Development of Mathematics Module on the Material of Flat Side Space Building in DIY Culture-Based.

Kintoko and Padrul Jana
Universitas PGRI Yogyakarta, Yogyakarta, Indonesia.
kintoko@upy.ac.id

Abstract. Research is based on the limited learning resources that can be used by students independently. The purpose of this research is to develop a Mathematics module in Jogja culture-based at junior high school with the material of Flat Side Space Building. To be able to find out the feasibility, effectiveness of the Jogja Culture-based Mathematics module that has been developed, and to determine the level of character of the love of the local culture of students through the implementation of the developed Mathematics module. This research use research and development design. Development carried out by referring to the 4-D model found by Tiagarajan is modified to 3-D including define, design, and develop. The subjects of this study are students of class VIIIB of SMP 2 Pajangan, Bantul Academic Year 2017 / 2018. The instruments used included Module assessment sheets, test instruments, questionnaire sheets, instrument validation sheets. The research data obtained is analyzed by descriptive percentage. The results show that the mathematics module based on DIY culture material Flat Side Space Building had fulfilled the eligibility criteria which included valid, effective, and practical. Valid based on expert judgment that shows the quality of worksheets is very good category with an ideal percentage of 85.7%. These results indicate that the Culture-based Mathematics module developed is suitable for use in the eighth grade mathematics learning in junior high school.

1. Introduction

Mathematics is one of the subjects published at all levels of education. At the level of the elementary and secondary school of mathematics in groups that must be mastered by the participants because of mathematics at the primary and secondary education level is the first mathematics subject, in this case, the number of learning hours. This shows everyone about the importance of mathematics [1].

The teacher as one of the learning processes in the classroom behind him, it is proper for the teacher to develop the potential at all times to improve the quality of learning. There are so many ways that teachers are biased to improve the quality of education, one of which is the use of teaching materials as learning modules. Modules as teaching materials evolve as rapidly as they are in line with technological advancements. The variety and type of teaching materials can be used quite a lot following the conditions, time, finances, and materials that are delivered. Learning media includes modules developed in improving the quality and quality of learning. The presence of learning media in the form of modules not only helps teachers in delivering material but provides added value to learning activities. This applies to all types of media, both sophisticated and expensive, and inexpensive and straightforward learning media.

However, education in Indonesia is still relatively low, especially in mathematics subjects. Though mathematics is an essential subject because it is one of the basic sciences, both aspects of application and reasoning. It has been proven that mathematics has been taught since childhood and will
continue to be used for life. One of the goals of school mathematics learning in Indonesia is that students have problem-solving skills that include the ability to understand problems, mathematical design models, complete models and interpret solutions obtained [2]. This is very important considering that in everyday life people are faced with various problems. According to [3], a person's success in his life is primarily determined by his ability to solve the problems he faces. Thus, it is clear that the ability to solve problems is essential.

Argues that story problems are questions that are presented in the form of short stories. Stories revealed can be a matter of everyday life or other issues. Also stated that in solving mathematical problems, students must master how to apply concepts and use computational skills in a variety of different new situations. Through math story problems related to daily life students' ability to solve problems can be trained. Thus students not only understand mathematical concepts but are also able to apply the concepts and use their computing skills in dealing with various situations.

However, in reality, students' mathematical problem-solving abilities are still low. The research results of the Mathematics Teachers Development Training Center Team revealed that most students still had difficulties in solving problem-solving problems and translating questions from everyday life into mathematical models [4] One factor that causes students to get questions about understanding concepts rarely is learning media that are not supportive or inappropriate. Teaching media that does not support problem-solving make students only work on routine matters do not have a more complex problem view and have difficulty in completing tasks that require understanding and decision making. The module is an alternative learning media that can help students and teachers in the learning process. By using the module, students will be able to learn systematically, actively and get information about the concept of the material being studied. The module also helps students to hone concept comprehension skills, that the Module is a Module is a book written with the aim that students can learn independently without or with the guidance of the teacher so that the Module has an essential function in the learning process.

Another problem is the swift currents of globalization that bring foreign culture into freely feared will erode the knowledge and interest of the next generation of their own culture, including the young age who live in a culture-rich region such as DIY (Yogyakarta Special Region). This is in line with the opinion [5] that globalization has a negative impact on national culture. DIY Regulation No. 4 of 2011 concerning Yogyakarta Cultural Values also states that the process of globalization can lead to a shift in cultural values, including the Cultural Values of Yogyakarta. This also includes the attitudes and actions taken towards the DIY cultural heritage. There are still many students who are not interested in knowing the DIY culture and are more inclined to want to know and like Western cultures than their own learning. Therefore, the DIY city government often holds cultural preservation activities and the cultivation of artistic love for the younger generation. Various programs and government plans to show different cultures so that we are aware of our own culture, namely by introducing and promoting tourist attractions and culture in DIY through advertising and print media, holding cultural fairs and festivals and giving patents to every religion that is owned such as dance, songs area, and musical instruments. Also, the school also strives to foster student love for local cultures such as the adoption of several culture-based schools and the holding of school activities such as participating in commemorating regional, extracurricular activities held (karawitan, dance, gamelan, and others) and providing supporting facilities. Cultural activities.

Education policy in Indonesia based on the Law of the Republic of Indonesia No. 20 of 2003 concerning the National Education System, one of which also aimed to increase the mastery, development and utilization of science and technology, including the nation's own technology in the business world, unusually small, medium and cooperative businesses to improve the competitiveness of local resource-based products. This, of course, needs to be supported by the regulations in each region such as the policy given by DIY in the DIY Regional Regulation Number 5 of 2011 concerning the Management and Implementation of Culture-Based Education. This regulation was made, among others, based on the consideration that the DIY Provincial Government had established the vision of developing the Special Region of Yogyakarta in 2025 as a leading center of education, culture and tourism destination in Southeast Asia in an advanced, independent and prosperous society. The concept of culture-based education is education that is held to meet national education standards that are enriched
with comparative and competitive advantages based on excellent cultural values so that students can actively develop their self-potential so that they become superior, intelligent, visionary, environmentally sensitive and diverse. Culture, and responsive to the development of the world.

Based on the results of a preliminary study conducted at SMP Negeri 4 Kalasan, there are still many students who are less interested and have not been able to explore various cultures, especially places that are cultural heritage in DIY. This is due to the lack of knowledge and experience of student visits. Therefore, every subject should be used as a medium to instill the character of love for culture, especially the local culture that is closest to the student's living environment. In mathematics subjects, this can be done through learning that includes cultural elements and the peculiarities of an area within it or the teaching of mathematics with a local artistic approach. According to the science of anthropology, culture is the whole system of ideas, actions, and the results of human work in the framework of the life of a society that belongs to human self by learning [6]. Every culture and subculture develops mathematics in their own way. So that mathematics is seen as the result of the mind (mind) of humans in the daily activities of the society. This concludes that mathematics is a cultural product which is the result of abstraction of the human mind, as well as a problem-solving tool. As stated by Sembiring in Prabowo that mathematics is the construction of human culture [7]. This is in line with the opinion of Ibrahim and Suparni that mathematics is a human activity and born and developed in human activities as well [8].

Related to these problems, then a teacher can link his learning with local culture in classroom learning. The DIY region itself is found in many cultural forms that allow it to be used as a means of learning mathematics in schools. One alternative solution that can be done related to the above problems is that the teacher can use MODUL mathematics based on the DIY culture that can facilitate students' problem-solving abilities and foster a sense of love for the local culture of students. Based on the observations of researchers, models like this are still rarely found. Therefore, the author wants to develop a mathematical MODULE which will help students in exploring, finding, identifying information that can be used in the process of solving a mathematical problem and introducing and instilling the value of the love of local culture. Material that will be developed in this mathematical MODULE is cube and beam material. Cubes and beams are part of the geometry field. Geometry is very close to students because almost all visual objects around students are geometric objects. Geometry is also a means of honing students' problem-solving abilities as revealed [9] one of the goals of geometry learning is so that students can be good problem solvers. Even so, what has happened so far is that geometry is difficult to understand material and tends to be hated by most students. As stated the mathematics material that is considered difficult and feared by students in mathematics is geometrical material [9].

Geometry occupies a unique position in the mathematics curriculum, because of the many concepts contained in it. From a psychological point of view, geometry is the presentation of abstractions from visual and spatial experiences, such as fields, patterns, measurements, and mapping. Whereas from a mathematical point of view, geometry is used.

The purpose of geometry learning is so that students gain confidence about their mathematical abilities, become good problem solvers, can communicate mathematically and can reason mathematically [10]. While states that the purpose of geometry learning is to develop the ability to think logically, formulate spatial intuitions, instill knowledge to support other material, and can read and interpret mathematical arguments [11].

Basically, geometry has a more significant opportunity for students to understand compared to other branches of mathematics. This is because geometric ideas have been known by students before they entered schools, such as lines, fields, and spaces. Nevertheless, the evidence in the area shows that geometry learning outcomes are still low and need to be improved [10]. In fact, among various branches of mathematics, geometry occupies the most concerning position.

In the United States, only half of the students take formal geometry lessons [10]. Besides, the achievement of all students in problems related to geometry and measurement is still low [10]. Furthermore, Hoffer stated that students in America and the Soviet Union both experienced difficulties in learning geometry.

The low level of student geometry achievement also occurs in Indonesia. Empirical evidence in the field shows that there are still many students who experience difficulties in learning geometry, from
elementary to tertiary level. Various studies show that the geometry of elementary school students is still low [12]. Whereas in SMP it was found that there were still many students who did not understand the concepts of geometry. According to [13] study, it was found that many students were wrong in solving questions about parallel lines in junior high school students and there were still many students who stated that rhombus was not a long distance.

Based on the explanation above, it is considered essential to conduct a study of the development of Culture-based mathematics learning modules to facilitate concept understanding and increase students' motivation in mathematics subjects in building material, so that it can be used as a bright spot in handling quality learning processes and can be used as a study. In the teacher in selecting teaching materials that are following the characteristics of their students. Besides, the results of this study have the primary outcome of a scientific article about research Development of Jogja culture-based mathematical modules to facilitate the ability to understand concepts and improve the character of local culture love for students of class VIII SMP to build flat side space.

2. Methods

This research is a Research and Development (R & D) research, which aims to compile a Jogja-based cultural learning module on the material of Space Building and find out the feasibility of the media which is expected to improve the mastery of concepts and the penchant for the local culture of eighth grade junior high school students. The model used for the basis of developing this learning media is the 4-D model (define, design, develop, disseminate) found [14]. But in this study 4-D was modified to 3-D, namely define, design, and improve. The selection of this model is based on the implementation stage which is divided in detail and systematic.

The development procedure used in this research and development is the development of 3-D namely define, design, and develop. The stages of study based on the model are as follows:

a. Define

The development of learning multimedia begins with the define stage or defining/analyzing needs. The purpose of this stage is to identify and define requirements in the learning process. This stage starts with an analysis of the objectives and boundaries of the material adapted to the syllabus in the 2013 curriculum. There are five steps in this stage: pre-research, student analysis, task analysis, concept analysis and formulation of learning objectives.

b. Design

This stage is spelled out to prepare/design a scenario for Jogja culture-based learning modules with steps, namely:

i. Material formulation stage
ii. Stage of designing a flowchart
iii. Phase designing module
iv. Stage program / do modules

c. Develop

This stage includes the preparation stage of Jogja's culture-based learning modules on Space Building material, media assessment by internal reviewers consisting of material experts and media experts, external reviewers comprised of mathematics teachers and peers, limited trials whose assessment/validation results will be used as input for repairs before being used in field trials. Field trials aim to produce the final product that has been revised.

3. Result

a. Needs Analysis

The development of Jogja's local Culture-based Mathematics Module uses the Research and Development method. The model used for the basis of developing this learning media is the 4-D model (define, design, develop, disseminate) found [14]. But in this study 4-D was modified to 3-D, namely define, design, and improve. The selection of this model is based on the implementation stage which is divided in detail and systematic.
Based on the results of interviews with students and teachers at SMP N 2 Pajangan, researchers found the following problems:

i. Teachers have not developed their own teaching materials according to the needs of students

ii. Teaching materials used by teachers and students still use the work of outside publishers

iii. There is still a lack of locally-based teaching materials in Jogja

iv. Students' understanding of building space is still low

v. In learning, motivation to love the homeland of students is still low and multiplying information from other sources is still low.

vi. The absence of a mathematical module based on Jogja culture that is used to add students' references to the homeland.

Based on the problem and the results of the above needs analysis interview, the researcher concludes the need for teaching materials to be developed, namely

i. The Mathematics module for the eighth grade of junior high school which can foster an understanding of concepts and love of the homeland of students

ii. Practical learning modules are used in learning in class and used by teachers and students independently.

b. Preliminary Design or Product Design Results

The design result or design of the initial product of Jogja's cultural-based module is still in the form of a draft that is ready to be assessed by experts. Module design is designed using Ms word 2010 and Corel draw to cover the cover. Module products contain profiles, preface, table of contents, module descriptions, module usage instructions, concept maps, KI and KD, learning activities 1, learning exercises 2, Teaching activities 3, teaching activities 4, Competency tests, Bibliography, Glossary.

Products The developed modules contain class VIII material about building flat-side spaces including, Cube, Beams, Limas, and Prisma which include Jogja culture. This module has enough pictures of the cultural buildings in Yogyakarta. The following is presented the results of the initial product design before and after the Module revision.

c. Expert Validation Results

The product design of Jogja's culture-based learning module is validated by material experts and media practitioners. The validation process is carried out by giving a value to the questionnaire on the assessment of mater experts and media experts on teaching materials.

| No. | Evaluator  | Feasibility of Content | Linguistics | Presentation | Total |
|-----|------------|------------------------|-------------|--------------|-------|
| 1.  | Validator 1| 83                     | 47          | 42           | 172   |
| 2.  | Validator 2| 79                     | 41          | 42           | 162   |
|     | amount     | 162                    | 89          | 84           | 334   |
|     | Average    | 81                     | 44,5        | 42           | 167   |
|     | Percentage of Ideality | 84,38% | 85,58% | 84% | 84,77% |
|     | Category | Very good              | Very good  | Very good    | Very good |

Based on the table, it can be seen that the components of content, linguistic, and presentation feasibility are in the excellent category with ideal percentages are 84.38%, 85.58%, and 84%, respectively. Based on the results of the module assessment, it can be concluded that the quality of the Mathematics Module based on DIY culture, in general, is very good with an ideal percentage of 85.7%. The draft I, which has been revised and assessed by the validator, is from now on referred to as Draft II, which will be used during small-scale field trials.

The development step after completing the expert validation step and the Draft I revision is a small-scale field trial and product revision (Draft II). Small field trials are used for readability testing
and presentation of advanced modules. Readability and presentation tests are carried out to assess the level of ease of reading the manuscript, the performance that is interesting, and the clarity of the documents and images in the Module.

Sources of data from this small-scale field trial were six eighth grade students of SMPN 2 Pajangan consisting of three from VIIIA class and three VIIIC grade students. Sampling was done based on the criteria of high, medium and low ability in each category with the help of the teacher. Such sampling is based on proper LKS requirements according to [15], namely on academic qualifications. These requirements relate to the use of universal worksheets that can be used well for students who are slow, medium, or smart. Small-scale field trials were held on Thursday, 10 July 2018 outside school hours by distributing Draft II to the six students. Then, students are asked to read the contents and give opinions about Draft II by filling out the questionnaire that has been provided by the researcher. Following are responses, criticisms, and suggestions obtained from the small-scale field trial stage.

4. Conclusion

This research and development is a Research and Development (R & D) research, which aims to compile a Jogja-based cultural learning module on space building material and find out the feasibility of the media which is expected to improve the mastery of concepts and preferences of the local culture of the eighth grade junior high school students. The model used for the basis of developing this learning media is the 4-D model (define, design, develop, disseminate) found [14]. But in this study 4-D was modified to 3-D, namely define, design, and improve. In the last step, the researcher turned it into the final product, because this study did not make mass production.

The product of teaching materials developed contains learning material for VIII SMP class Building Material Flat-side space: Product modules include profiles, preface, table of contents, module descriptions, module usage instructions, concept maps, KI and KD, learning exercises 2. Teaching activities 3, learning activities 4, Competency testing, Bibliography. The quality of teaching materials is based on the validity, practicality and effectiveness aspects when tested on research subjects, namely students of class VIII B of SMPN 2 Display as follows: Teaching materials Based on the table, it can be seen that the components of content, language, and presentation are in an excellent category with ideal percentage respectively 84.38%, 85.58%, and 84%. Based on the results of the module assessment, it can be concluded that the quality of the Mathematics Module based on DIY culture, in general, is very good with an ideal percentage of 85.7%. So it gets an A (excellent).

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