QISTINA: Jurnal Multidisiplin Indonesia
Vol. 2 No. 1 June 2023
P-ISSN: 2964-6278 E-ISSN: 2964-1268

Development of a Problem Based Learning Module for Class XI SMAK Arastamar Lotu Academic Year 2021/2022

Rintis Kharisna Putri Zega[1] Ratna Natalia Mendrofa[2] Yulisman Zega[3]
Mathematics Education Study Program, Faculty of Teacher Training and Education,
Universitas Nias, Gunungsitoli City, Nort Sumatera Province, Indonesia[1,2,3]
Email: rintiskharisna@gmail.com[1]

Abstract

The problems in this study are educators who have not used the mathematics learning module in the teaching and learning process and the low learning outcomes of students because of the lack of students' ability to construct the knowledge they acquire. The objectives of this research are: to know the feasibility of learning modules, to know practicality, to know the effectiveness of problem-based learning-based learning modules in the material for class XI SMAK Arastamar Lotu lines and sequences in the learning process. This research is a development research using the ADDIE development model which consists of analysis, design, development, implementation, and evaluation stages. The instrument used is a validation questionnaire which includes aspects of content feasibility, presentation feasibility, and design feasibility, student response questionnaires and learning achievement tests. Research result; (1) module content validity reached an average percentage of 94.84% (very feasible), language validity achieved an average percentage of 100% with very feasible criteria, design validity achieved an average percentage of 95% with very feasible criteria. (2) the practicality of the module based on the corporate test reached a percentage of 95.65% with very practical criteria, small group tests reached a percentage of 91.95% with very practical criteria, field tests reached a percentage of 91.68% with very practical criteria, (3) effectiveness the module reaches a percentage of 90% with very effective criteria.

Keywords: Module, Problem Based Learning, ADDIE

INTRODUCTION

At this time education is an important subject in human life. Education is a form of embodiment of human culture that is dynamic and continues to develop. Therefore changes or developments in education are things that really should happen in line with changes in the culture of life in a better direction in anticipation of future interests and demands of modern society. This is in line with the Law of the Republic of Indonesia Number 20 of 2003 Article 3 which states that: National education functions to develop capabilities and form dignified national character and civilization in the context of educating the nation's life, aiming at developing the potential of students to become human beings who believe and having the character of God Almighty, having noble character, being healthy, knowledgeable, capable, creative, independent, and being a democratic and responsible citizen.

Education is programmed learning experiences in the form of formal, non-formal, and informal education at school, and outside of school, which lasts a lifetime aimed at optimizing individual abilities, so that in the future they can play the role of life appropriately (Triwiyanto, 2014: 23). The purpose of education is to create someone with quality and character so that they have a broad outlook in the future to achieve an expected goal and be able to adapt quickly and precisely in various environments (Amri, 2016: 241). Education will make humans develop their potential so that they are able to deal with any changes that occur as a result of advances in science and technology.

Therefore, the problem of education needs to get better attention and handling which involves various problems related to quantity and quality. This can be achieved by implementing education that is timely and effective to achieve learning objectives which are carried out in the form of a teaching and learning process which is the implementation of the school curriculum through teaching activities. Based on the very important functions and goals of education, education is carried out as well as possible so that it can achieve the expected educational goals. One of the government's efforts to improve the quality of education in Indonesia is to continue to make efforts to update the curriculum development.

The current curriculum is the 2013 curriculum, which is one of the changes in the learning paradigm from conventional learning to learning that makes students play an active role and trains students' creative thinking skills. In Indonesia itself, the notion of curriculum is contained in Article 1 point 19 of Law Number 20 of 2003 concerning the National Education system, namely the curriculum is a set of plans and arrangements regarding goals, content, and learning materials and methods used as guidelines for the implementation of learning activities to achieve certain educational goals. The 2013 curriculum is based on the principle that every attitude, skill and knowledge formulated in the curriculum in the form of basic abilities can be learned and mastered by every student in accordance with the ever-changing times. The roles and functions of the curriculum adjust to human existence which always faces changes and challenges. The development of roles and functions of the curriculum encourages curriculum renewal. Views and trends in future life are of primary interest in curriculum renewal (Triwiyanto, 2014: 132). In realizing attitudes, skills and knowledge, the 2013 curriculum has prepared various subjects including mathematics.

Learning mathematics in the world of education has an important role for students in training cooperation to deal with various problems, to think logically, systematically, critically and creatively. According to Meida et al (2020: 128): Mathematics is a science that is very important in the development of science, both for all the tools in the application of other fields of science and in the development of mathematics itself. Mathematics is a field of study that has an important role in the world of education. Mastering mathematics is not only seen from the unit such as arithmetic, but there is something broader, namely mastering and being skilled at solving problems with certain stages. According to Hamzah (2014: 48) Mathematics is a way or method of thinking and reasoning, a symbolic language that can be understood by all cultured nations, art as in music full of symmetry, patterns, and rhythms that can be entertaining, a tool for architects, cartographers and navigators. aerospace engineers, engine builders, and accountants.

Apart from that realizing the importance of learning mathematics in schools, in the Regulation of the Minister of National Education no. 20 of 2003 concerning the National Education System Article 37 Paragraph 1 (Ministry of National Education 2003) emphasized that mathematics is a compulsory subject for students. Mathematics subjects have been studied starting from Elementary School (SD), Junior High School (SMP), High School (SMA) to the tertiary level. The goal is to introduce mathematics to students to be applied in everyday life and in the subject itself. Schools have a very important role as a place for education in educating their students, guiding and teaching students to improve their power or abilities in learning. For this reason, schools organize learning processes to achieve learning objectives. The teacher as the person in charge of the learning process in the classroom is required to be able to provide the best for students in order to create effective and efficient learning, because this has a direct effect on improving the quality of student learning outcomes, especially in mathematics. Educators and educational staff are obliged to create an educational atmosphere that is meaningful, fun, creative, dynamic and dialogic; have a professional commitment to

improve the quality of education; and set an example and maintain the good name of the institution, profession, and position in accordance with the trust given to him (Triwiyanto, 2014: 133).

One of the main elements that the teacher prepares is a set of lessons that are presented in the classroom to create a conducive learning atmosphere so that the process of forming knowledge in students can develop optimally. In the implementation of learning teaching materials as learning tools are a very important part, teaching materials used in the learning process which if developed according to the needs of teachers and students and used correctly will be one of the important factors that can improve the quality of learning. As with Madjid's statement in the Halik journal (2018: 73) says that: Teaching materials are all forms of materials used to assist teachers in carrying out teaching and learning activities in class. The teaching materials in question can be in the form of written materials or unwritten materials. Teaching materials enable students to learn a competency or basic competency in a coherent and systematic manner so that cumulatively they are able to master all competencies as a whole and integratedly.

With the existence of teaching materials, the teacher is no longer the only source of learning. Meanwhile, by utilizing teaching materials that have been designed according to learning needs, students are directed to become active learners because they can read or study the material in the teaching materials first before participating in class learning. Thus, when discussing material in class, students are prepared with sufficient information and knowledge so that the available study time is no longer used by the teacher to explain material at length, but is more used for discussion and discussing certain materials that are not yet discussed. understood by students. One of the teaching materials that can be used by a teacher in carrying out learning is a module.

Modules are teaching materials that are systematically designed so that users can learn with or without a facilitator or teacher. The module is a very important and strategic educational tool to determine success in the teaching and learning process of students at school. With the module, the implementation of education will run more smoothly, and teachers can manage learning activities effectively and efficiently. Modules are a form of print-based teaching materials designed for independent study by learning participants therefore modules are equipped with instructions for self-study (Asyhar, 2012: 155). Furthermore Amri (2013: 98) states that the Module is a complete learning program, arranged systematically, referring to clear and structured learning objectives, which contains learning objectives, materials and activities to achieve the objectives and evaluation of the achievement of learning objectives.

Based on the results of observations and interviews conducted by researchers with math caregivers for class XI at SMAK Arastamar Lotu it was found that in the learning process in the classroom the teacher as an educator uses learning tools in this case printed books provided by the school as the only source of learning and in the number is still limited, and in the learning process educators have not yet developed other teaching materials such as mathematics learning modules to assist educators in the teaching and learning process. In addition, it was found that learning in class using the lecture method or during the teaching and learning process was still dominated by the teacher even though the 2013 curriculum had been enacted. As a result, students in the learning process in the classroom still tend to be passive, which means that in learning and teaching activities students continue to depend on the teacher and only receive material delivered by the teacher and cannot study and search independently. So that this affects the learning outcomes of most students who are still low because of the lack of students' ability to construct the knowledge they get.

From the problems above, one of the reasons why students in the learning process in the classroom still tend to be passive is because the teaching materials used do not facilitate students to learn actively in discovering their own concepts. The teaching material used is a textbook that meets the usability requirements for use in the learning process, but has not been able to meet the needs of students in constructing concepts and solving questions that are different from the examples of questions given, the material presented in the textbook is still not related to the everyday life so that students have difficulty understanding the language in the textbook.

Students need other teaching materials to support their learning process, these teaching materials are in the form of mathematics learning modules that can help students to study independently or in groups in discovering the concepts of mathematics learning material to be studied. The use of this module is useful for activating students in the learning process, helping students develop concepts, as a guide for teachers and students in carrying out the learning process, and helping students obtain notes on material learned through learning activities. The use of this module is also expected to help students be actively involved with the material discussed and provide learning experiences for students in practicing their independence in learning.

To overcome problems in learning so that students are able to construct their own knowledge, the researchers developed a module based on Problem Based Learning. This Problem Based Learning-based module trains and develops the ability to solve problems that are oriented to authentic problems from students' actual lives, so that they can stimulate students' thinking skills. With the module, students are expected to play an active role in learning, students can apply and develop a scientific attitude in learning and everyday life. In this module, one of the materials contained in the package book will be loaded, namely sequence and series material, this module is adapted to the core competencies and basic competencies that will be achieved according to the syllabus, so that learning activities can run more optimally and be able to help students achieve core competencies and basic competencies that have been determined.

Based on the background of the problem above, the formulation of the problem can be found, namely: How is the validity of the Problem Based Learning module at SMAK Arastamar Lotu on sequences and series material by expert validators? How practical is the Problem Based Learning-based module at SMAK Arastamar Lotu on sequences and series material? How is the effectiveness of the Problem Based Learning-based module at SMAK Arastamar Lotu on sequences and series material for students? The objectives in carrying out this research were: To find out the validity of the content, language, and design of Problem Based Learning-based mathematics learning modules at SMAK Arastamar Lotu on sequences and series material by expert validators. Knowing the level of practicality of Problem Based Learning-based mathematics learning modules at SMAK Arastamar Lotu on sequences and series material. Knowing the level of effectiveness of Problem Based Learning-based mathematics learning modules at SMAK Arastamar Lotu on sequences and series material.

RESEARCH METHODS

Development Style

According to Apriani (2017: 32) the development research used is (Research and Development). The method used in testing the effectiveness of a product and producing a product is development research. A simple structured procedure with the aim of promoting active learning is called a developmental model. Guiding and directing users from step to step that must be done is the goal of development. The development model used in developing

teaching materials in the form of modules is the ADDIE development model. The ADDIE model is a model whose development process is sequential but interactive, that is, the evaluation results at each stage can be used for development to the next stage.

Development Procedure

To produce a Problem Based Learning based module using the ADDIE model, a development procedure is required. The development process using ADDIE consists of five stages, namely: Analysis (Analyze), planning (Design), development (Development), Implementation (Implementation), Evaluation (Evaluation).

RESEARCH RESULTS AND DISCUSSION

Development Stage (Development)

The third stage of the ADDIE learning model is the development stage. The results of this development stage consist of assessments by material expert validators, linguists and design experts as well as product trials. The material expert assessment was carried out by an expert who is experienced in the field of learning mathematics, namely a lecturer in mathematics education who is competent in the field of content/materials and a mathematics teacher at SMAK Arastamar Lotu, he is Mr. Yulisman Zega, M.Pd., M.Si and Mrs. Sidermawati Nazara, S.Pd. The linguist assessment is carried out by an expert or expert who is experienced in presenting language, namely a Lecturer in Indonesian at the University of Nias, He is Mr. Imansudi Zega, M.Pd. And the design expert's assessment was carried out by experts or experts experienced in design, namely Mr. Rines Boy Zega, S.Kom.

After conducting validation tests by experts, the next step is for researchers to conduct product trials which are intended to determine the practicality of teaching materials in the form of mathematics learning modules using non-test instruments, namely questionnaires. The school where the trial of this learning module product was carried out was the Arastamar Lotu SMAK school which is located in Lawira Satua Village, Lotu District, North Nias Regency, this trial was conducted to assess whether this mathematics learning module development product was feasible, practical and effective for class XI high school or vice versa. The product trial was carried out in three stages, namely individual testing and small group testing which was carried out in class XII at Arastamar Lotu SMAK school, and the third stage, namely field trials which were carried out in class XI SMAK Arastamar Lotu. Individual trials were carried out by providing teaching material products in the form of mathematics learning modules to 3 (three) students with high, medium and low abilities. Then the small group test is carried out by dividing students into small groups, consisting of 5 (five) students. And field tests were carried out by carrying out learning using teaching material products in the form of mathematics learning modules with 25 students.

Module Development Discussion

Problem-Based Learning-based mathematics learning module is a teaching material unit consisting of a series of learning activities that are arranged systematically to assist students in learning independently and to find knowledge through concepts based on the experiences of these students. This mathematics learning module is structured using a Problem-Based Learning-based learning method, through this learning model students are directed to be able to solve some of the problems that exist in the real world and guide them to be able to solve these problems through activities or learning experiences carried out during the learning process.

The use of Problem Based Learning-based learning methods on sequences and series materials makes the learning process of students more active, even though initially students feel unfamiliar with the mathematics learning modules used, especially with Problem Based Learning-based learning methods they rarely encounter, but before starting the learning process researchers first explain how to use the learning module and how the system works from the learning method. In its implementation, some students at the beginning of learning are still in a vacuum and it is difficult to provide ideas or responses regarding the material being studied, students who are in a vacuum are still carried away by the learning atmosphere that they often use when studying and only a few people want to give opinions. However, by following the steps of learning based on Problem Based Learning students are invited to be able to build their own knowledge through learning activities so that students have problem solving abilities and can convey how the process of solving a problem they encounter.

This Problem Based Learning-based mathematics learning module has been compiled by researchers and has been developed and assessed by validators including material, language and design expert validators. This Problem Based Learning-based mathematics learning module has also been implemented and tested in the field and trials have been carried out in class to see the effectiveness of the modules that have been developed. Based on the learning outcomes test, the researchers concluded that the Problem Based Learning-based mathematics learning module was effective in its use. From the existing data, the researcher concluded that the problems that occurred in the research background had been answered. Where the teaching materials in the form of this module can already be used in the learning process, especially in class XI SMAK Arastamar Lotu with Rows and Series material and learning modules have been developed so that students more easily understand learning using Problem Based Learning-based mathematics learning modules.

CONCLUSION

Based on the results of data processing and analysis that has been carried out by researchers regarding "Development of Problem Based Learning Mathematical Learning Modules on Rows and Series Material for Class XI SMAK Arastamar Lotu", the researchers draw the following conclusions: The validity of the Problem Based Learning mathematics learning module for class XI SMA based on Problem Based Learning on material aspects of Sequences and Series by 96.42%, validity based on language aspects by 100%, and validity based on design aspects by 96.66%. The overall results of the validation test are very valid and very feasible to use. The level of practicality of the Problem Based Learning class XI high school mathematics learning module on the subject of Rows and Series in the individual test is 95.64% with very practical criteria, small group test is 91.95%% with very practical criteria and field test is 90, 51% with very practical criteria. The level of effectiveness of the problem-based learning module for class XI high school mathematics in the material for Sequences and Series with the completeness of 22 students with a completeness percentage of 88% in the very effective category.

Based on research findings, discussion and conclusions in this study, the following are some suggestions from researchers as follows: This product can be used in teaching mathematics for class XI, which can support teachers in the teaching and learning process. It is hoped that schools can make this Problem Based Learning-based mathematics learning module a material for consideration in developing learning resources that are appropriate to the situations and conditions of students and adapted to the potential that exists in the school environment. It is hoped that students can study this mathematics learning module, so that they can add knowledge related to the material contained in this module. Students are

expected not to immediately read the learning activities but to follow the instructions for use, and students are also expected to be more active by trying to solve the questions that have been included in the Problem Based Learning-based mathematics learning module. In this study, the researcher carried out the research up to the evaluation stage. Evaluation carried out by researchers in research is formative evaluation. For this reason, the researchers suggest that in future carry out summative evaluations in other educational units to measure the final competency of students using products that have been developed.

BIBLIOGRAPHY

Amri Sofan. 2016. Pengembagan dan Model Pembelajaran dalam Kurikulum 2013. Jakarta: Prestasi Pustakaraya

Anggraini, N, dan Masykur, R. 2018. Modul Matematika Berdasarkan Model Pembelajaran Problem Based Learning Materi Pokok Trigonometri, dalam Desimal: Jurnal Matematika, Vol. 1, No. 2,

Apriani, Buyung, dan Relawati. 2017. Pengembangan Lembar Kerja Siswa (LKS) berbasis Contextual Teaching and Learning (CTL) Pada Materi Faktorisasi Suku Aljabar Kelas VIII SMP Negeri 9 Muaro Jambi. Vol. 1. Nomor 1.

Daryanto, dan Aris Dwicahyono. 2014. Pengembangan Perangkat Pembelajaran (Silabus, RPP, PHB, Bahan ajar). Yogyakarta : GAVA MEDIA.

Daryanto. 2013. Menyusun Modul Bahan Ajar Untuk Persiapan Guru dalam Mengajar. Yogyakarta : Gava Media

Depdiknas. 2008. Kurikulum Tingkat Satuan Pendidikan. Jakarta: Dikmenum Depdiknas.

Gitriani, R, dkk. 2018. Pengembangan Lembar Kerja Siswa Berbasis Pendekatan Kontekstual Pada Materi Lingkaran Untuk Siswa SMP, dalam Jurnal Review Pembelajaran Matematika, Vol. 3, No. 2,

Halik, Fitriani. Thamrin Tayeb, Baharuddin, Nidya Nina Ichiana. 2018. Pengembangan Modul Berbasis Model Problem Based Learning (PBL) Pada materi Aritmetika sosial. Vol. 1, No. 2

Hamdani. 2010. Strategi Belajar Mengajar. Bandung: Pustaka Setia

Hamzah, Ali dan Muhlisrarini. 2014. Perencanaan dan Strategi Pembelajaran Matematika. Jakarta: Raja Grafindo Persada.

Isrok'atun. Rosmala, Amelia. 2018. Model-model Pembelajaran Matematika. Bandung: PT. Bumi Aksara

Khayati, fitrotul. Imam sujadi, Dewi retno sari saputro. 2016. Pengembangan Modul Matematika Untuk Pembelajaran Berbasis Masalah (Problem Based Learning) Pada Materi Pokok Persamaan Garis Lurus Kelas VIII SMP. Vol. 4, No. 7

Kustandi Cecep, dan Daddy Darmawan. 2020. Pengembangan Media Pembelajaran Jakarta: Divisi Prenamedia Group

Lubis, S, M. 2016. Pengembangan Perangkat Pembelajaran Topik Bilangan dengan Pendekatan Pendidikan Matematika Realistik di Madrasah Ibtidaiyah, dalam Jurnal Tarbiyah, Vol. 23, No. 1

Majid, Abdul. 2013. Perencanaan Pembelajaran (Mengembangkan Standar Kompetensi Guru). Bandung : Remaja Rosdakarya Offset.

Meida Puput. Sutrisni Andayani,Nurul Farida.2020.Pengembangan Bahan Ajar Berbasis Inkuiri Terbimbing Pada Materi Himpunan,dalamJurnalpendidikan Matematika, Vol. 1, No.2

Najuah.dkk. 2020. Modul Elektronik Prosedur Penyusunan dan Aplikasinya Jakarta : Yayasan Kita Menulis

Nana. 2019. Pengembangan Bahan Ajar Jakarta : Lokersha

Nat H. Rayanrasyahar 2012. Kreatif Mengembangkan Media Pembelajaran Jakarta : TimGPPress

Nurdyansyah & Eni Fariyatul Fahyuni. 2017. Inovasi Model Pembelajaran Sesuai Kurikulum 2013. Sidoarjo : Nizamia Learning Center.

Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 59 Tahun 2014 Tentang Kurikulum 2013 Sekolah Menengah Pertama/Madrasah Tsanawiyah,

Rochmad. 2012. Desain Model Pengembangan Perangkat Pembelajaran Matematika. Vol. 3. Nomor 1

Sanjaya, W. 2010. Strategi Pembelajaran Berorientasi Standar Proses Pendidikan. Jakarta: Prenadamedia Group.

Septryanesti,NdanLazulva.2019.Desain Dan Uji Coba E-Modul Pembelajaran Kimia Berbasis Blog Pada Materi Hidrokarbon,dalam JurnalTadris Kimiya, Vol. 4, No.2,

Shoimin, aris. 2014. 68 Model Pembelajaran INOVATIF dalam Kurikulum 2013. Yogyakarta: Ar-ruzz Media

Sukiman. 2012. Pengembangan Media Pembelajaran. Yogyakarta: PT Pustaka Insan Madani

Tegeh, Made, Inyoman Jampel, dan Ketut Pudjwan. 2014. Model Penelitian Pengembangan. Yogyakarta: Graha Ilmu.

Triwiyanto, Teguh. 2014. Pengantar Pendidikan. Jakarta: Bumi Aksara

Undang-Undang Republik Indonesia No. 20 Tahun 2003tentang Sistem Pendidikan Nasional 2003

Yuberti. 2014. Teori Pembelajaran dan Pengembangan Bahan Ajar Dalam Pendidikan. Bandar Lampung : Anugrah Utama Raharja (AURA)