

MEANS END ANALYSIS (MEA) MODEL DEVELOPMENT ON SOCIAL MATHEMATICS LEARNING JUNIOR HIGH SCHOOL

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ABSTRACT

The purpose of this development research was to produce a mathematics learning module using the Means End Analysis (MEA) model on the subject of Social Arithmetic for VII grade junior high school. The development model used is ADDIE only up to the stages of Analysis, Design, Development. The subject in this study was Expert Validation consisting of two Expert Lecturers and one Mathematics Teacher as validators. The feasibility of the mathematics learning module refers to the results of the module's assessment by experts on the learning module being developed. The mathematics learning module uses the Means End Analysis (MEA) model on the subject of Social Arithmetic which has been developed to meet the criteria of being feasible/valid to use for class VII junior high school students. Based on the results of expert validation, the results of the final assessment on IPPP-1 by the third expert with an average score of 3.53 with a proportion of 88.33% fulfilled the criteria. The results of the final assessment on IPPP-2 by the third expert with an average score of 3.92 with a proportion of 97.92% met the criteria. As well as the results of the final assessment on IPPP-3 by the third expert with an average score of 3.89 with a proportion of 97.22% fulfilling the criteria. Based on these data, it can be concluded that the development of mathematics learning modules using the means end analysis (MEA) model on the subject of social arithmetic in junior high school is feasible.

Keywords: Development, Mathematics Learning Module, Social Arithmetic

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1. INTRODUCTION

Learning Learning is a process where there is interaction between the teacher and students so that the message can be conveyed properly. The learning process and learning outcomes are two things that cannot be separated. For this reason, all factors that influence it must be optimized to achieve good learning outcomes, especially the teaching and learning process which greatly determines students' understanding of the subject matter provided by the teacher. In the Education Process Standard, learning is designed to teach students (Arief Aulia Rahman, 2016). The ability of students' mathematical connections is an integral part of a series of mathematics learning processes. Connection aims to help shape student perceptions, by seeing mathematics as an integrated part of life. Subject matter will be more meaningful and enjoyable if students learn subject matter that is related to the context of their lives (Sri Wahyuni, 2022). Along with the development of the curriculum in Indonesia, the learning paradigm has also developed from Teacher Centered Learning (TCL) towards Student Centered Learning. In the 2013 curriculum the teacher's position in learning is as a facilitator. The approach applied to the learning process requires students to be able to think critically and find their own solutions to problems and the material being studied [1]. The application of the desired learning process in the 2013 curriculum is centered on students and minimizes the lecture method. Curiosity in students needs to be grown and the learning process applied must train students to be able to learn independently. One of these goals can be achieved if students' interest in reading is high. (Putri, 2022) Mathematics as a scientific discipline that trains students to think logically, rationally, critically and carefully must be able to support the progress of national education. The obstacle is that most students agree that mathematics is the most difficult and frightening subject. Perceptions like this must be eliminated because it will be the cause of student learning failures in the field of mathematics. Everyone can learn critically because the human brain is constantly trying to understand experience.

According to Agustina 2020 , understanding mathematical concepts is one of the most important things in learning. Understanding the concept makes it easier for students to solve problems because students will be able to associate and solve these problems armed with the concepts they understand. Conversely, if students do not understand a given concept, students will tend to experience difficulties in using and selecting certain procedures or operations and applying problem-solving concepts and algorithms. Recognizing the importance of understanding concepts in learning mathematics, learning needs to be planned in such a way that at the end of learning students can understand the concepts they are learning [2].

Based on the observations made, most of the learning processes applied to mathematics are still teacher-centered. The position of students in the learning process is as Communicator without giving feedback. Because students only act as recipients of information, students' understanding is limited to the material presented and they do not understand the meaning and purpose of the material being studied. Facilities and teaching materials are still very limited, teachers only use whiteboards during the learning process. Another obstacle experienced during the learning process is the different abilities of students. Students who have relatively low thinking skills compared to their classmates will find it difficult to digest the material presented by the lecture method. Thus, students are required to be able to follow the learning process and learn material that is understood independently.

Another difficulty experienced by students is the boredom of students with monotonous teaching materials, so that students are less interested in learning these teaching materials. Students do not understand the material being taught in accordance with the procedures of real problems. Students tend to be able to solve questions but the majority of students' understanding is still relatively low. As a result, if the types of questions are different, students will have difficulty solving them. Thus it is necessary to have a chronological description so that students can understand the material and the objectives of learning.

To overcome the obstacles experienced by students in understanding the teacher's explanation, it is necessary to prepare teaching materials that are tailored to the needs of students. Apart from being interesting, easy to understand/learn well done with direction from the teacher or independently, so as to foster a concrete understanding. Through real illustrations in everyday life which are then poured into learning materials in the form of teaching materials, because teaching materials are a source of learning for students. So teaching materials need to be arranged according to needs, so that they can be used optimally. In line with the presentation of teaching materials which are the source of the learning materials being taught.

Teaching materials are subject matter that is arranged in a complete and systematic manner based on the learning principles used by teachers and students in the learning process (Sungkono, 2009: 2) [3]. According to Kurniawati (2013: 10) teaching materials consist of 2 types, namely print and non-print. Printed teaching materials are teaching materials in the form of printouts such as modules, textbooks, student worksheets, study guides, and handouts. Non-printed teaching materials are teaching materials that are not in the form of printouts so that devices are needed for operation such as computers, projectors, LCDs, and the internet. Non-printed teaching materials can be in the form of learning audio, learning videos, and interactive media. In order for the jara materials to be used optimally, the teaching materials developed are adapted to the characteristics of the intended school. [4]

Teaching materials developed must be in accordance with the needs. The teaching materials needed are teaching materials that can motivate students to learn independently so that learning can be student-centered. The different abilities of students require teaching materials that can be studied independently according to their respective learning speeds. Printed teaching materials designed so that students can study independently are modules. According to Kurniawati (2013: 10) modules are teaching materials that can be studied by students with different abilities and times.

Based on research previously conducted by Endang Novita Tjiptiany, Abdur Rahman As'ari, and Makbul Muksar in 2016 entitled "Development of Mathematics Learning Modules with an Inquiry Approach to Help Class X High School Students Understand Opportunity Material", the results show that the module used with The inquiry approach obtains a validity score of 3.31 in the Valid category. In the implementation of learning using the module, the total average score for all aspects was 3.90 from two practitioners. The results of the field trials obtained an average score of 85.21 for module mastery, so it was concluded that the module mastery of the trial students for the opportunity material was said to be good and the students were said to have completed the material. The results of the

student response questionnaire showed a score of 3.56 which means students gave a positive response.

While the research conducted by Ketut Suastika and Amaylya Rahmawati in 2019 entitled "Development of Mathematics Learning Modules with a Contextual Approach" the results showed that student responses obtained an average percentage of 79% in the "Good" category and the results of the teacher's response were 95% with the "Very Good" category as well as the results of the posttest students got a percentage of 68% in the "Good" category. Then research conducted by Nina Juniarti in 2014 entitled "Application of the Means End Analysis (MEA) Learning Model in DI SETTINGS to Improve Student Learning Outcomes" the results showed the implementation of lesson plans in cycle I was 85.55%, cycle II was 87.15% and cycle III 92.72% with the category "Very Good". Analytical skills in cycle I 56.86%, cycle II 75.58%, and cycle III 80.93% with the category "Very Good". to increase the completeness of student learning outcomes in a classical manner in the first cycle 15.34% (not complete), cycle II 85.0% (complete) and cycle III 100% (complete).

The importance of students to solve problems allows students to be analytical in making decisions in their lives. If students are trained to solve problems, then students are automatically able to make decisions, so that students have the ability to collect relevant information, analyze information, and realize how necessary it is to re-examine the results obtained.

2. RESEARCH METHOD/MATERIAL AND METHOD/LETERATURE REVIEW

This research was conducted at SMP Muhammadiyah 57 Medan which is located at Jalan Mustafa No.1 Glugur Darat Village 1, East Medan District. When the research was carried out in odd semesters. The schedule for carrying out the research is adjusted to the schedule for the mathematics subject at class VII SMP Muhammadiyah 57 Medan for the 2020/2021 academic year. The subjects in this research and development expert validation were three experts consisting of one expert lecturer and two mathematics teachers as validators of the feasibility of lesson plans (IPPP-1), Mathematics Learning Module (IPPP-2), and Evaluation Sheet (IPPP-3). This research has no object because researchers do not conduct research on students.

Research and development or research and Development (R&D). Producing a particular product and testing the effectiveness of the product using research and development (R&D). Research and development aims to produce effective products to help students understand and describe problems regarding Social Arithmetic.

This study uses the ADDIE learning model which stands for Analysis, Design, Development or Production, Implementation and Evaluation. However, this research was conducted up to the Development or Production stage (product development or manufacture).

The instrument used to obtain data about the expert's assessment of the applied mathematics learning module. The results of this assessment are used as the basis for module improvements before being tested. The feasibility questionnaire sheet for the mathematics learning module was filled in by expert lecturers and mathematics teachers. The feasibility questionnaire sheet for the mathematics learning module consists of the RPP Learning Planning Assessment Instrument (IPPP-1), the Mathematics Learning Module Assessment Instrument (IPPP-2), and the Learning Devices Assessment Instrument (IPPP-3) which are arranged using a Likert scale. The preparation of this feasibility questionnaire sheet was developed based on the instrument grid for each learning planning assessment instrument, module 31 learning mathematics and learning device assessment. In the research that will be carried out, validation of the feasibility of learning media will be carried out through the opinion of an expert.

3. RESULTS AND DISCUSSION

Research result

Description of the Results of the Development of the Mathematics Learning Module

The results of the development carried out by the researcher produced a learning module based on the Means End Analysis (MEA) model. This research and development uses the ADDIE procedure only up to stage 3, namely the Analysis, Design, Development stages. Based on the development research conducted, the following research results were obtained:

Analysis Stage (Analysis)

The first stage in this research and development is the analysis stage. The results of this analysis are the guidelines for the preparation of learning modules. The analysis carried out includes:

1) Curriculum Analysis

Current learning refers to the 2013 curriculum. Curriculum analysis is carried out by setting KI and KD in the applicable curriculum, namely the 2013 curriculum.

Table 1. KI, KD and Social Arithmetic Material Indicators Class VII

K1	KD	Indicator
3	Recognize and analyze various situations related to social arithmetic (sales, purchases, deductions, profits, losses, single interest, percentage, gross, net, tare)	3.1 Explaining the value of an item, selling price and purchase price. 3.2 Explain the percentage of profit and loss. 3.3 Explain discount, gross, tare and net. 3.4 Explain simple interest and taxes.
4	Solve problems related to social arithmetic (sales, purchases, deductions, profits, losses, interest, single, percentage, gross, net, tare)	4.1 Solving problems regarding the value of an item, selling price and purchase price. 4.2 Solve the problem of profit and loss percentages. 4.3 Resolving issues regarding discounts, gross, tare and net. 4.4 Solving problems regarding single interest and taxes.

Based on the table above KI, KD and indicators of achievement of competition and adapted to the material that will be presented in the learning module that will be developed. Core Competencies, Basic Competencies, and Indicators as in Table 1.

2) Objective Analysis

The learning objectives to be achieved are:

Table 2. Learning Objectives on Social Arithmetic Material

No	Learning objectives
1	Through observing activities in the school canteen, students can explain the value of an item, selling price, purchase price, profit and loss
2	Applying the use of profit percentage or loss percentage in everyday life
3	By using print media (newspapers or magazines) students can solve questions related to Discounts and Taxes
4	By using goods scales, students can solve questions related to Gross, Tara and Net of a package of goods
5	Through group discussion activities, students can present examples of using a single flower in everyday life

3) Learning Media Analysis

Analysis of learning media is shown to find out what is applied during the learning process. The data obtained from the analysis of learning media are as follows:

- a. The learning media that are still used are printed books that have been provided by schools and learning modules have never been developed on social arithmetic material.
- b. The media has not been effectively given to students so that students do not understand the concept of social arithmetic in everyday life.

Design Stage (Design)

At the completion of the analysis stage, then proceed to the design stage, the media specifications that will be made are learning modules using the Means End Analysis (MEA) learning model. The following is the design of the learning module that will be made as follows:

- 1) **Material Assessment**
Based on the analysis stage, the material used to develop the learning module is social arithmetic material for class VII.
- 2) **Initial Plan**
Learning media in the form of learning modules combined with the Means End Analysis (MEA) learning model. The preparation of the module begins with the design of the module shell and the design of the module content. Learning activities using this module begin with problems commonly found in everyday life and to solve problems using the Means End Analysis (MEA) learning model.
- 3) **Media Creation Kit**
The devices used for making Learning Modules are software and hardware devices. The software tool in making this media is Microsoft Office 2007. The hardware device is a printer to print results from Microsoft Office.

Based on the design examines the material, initial design, and tools for making media. Researchers collect materials related to social arithmetic, in solving problems or questions that are in the learning module that will be made using the Means End Analysis (MEA) learning model. Researchers make the instruments that are made will be given to validators and educators to find out the attractiveness of the learning modules that are made. In accordance with the information obtained, the researcher can proceed to the development stage.

Development Stage (Development)

The planning stage is complete, go to the development or development stage. The development stages are as follows: The point of this development is the creation of learning modules that are developed into learning media. The developed modules aim to facilitate and add insight to students in learning social arithmetic. The following is the development of learning media in the form of modules as follows:

- 1) **Making Skin Display (cover)**
The display skin aims to make the module look more attractive. Filled with the identity of the researcher with an attractive color choice in the display skin.
- 2) **Material Display**
The display of the material used in this module is combined with the Means End Analysis (MEA) learning model. The initial display of material activities, sample questions, and exercises also uses the Means End Analysis (MEA) model.
- 3) **Making lesson plans**
The Learning Implementation Plan (RPP) consists of 1 meeting with a time allocation of 2 x 45 minutes. Based on KI, KD, indicators and learning objectives that have been designed.
- 4) **Making Evaluation Sheets**
In making material evaluation sheets, KD, and indicators adjusted to the RPP. Questions are obtained from learning sources that are used as a reference for educators when carrying out the learning process, for example electronic school books, Mathematics Package books for class VII SMP Muhammadiyah 57 Medan and the internet. Discussion of questions and answers also gets sources from electronic school books, Mathematics Package books for class VII SMP Muhammadiyah 57 Medan and the internet and other references.

Quality of Learning Devices

Feasibility Analysis

The material experts who carried out the assessment were Mrs. Putri Maisyarah Ammy S.Pd.I., M.Pd, as validator 1, Mrs. Fitri Wahyuni Sirear, S.Pd as validator 2 and Mrs. Feri Haryati, S.Pd as validator 3. IPPP Assessment -1 by experts carried out on the standard aspect of the content. The assessment of each question item uses a score from 1 to 4.

1. Assessment Results for IPPP-1

Table 3. Results of the final (2nd) IPPP-1 Assessment by Experts

No	Assessment Stage	Total score	Average Score	Category	Percentage	Criteria
1	Validators	66	3,3	B	82.5%	L
2	Validators	66	3,3	B	82.5%	L
3	Validators	80	4	B	82.5%	L
Average			3.53	B	88.33%	L

Description: B = Good and L = Decent

Based on the table above, it can be concluded that the results of the assessment of the RPP (IPPP-1) by the three expert validators obtained an average score of 3.53 included in the "Good" category and a score of 88.33% was obtained so that it was included in the "Decent" criteria.

Discussion of Research Results

The mathematics learning module uses the Means End Analysis (MEA) Model as a product in this development research developed through several stages according to the ADDIE development model which consists of analysis, design, development, implementation and evaluation stages. However, due to the limitations of the researchers, this research was conducted only up to the development stage. The results of the development of learning media will be tested for feasibility.

The development stage of this mathematics learning module begins with the analysis stage. Where at this analysis stage it aims to find out and analyze the needs of the mathematics learning module that will be developed. This stage consists of the stages of curriculum analysis and learning media analysis. From the results of the curriculum analysis, the researcher created a mathematics learning module based on the curriculum that was appropriate for the school. And analysis of learning media is carried out to determine the ability of the media in delivering the material to be used.

Next is the design stage, namely making the Mathematics Learning Module consisting of material assessment, initial design and media making tools. This material assessment is made based on the model that will be used. In the initial design of the preparation of the module begins with the creation of the module skin design and module content design. Learning activities using this module begin with problems commonly found in everyday life and to solve problems using the Means End Analysis (MEA) learning model. While the tools for making media, the devices used for making Learning Modules are software and hardware devices. The software tool in making this media is Microsoft Office 2007. The hardware device is a printer to print results from Microsoft Office.

The final stage in this module development research is the development stage, namely the manufacture of products in the form of interactive media based on lesson plans, mathematics learning modules and Learning Evaluation Sheets used. RPP, mathematics learning modules and evaluation sheets are assessed by experts. The assessment given by experts is the determinant of whether the media is suitable for use or not. At this development stage it produces interactive mathematics learning modules that will be tested.

The results of the feasibility analysis of lesson plans by lecturers and teachers obtained an average score of "3.53" with a "Good" score category, which means that the lesson plan is good for use in learning. The results of the evaluation of the mathematics learning module by lecturers and teachers obtained an average of "3.92" with a "Good" score category. Then the results of the assessment of the learning evaluation sheet by lecturers and teachers obtained an average of "3.89" in the "Good" category. From the results of the RPP assessment, the mathematics learning module and the learning evaluation sheet showed an average score of "3.78" with the "Easy" category used in learning.

Based on this description, it can be concluded that the Development of a Mathematics Learning Module Using the Means End Analysis (MEA) Model on Middle School Social Arithmetic Subjects is

feasible for use in learning. Besides being suitable for use in learning mathematics, the authors also observe that the Mathematics Learning Module has another advantage, namely to instill the characteristics of students and make learning meaningful. By using the Mathematics Learning Module students get more insight into knowledge and are happy in learning mathematics.

4. CONCLUSION

Based on the results of the analysis and discussion that has been carried out, it can be concluded as follows:

1. The development of the Mathematics Learning Module using the Means End Analysis (MEA) Model for the SMP Social Arithmetic material uses the ADDIE model only up to stage 3, namely the Analysis, Design, and Development stages.
 - a. The analysis phase is carried out by analyzing the curriculum and learning media analysis.
 - b. The Design phase (design) is carried out by studying the material, the initial design and media making tools. The design stage aims to simplify the development process and combine existing media components, such as describing the flow of learning modules and the order in which they are presented and reviewing the material based on curriculum analysis and preparing references from several relevant sources.
 - c. The Development stage is carried out by making an Assessment Instrument, namely a questionnaire of media experts and educators. Making RPP, Mathematics Learning Modules and Learning Evaluation Sheets.
2. By calculating the feasibility of the Mathematics Learning Module through IPPP-1, IPPP-2, and IPPP-3 assessments by experts as a whole using the same formula, an average score of 3.78 was obtained on 52 indicators so that it was included in the "Good" category. If calculated by the feasibility percentage, it is obtained 94.49% so that it is included in the "Easy" criteria for use as learning media. Why was this Mathematics Learning Module made to make it easier for students in the learning process in social arithmetic material. In the percentage above the percentage level it can reach feasible, that is, validation is carried out 2 times so that it is suitable for use.

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