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Moocs-Based Solar System Module for Class VII Junior High School Students

Okta Rahma Putri[1*], Eko Risdianto[2], Indra Sakti[3]

Universitas Bengkulu
Bengkulu, Indonesia
✉ oktarahma@gmail.com*

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Abstract

This research aims to develop a digital module based on MOOCs on solar system material for class VII junior high school students. This research is a Research and Development study (R&D) with a 3D model which includes the Define and Design and Development stages. The data collection techniques used were observation, interviews and questionnaires. The instruments used in this research were observation sheets, teacher interview guide sheets, expert validation sheets, and student response test sheets. Data analysis techniques are carried out qualitatively and quantitatively. The research results show that digital modules based on MOOCs are valid and can be used. The test results of students' responses to the digital modules developed showed a very good category. The conclusion from the results of this research shows that the digital module developed was declared feasible by the expert team and received a positive response from students to be continued in wide-scale trials to see the product's effectiveness.

A. Introduction

Information technology has advanced to a point where it is entirely digital, significantly altering human lifestyles in the process. Learning implementation plans are created by taking into account the application of information and communication technology (ICT) in an integrated, systematic, and effective manner according to the situation and conditions, according to Minister of Education and Culture Regulation No. 22 of 2016 concerning learning in basic education and secondary education. Thus, learning materials that make use of ICT are required in order to optimize the learning process in the classroom (Suwasono et al., 2017) .

Scientific advancements in the field of education lead to technological advancements. As a result, using technology to facilitate learning inside the educational setting is appropriate. These days, educational institutions employ digital technology as a learning support tool as well as an information tool (i.e., a tool for acquiring knowledge) (i.e. supporting learning activities and tasks) (Lestari, 2018).

Research Wijaya (2020) was found that 60% of Generation Z respondents started their social life online, 50% of Generation Z preferred communicating online or virtually rather than talking directly in real life, even 70% of Generation Z were more comfortable communicating with their friends online. This condition is likely due to the synchronization of motor skills possessed by Generation Z which is quite high, especially in the eyes, hands and ears compared to other generations before them.

One of the curriculum concepts that requires pupils to be independent is the independent learning curriculum, which has been adopted by multiple institutions as part of their educational process. Every student should have the freedom to access both official and informal educational resources, according to the definition of independence. This curriculum encourages innovation from teachers and students and does

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not place restrictions on the idea of learning outside of the classroom. For skilled individuals, monotonous or one-sided learning becomes a barrier to expressing their abilities (Manalu et al., 2022).

The use of learning media in learning is part of the teacher's attention in learning activities. Learning media is a very important component in the learning process (Angraini et al., 2021; Setiawan & Nugraha, 2018). One of the learning media that is often used in schools is print learning media. This communication tool is widely used because it is considered practical, can be adapted to students' abilities and is easy to distribute, but this tool has limitations, namely that it cannot display certain objects such as sound, moving images or 3D. An example of a learning object that requires visualization of three-dimensional objects is the Solar System material in Class VII.

Based on the results of observations and interviews with science teachers conducted at SMPN 01 Bengkulu City, it was found that teaching materials in the form of digital modules were not widely used by students at the SMP, the modules or teaching materials used were still less varied or were still in printed form. The unavailability of varied modules can make students less interested and quickly feel bored in understanding the material. Apart from that, there is a lack of use of media to convey material or teaching materials to help students understand the material, such as materials that require the use of additional media to convey material that cannot be visualized directly, such as the solar system material. This is very unfortunate because it contradicts the purpose of educational media, namely as a useful learning tool to improve the learning process (Imansari & Sunaryantiningsih, 2017).

Based on the problems above, an alternative solution is provided by developing digital modules based on *MOOCs* to complement the limitations of printed learning media, especially regarding solar system material for class VII. This teaching material will be in the form of a digital module containing solar system material which can be accessed by students anytime and anywhere. *MOOCs* -based digital modules are teaching materials that will be a new breakthrough applied at the junior high school level which can help students in the learning process, thereby improving student learning outcomes. Technological development information, development learning in provision material teach related is module , now there are many developments , namely module Which packed in format digital, that is module electronic (E-module) (Hasan et al., 2021). E-modules are learning materials that are built within a certain time unit according to a planned and organized curriculum, completed using electronic devices such as computers or Androids (Rahayu & Sukardi, 2021; Wulandari et al., 2022).

There are many different types of digital-based instructional materials being developed, but frequently used and readily accessible materials are typically created in this way since students can easily access digital modules. E-learning is the term for the actual instructional content. E-learning is education that helps students learn by using electronic gadgets (Jassim, 2020; Wulan et al., 2015). To provide learning that can be accessed by anyone and anywhere, one way can be done by developing *MOOCs-based learning media.*

Because MOOCs are a new type of online learning model, digital modules based on them can be conveniently accessed from a distance (Sosa-Díaz & Fernández-Sánchez, 2020; Zotova et al., 2021). Specifically, learning through generally open online courses that are accessible to any number of students at any time is known as MOOCs, or enormous open online courses. When it comes to MOOCs, users can easily customize their experience by selecting the material that interests them, for example. The content, which is available as films and quizzes, can be downloaded whenever you'd want and played repeatedly (Oksatianti et al., 2022).

The solar system material for class VII even semester is the concept used in the independent study curriculum. The solar system content was selected since it is one of the science topic materials that calls for supplementary teaching resources in order to be effectively taught. This is because there are materials of which we are unable to directly provide examples, such as the solar system's structure, types, textures, and layers. which is found within the earth (Rosa, 2019) . In addition, class VII pupils are required to receive this kind of content as part of the autonomous learning curriculum, which is governed by Minister of Education and Culture Decree No. 56 of 2022. It is envisaged that the creation of digital modules based on MOOCs will aid students in understanding the grammatical content, based on the findings of observations. sun energy in order to enhance student learning results (Setiyadi, 2017).

This study also draws from a number of other investigations that produced MOOC-based educational resources. Studies conducted by Oksatianti et al (2022). In order to boost learning motivation on temperature and heat material, online learning based on MOOCs was developed. Excellent results with a percentage value of 84.03% were obtained from the research. Aside from that, Zahro's (2017) study found that training in MOOC creation was successful and successful when MOOCs were obtained for PPL PPG

professors at the State University of Malang. The knowledge and abilities of the participants increased by 85% compared to before the training was put into place.

Based on the description above, researchers will conduct research entitled development of *MOOCs- based solar system modules* in learning for junior high school students. The hope is that after developing digital modules based on *MOOCs* on solar system material, it can help increase students' interest and learning outcomes in studying science, especially on solar system material

B. Research Methods

MOOCs -based solar system module was developed using the Research and Development (R & D) type of research. The development model used in this research is the 4-D development model (Four D Models), according to Sugiyono (2015) which consists of 4 development stages, namely definition , design , development and deployment. Disseminate). However, in this research there are restrictions on the content of activities, namely at the Disseminate stage, so that the research stage is only carried out at the definition, design and development stages.

The development procedure used by researchers refers to the 4-D development model according to Thiagarajan, which is limited to the Disseminate stage. The research stages can be seen in the following picture:

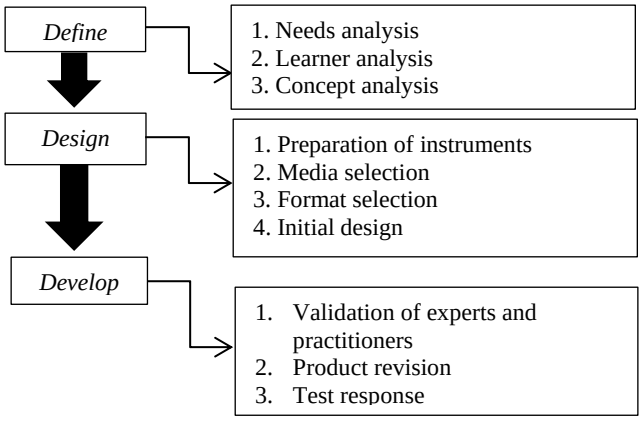

Figure 1. Research Stages

The student needs questionnaire aims to determine students' needs for *MOOCs- based solar system module teaching materials*. In analyzing the needs questionnaire, researchers used a Likert scale to translate the questionnaire. This measurement scale will result in answers in the form of choices made in the form of a checklist. The following is a table of needs questionnaire assessment criteria as follows:

Table 1 Needs Questionnaire Assessment Criteria

Score	Interpretation
4	Strongly agree
3	Agree
2	Don't agree
1	Don't agree

(Oksatianti et al., 2022)

To analyze the student needs questionnaire, the following formula is used to calculate the percentage:

$$\text{Percentage } \% = \frac{\text{number} \times \text{weight of each choice}}{\text{the total number of options}} \times 100\%$$

Following the determination of the percentage of students in need of MOOCs-based solar module teaching resources, a description of the teaching materials that will be created in response to those needs can be given.

Additionally, the data from the validator assessment findings serve as a first example of how academics are using MOOCs-based solar system modules, which will be transformed into quantitative data. Stage validity done by 2 validator and 1 Teacher which aims to provide an assessment of various aspects in terms of

material, appearance and language. In addition, to test the feasibility of MOOCs-based solar system modules developed based on content standards consisting of competency standards and basic competencies. This validation is calculated using the Likert Scale in table 2 below:

Table 2. Likert Scale

Score	Interpretation
4	Strongly agree
3	Agree
2	Don't agree
1	Don't agree

(Retnawati, 2016)

To determine the percentage value of expert validation, use the formula:

$$\text{Validation (V)} = \frac{\text{Total Score}}{\text{Maximum Score}} \times 100\%$$

So that, from results validity Which has is known the percentage so can be matched with the criteria in table 3 below:

Table 3. Validation Results Criteria

No	Index Appropriateness	Category
1.	0% - 25%	Very No Worthy
2.	26% - 50%	No Worthy
3.	51% - 75%	Worthy
4.	76% - 100%	Very Worthy

(Retnawati, 2016)

Then, the questionnaire data analysis of the results of student responses was carried out quantitatively, this aims to obtain perceptions/opinions regarding the MOOCs- based solar system module products being developed. The scale used is the Likert scale. To facilitate quantitative analysis, the assessment can be given a score as in table 4 below:

Table 4. Criteria for Student Response Assessment

Score	Interpretation
1	Strongly disagree
2	Don't agree
3	Agree
4	Strongly agree

(Oksatianti et al., 2022)

Data from student responses obtained through questionnaires was then analyzed using quantitative data for the MOOCs- based solar system module that is being developed. Data analysis from the questionnaire was obtained based on students' responses using the following percentages:

$$\text{Final Score} = \frac{\text{Score acquisition}}{\text{Maximumscore}} \times 100\%$$

MOOCs- based solar system modules. To determine the quality level of the product, a conversion of the achievement level is carried out using the scale shown in Table 5 below:

Table 5. Interpretation of Student Responses

Score Interpretation	Category
0%-25%	Not good
26%-50%	Not good
51%-75%	Good
76%-100%	Very good

(Sugiyono, 2015)

C. Results and Discussion

At the MOOCs-based solar system module development stage, digital modules are created based on the design that has been created. The initial section or initial display contains the material title and background, brief description, progress, material and quiz. The aim of this initial section is to provide information and initial knowledge to digital module users regarding the contents of the digital module. One example of the initial display of the module can be seen in the image below:

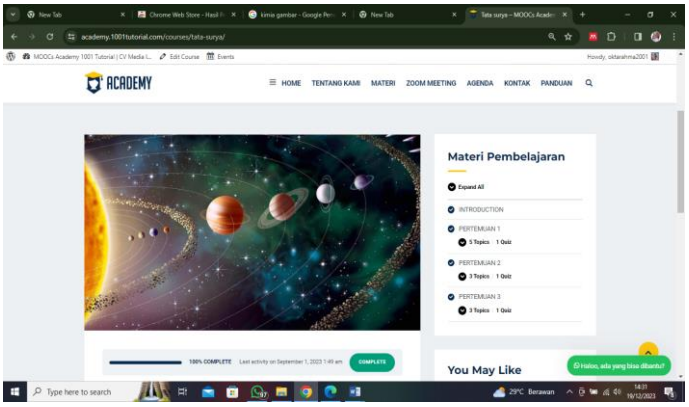

Figure 2. Initial View Image

The content section is an important part of the MOOC-based solar system module which contains a brief description of the solar system material in the form of videos, KD and KI of the respiratory system material and learning objectives. Where the development of this contents page was created using the Caveat brush typeface with font size 70 for the title. An example of the display of the contents of the digital module can be seen in the following image:

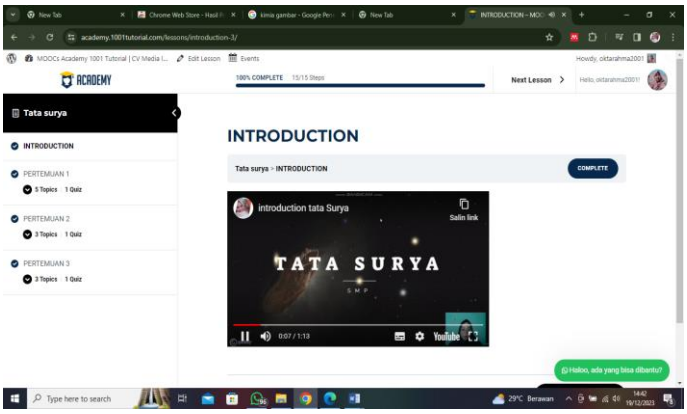

Figure 3. Image of the Contents Section in the Introduction

In the objectives section contained in the introduction section, there is a description of the learning objectives that must be achieved by students. Having learning objectives can provide opportunities for students to develop intelligence and train thinking skills. Learning objectives are a description of the things that are expected to be achieved and produced in teaching and learning activities. There are three learning objectives, namely first, students describe the planets in the solar system, second, describe the differences between natural and artificial satellites, and third, students describe the effects of the movement of the earth and celestial bodies on natural phenomena on earth. Next, the material display section contains the materials that will be discussed and there is a final quiz for each material.

Figure 4. Image Display material

In the closing section or video presentation of the material, develop the closing section by creating a final quiz related to the material that has been discussed, so that the final quiz must be completed by students to be able to open the next material. If the final quiz is not taken and the results are still not appropriate or do not meet the required score, then students must repeat it again until they get the desired score. The following is image of the development of the final quiz page.

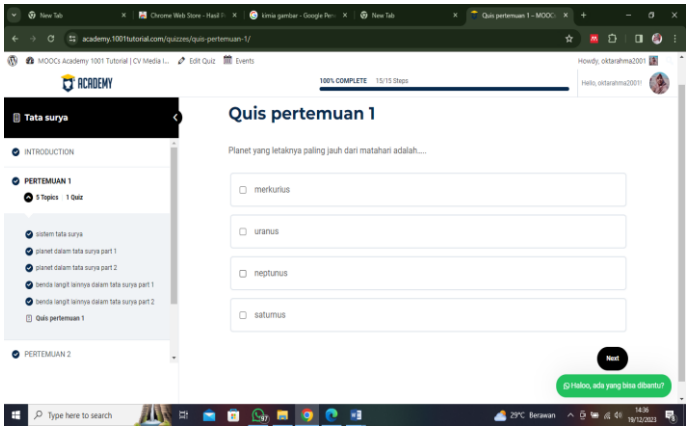

Figure 5. The Final Quiz Page

Based on the digital module feasibility test that has been carried out, the results of expert validation and suggestions for improvement are obtained by the validator. The digital module feasibility test was carried out based on four aspects that is, aspect fill material, aspect presentation, language aspects, and display aspects. With the validator, the feasibility tester for the digital module being developed consists of three validators, namely, two science education lecturers and a science subject teacher at SMPN 01 Bengkulu City.

Results on aspect Language obtain results by 97% stated in category very worthy, because in this aspect of language there are four indicators, namely, (1) straightforward, (2) communicative, (3) dialogical and interactive, (4) use term. Aligned with According to Hanatan et al (2023), the development of teaching materials can be said to be feasible because it is in accordance with communication visual in delivery material through media which used on teaching materials that are presented interactively, and on the display aspect of learning materials results by 95% with category very feasible, because in this display aspect there are four indicators, namely, (1) presentation, (2) appearance, (3) use letter, And (4) access material teach obtain results very worthy, because it has fulfil aspect. According to Megantari (2021), appearance which served with a clear voice accompanied music as *background sound* , usage appropriate color and harmonious with appearance picture And *background* become more interesting and can help teachers explain abstract learning material so that students can understand the material easily. Apart from that, according to Suryani (2020) , with a stable signal and network, access to open the module digital does not require a long

time and duration The audio and video in this *MOOCs- based solar system module* are not very long. So the module digital based *MOOCs* on solar system material This worthy For continued at the response test stage.

The average result obtained in developing this digital module is 93%. This shows that the teaching materials for this *MOOCs- based module* have met the appropriateness aspects in terms of material content, presentation, language and appearance. This is in accordance with what was stated by Hanatan et al (2023), learning tools like material teaching that can be said to be good because it is able to attract the attention of students who can combine images, text, animation and video in product packaging, apart from that the material presented in the module is in accordance with the grammar and components of the material presented, and also by getting an assessment in the appropriate category or either by validators.

In the development of this digital module, there were several improvements before it was declared suitable for response testing. Several revisions were made related to simplifying the explanation of the material, consistency in the use of words, and adding questions. After revisions have been made to the digital module which has been developed based on suggestions from the validator, the response test of the digital module is then carried out for know response participant educate to module digital which was developed. Participant educate Which involved on test response module digital This There were 20 people in class VII B of SMPN 01 Bengkulu City as respondents. The response assessment component includes several indicators which have been summarized into three aspects, namely aspects of interest, material and language. Test response done to use to see if module digital Already Good and can used in process learning as Wrong One material teach addition. According to Mawarni (2022), test response useful For see convenience something writing to be read and the appropriateness of the language conveyed, apart from that, the language aspect is related to the ease of vocabulary, sentences, paragraphs, and interviews as well as in carrying out instructions for students to carry out their learning activities.

Data test questionnaire response calculated using the formula adopted from Oksatianti (2020), where based on the calculation results, the response rate was obtained module digital. Results Which obtained shows that the percentage of student responses to MOOC- based surta modules was 83%, which was categorized as very good

D. Conclusion

MOOCs- based solar system modules in science learning for class VII junior high school students, the following conclusions can be drawn: The moocs-based solar system module in science learning for class VII SMP students based on the average results of the overall validation test on assessment aspects can be concluded as suitable for use for testing and meets the aspects of content, presentation, language and appearance. And the moocs-based solar system module in science learning for class VII junior high school students based on the overall average results of student responses to media responses is in very good criteria which includes aspects of interest, material and language.

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