students' needs for the development of digital teaching materials using MOOCs to increase students' conceptual understanding of

temperature and heat material, it shows that these digital teaching materials are very much needed by students and teachers to support the learning process.

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