



Analysis of the Development of MOOCs Assisted Digital Teaching Materials on Impulsive and Momentum Materials to Train Critical Thinking Skills in Bengkulu City High Schools

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Abstract

Investigating the feasibility of the product and students' response to it is the main goal of this R&D. The 4-D development paradigm used in this study consists of the following stages: defining, designing, developing, and dissemination stages. In this study, students from secondary schools in Bengkulu City, SMAN 02, SMAN 4 and SMAN 09 took part. The focus of this research is to train students' critical thinking skills through participation in massive open online courses (MOOCs) with topics related to assisted impulses and momentum. Eighty-eight students from three institutions were surveyed, and their answers were validated by two professional lecturers and three physics professors. Classroom observations, interviews with instructors and students, questionnaires tailored to their needs, expert validation, and analysis of quantitative and qualitative responses provided data for research. The average percentage of respondents who strongly agreed with the statement that teachers' needs were met was 89.68 percent; Respondents who agreed with the statement of student needs were 73.92 percent.

Keywords: Critical Thinking, Digital Textbooks, Online Courses

A. Introduction

Article 8 of Permendikbud Number 53 of 2015 is one of the government's measures to improve the quality of education in Indonesia by mandating that all facets of education have an emphasis on student-centered, interactive learning that makes use of technological tools and multimedia. An example of this tendency is the broad use of technology resources in the Indonesian educational system. In a classroom, both teachers and students benefit from open and honest dialogue. There are two phases to the educational process: studying and instructing. In other words, there are always two human components at play in education: the roles of the teacher and the pupil [1]. Today's digital age has sped up the progress of science and technology. Because of these advancements, more individuals than ever before may have access to knowledge and training in record time. Having a basic understanding of how to use a computer is essential in today's world. The advancement of information and communication technology has influenced many facets of human existence, including how people learn and are taught [2].

To prepare students for today's increasingly competitive job market, educators must provide them with resources that are both interesting and relevant to their life. Because teachers may lack experience with educational graphics, instructional materials might be useful in the classroom and beyond. Because of developments in technology, electronic copies of once-rare textbooks and other learning materials are now commonplace. Karemaker [3] argues that digital educational tools are crucial means to an end. Students who prefer to work alone may still gain knowledge by utilizing online materials. To restate, recent initiatives to change the educational system have made use of technical advances in the form of digital textbooks.

Panne (2007) [4] argues that teachers need supplementary materials to help students apply the ideas and objectives presented in linear text. Based on interviews with physics teachers at SMA N 9, SMAN 4, and SMAN 2 in Bengkulu City, it was found that many of them are still using outdated print materials to train their students. Student interviews, on the other hand, revealed

that physics was less attractive than other topics since its concepts were so abstract and its content was so comparable to those of other disciplines.

According to Prastowo (2012) [5], the creation of new materials has benefits for both teachers and pupils. Benefits to teachers include being able to create more interesting, interactive courses with less dependence on books. Students, meanwhile, benefit from teachers' efforts to generate resources by having access to more interesting readings and straightforward diagrams.

When asked to rate their level of agreement on a Likert scale, students at all three schools generally agreed at a rate of 73.92% (SMAN 02, SMAN 04, and SMAN 09). It is essential that this resource have an interesting digital base and be accessible to students whenever they need it since students think that the teacher's explanation is inadequate to help them grasp topics related to impulse and momentum. Therefore, it is essential to give internet access to educational materials. Students learn to think critically via their exposure to MOOCs' (Massive Open Online Courses) fast-paced, fascinating curriculum.

According to Glenna L. Decker in [6] explains that MOOCs consist of the words Massive Open Online Courses. Massive is more towards big words, meaning that MOOCs here have a large form, including large in terms of registrants who number in the thousands with origins from all over the world. Open means open, meaning that MOOCs are open to anyone who is connected to the internet and regardless of where they study. According to Kaplan and Haenlein [7], massive open online courses (MOOCs) represent limitless possibilities for online education. MOOCs, as suggested by Rhenald Kasal, broaden access to education by allowing students greater freedom in deciding what and when to study. An innovative method of education, massive open online courses (MOOCs) use the reach of the web to broadcast lectures and other instructional materials produced by institutions of higher learning and other institutions of learning. The advent of massive open online courses (MOOCs) is a game-changer for online learning. Along with these changes, the advent of massive open online courses (MOOCs) has provided students with free access to cutting-edge educational resources and new perspectives on the world of business. According to Chen (2013) in [8] the very nature of MOOCs is advantageous. It's convenient in that everyone can get to it, but it's also got a great interface and a lively atmosphere that's perfect for studying. It is open and free, so people of all economic backgrounds may take use of the site's educational contents.

The H5P platform is open-source and was developed in JavaScript to facilitate cost-free content sharing and collaboration. H5P makes it easier [9] for teachers to create and distribute interactive HTML5 material. Using H5P for self-directed learning has several benefits, including the provision of feedback while working, the decrease of time needed to complete tasks, and the reduction of time needed to review or amend the user's work [10]. In light of the feedback provided below, it seems that H5P is a valuable resource for the creation of interactive content, and that its use in the classroom has the potential to enhance the credibility of student evaluations and the quality of their actual work.

According to Ennis (1996)[11], critical thinking is "reasoned and reflective thinking" with a focus on making decisions about what to believe or do. What we mean when we talk about "critical thinking" [12] is the process of actively and competently forming ideas, applying them, analyzing them, synthesizing them, and evaluating what we've learned via observation, experience, contemplation, conversation, or communication (Scriven and Paul, 1987). influencing one's actions and ideas. Kurfiss (1988) states in [13] that the goal of critical thinking is to arrive at a hypothesis or conclusion that is well-supported by the available evidence on a specific scenario, phenomenon, issue, or problem.

According to Faccione's research[14], there are six methods in which one's critical thinking skills may be evaluated: via interpretation, analysis, evaluation, inference, explanation, and self-regulation.

When we say that someone can interpret a problem, we imply that they understand and can articulate its meaning. The ability to analyze means you can identify and develop conclusions regarding relationships between different types of information, such as claims, questions, ideas, and descriptions. Evaluation skill is the presentation and availability of rational connections among claims, explanations, queries, and hypotheses. Inference is the ability to perceive and reason rationally. Ability to reason and offer justification based on logically proven findings is

the heart of explanation. Indicator self-regulation Effective problem-solving requires the kind of self-control that may be shown via the use of analytical and evaluative skills.

Students might be more involved in their education, which is expected to lead to new educational innovations, by discovering or creating digital teaching materials that are tailored to the material they are studying. By developing digital instructional resources on impulse and momentum, MOOCs allow students to learn at their own speed and in their own time. Does teaching students to think critically work in massive open online courses? I was curious about the reception given to momentum and impulse-based physics textbooks. How Can I Strengthen My Critical Thinking Using MOOCs? It's meant to be used in physics classrooms as a resource for teaching about impulse and momentum. Free, accessible, and online classes that are designed to help students develop their critical thinking skills. to see how curious people are about a new physics course based on the ideas of impulse and momentum Training students to think critically and reflectively via open online courses (MOOCs).

B. Research Methods

Research and development (R&D) research is carried out, with the primary goal of creating new goods or bettering current ones. Research and development is a technique used to create and verify goods for use in classrooms, as described by Borg and Gall. The goal of this study is to create a new resource for teaching physics using digital tools, which will be titled "Development of Assisted Physics Digital Teaching Materials." The Bengkulu City High School uses massive open online courses to teach pupils how to think critically about topics related to impulse and momentum.

In this study includes stages Define, Design, Development and Disseminate. The research and development steps used are shown in Figure 1.

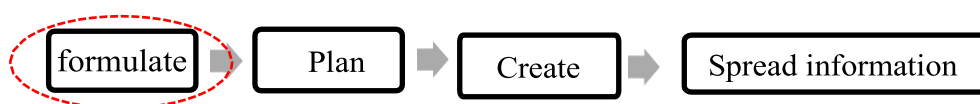


Figure 1. Research Steps

Information: formulate this section is the focus of research

This study included a total of 89 students and 3 physics professors from three different public high schools in Bengkulu City (SMAN 02, SMAN 04, and SMAN 09). Observation, interviews, and questionnaires are all used to gather information. We employed interview and observation forms, as well as questionnaires, to gather data for the creation of our online course materials. Table 1 of the requirements questionnaire grid provides a grid for collecting responses.

Table 1. Requirements questionnaire grid

Aspect	Item Number	Number of Item
Student Responses	1,2	2
Physics Learning Experience	3,4,20,8,9,21	6
Needs for Media based Learning	5,6,7,10,11,12,13,14,15,16,17,18	13

Because a Likert scale is necessary for assessing point sheets, quantitative analysis is the preferred approach of data analysis. At this phase, information will be obtained using methods such as interviews, surveys, evaluations of student needs, and observational examinations of current resources. The findings of a Likert-scale examination of teacher and student requirements are shown in tabular data table 2.

Table 2. Scale on each assessment

Evaluation	Scale Value
Strongly Agree (SS)	4
Agree (S)	3
Disagree (TS)	2
Strongly Disagree (STS)	1

[15]

To calculate this percentage use the formula:

$$Presentase\ skor\ (100\%) = \frac{Skor_{Rata-rata}}{Skor_{Tertinggi}} \times 100\%$$

After collecting the percentage score, the interpretation of the score is measured using the Likert scale interpretation table. Table 3 shows the score interpretation model for the Likert scale.

Table 3. Likert Scale Model of Sco. Interpretation

Percentage %	Category
0%-25%	Strongly Agree (SS)
26%-50%	Agree (S)
51%-75%	Disagree (TS)
76%-100%	Strongly Disagree (STS)

[15]

C. Result and Discussion

Result of Student Responses

Based on the results of a student needs analysis questionnaire, digital teaching materials aided by Massive Open Online Courses (MOOCs) were designed to train students' critical thinking abilities on impulse and momentum content. Each query will be subjected to validity and reliability testing to ensure its suitability for the intended purpose. Based on the analysis of student needs, we know that all 21 of the questionnaire's assertions are valid, as evidenced by the 100% r-count in the validity test findings in table 4.

Table 4. Validity Test Results

No	R Count	R Table	Crtiteria for Making Decision	Result
1	0.307	0.206	If r count > r table, then the question is VALID If r count < r table, then the question is INVALID	VALID
2	0.331			
3	0.275			
4	0.390			
5	0.280			
6	0.246			
7	0.338			
8	0.299			
9	0.438			
10	0.589			
11	0.648			
12	0.614			
13	0.633			
14	0.659			
15	0.692			
16	0.711			
17	0.383			
18	0.231			

No	R Count	R Table	Crtiteria for Making Decision	Result
19	0.517			
20	0.346			
21	0.572			

The instrument was then tested for validity and reliability using data from the case processing summary, with the findings shown in table 5.

Table 5. Summary of Case Processing

		N	%
Cases	Valid	89	100.0
	Excluded(a)	0	,0
	Total	89	100.0

Furthermore, a reliability study was performed on 21 separate assertions, obtaining a Cronbach's Alpha of 0.639. Table 6 shows that the obtained results are more than 0.60, indicating that the instrument is reliable.

Table 6. Reliability Statistics

Alpha Cronbach	N of Items
0,639	21

Table 7 displays the results of our data analysis aimed at determining how best to use Massive Open Online Courses (MOOCs) to educate and train future generations in the art of critical thinking as it pertains to the topics of Impulse and Momentum.

Table 7. Results of data analysis of student needs

Respondent	Total Score(n)	Maximum Score	Percentage %
89 Students from SMA N Bencoleen City	5527	356	73.92

As can be seen in table 6 above, students from SMAN 5 Bengkulu City, SMAN 2 Bengkulu City, and SMAN 10 Bengkulu City are all in favor of utilizing MOOCs to teach concepts related to impulse and momentum. The displayed percentage is now 73.92% out of a possible 100%, indicating this.

Teacher Interview Results

The first findings regarding the infrastructure and facilities of all schools that already have internet networks (such as wifi) were obtained through interviews with three physics teachers in Bengkulu, namely SMAN 02, SMAN 0, and SMAN 09. However, not all of these networks are provided to the public; rather, they are only available in select areas, such as the office, the administrative room, and the principal's room. school Students must utilize their card data to access the internet due to the lack of a wifi connection in the classroom. There is a physics lab at each school; some have made good use of it, while others have never used one at all. The school's resources, such as Infocus, are reliable and suitable, it seems. Subject-specific instruction continues with the consequence that, despite advances in technology, physics classes still rely almost exclusively on static textbooks and lecture notes rather than more engaging forms of instruction. Traditional lecture, Q&A, and class discussion formats are still used. Teachers also recognize that students' lack of interest and knowledge of the learning and teaching process contributes to a lack of acquiring critical thinking skills in the content being taught, such as impulse and momentum content.

Instructors were generally supportive of efforts to provide digital learning resources for physics topics utilizing technology-based massive open online courses (MOOCs), particularly those dealing with impulses and momentum, which are predicted to aid teachers in conveying learning to their

students. This study's findings corroborate those of a previous one [16] that found that both students and educators need access to digital learning materials in the form of massive open online courses (MOOCs), which take the form of interactive learning videos that appear more interesting to students than traditional textbooks. Previous studies focused on boosting student enthusiasm for studying, whereas the current ones aim to sharpen participants' analytical abilities.

D. Conclusion

Analysis The development of digital teaching materials assisted by massive open online courses (MOOCs) on impulse and momentum materials to train critical thinking skills has taken into account the findings of surveys, interviews, and analysis of student needs to ensure that courses meet student and instructor requirements. Acknowledgement

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