Development of Oriented Learning Devices of Model Eliciting Activities to Improve Math Abtraction Ability SMK Students

Desniarti[1*], Muhammad Hafiz[2]
[1]Department of Mathematic Education, Nusantara Muslim University of AL Wasliyah, Indonesia
[2]Departement of Agrotechnology, University of Pembangunan Panca Budi, Indonesia

ABSTRACT
This study aims to determine the effectiveness of learning tools oriented Model Eliciting Activities (MEAs) to improve students' mathematical abstraction and self-efficacy abilities. Learning tools developed (LKPD, RPP, Mathematical Abstraction Ability Test). The quality of products developed is assessed based on aspects of validity, practicality, and effectiveness. The procedure for developing learning tools refers to the 4-D development model, namely Define, Design, Develop, and Disseminate. Due to the limitations of researchers, the study was carried out to the develop stage. The subjects of this study were students of SMK Al Washliah 4 Medan. The instruments used to measure the quality of learning tools developed were learning assessment sheets to measure validity, student response questionnaires and observation sheets for the implementation of learning activities to measure practicality, problem solving ability tests to measure effectiveness.

Corresponding Author:
Desniarti,
Universitas Muslim Nusantara,
Jl Garu II A, Medan 20147, Indonesia
Email : abdulmaliknst@gmail.com

1.   INTRODUCTION

The ability of mathematical abstraction is the ability to find mathematical problem solving without the presence of the real object of the problem (Yuliati, 2013:10). The mathematical abstraction process is the final result of the abstraction process and can be called a concept. But in fact many students who have a low understanding of the concept because the process of abstraction is not in line and balanced, automatically the ability to think abstraction is low.

The low ability of mathematical abstraction is also related to the development of education and technology that is increasingly advanced, so the government changed the curriculum again, with the name of the 2013 curriculum. Nuh (2013:---) stated In learning planning, curriculum in the sixth point is the result of learning that will help through learning, one of which is the cognitive field in the form of mathematical abilities, abstraction abilities, deductive thinking patterns, learning, and creative thinking. In accordance with one of the cognitive domains in the 2013 curriculum is the ability of abstraction.

Based on these explanations, the mathematical abstraction ability is a very basic and very important part, each student has different abstraction abilities in solving mathematical problems according to the students' level of thinking and intelligence. But in reality many students still have difficulty understanding mathematical concepts. The explanation above can be proven by looking at the National Examination Report (LHUN) which shows that the average national exam score of vocational students for the 2017/2018 academic year is 31.38.

Based on the data above, it can be concluded that the ability of mathematical abstraction to develop mathematical ideas is still low. This is because in the learning process generally students are not accustomed to solving problems related to daily life. Can be seen from the way students solve mathematical problems students tend to only apply the formula without understanding the concepts related to solving the problem. Therefore, the ability of mathematical abstraction needs to be improved.

In addition to the cognitive abilities students must have, affective abilities are also important for students to have. Because affective ability is a supporting ability so that Indonesian education can be better.

The ability to apply concepts is very important for students to have. As stated, the benefit of the whole mathematical application problem is that it can improve the goal of connecting mathematical problems with real-world problems.

Based on the thoughts that have been described above, researchers feel interested in developing a learning tool through the Model Eliciting Activities (MEAs) with the title: "Development of Oriented Learning Devices Of Model Eliciting Activities (MEAs) to Improve Mathematical Abstraction Ability of Students of SMK Al Washliyah 4 Medan".

2. RESEARCH METHOD/MATERIAL AND METHOD/LETERATURE REVIEW (10 PT)

This research uses the Research and Development (R&D) method. Research and Development is a research method used to produce certain products and test the effectiveness of these products (Sugiyono, 2012: 407). R&D emphasizes useful or useful products in various forms as an extension, addition, and innovation from existing forms (Nusa Putra, 2012: 70). evelopment research is carried out to produce learning tools that will be tested in the Learning Devices class with the learning device products developed based on the MEAs (Model-Eliciting Activities) model which includes five stages: presenting material, elaborating, identifying, compiling sub-problems, and choosing solutions with five components of the scientific approach, namely: observing, asking, reasoning, trying, and communicating. The product produced from this research is a learning tool in the form of a Learning Implementation Plan (RPP), Student Worksheet (LKDP), Comparative test learning outcomes material oriented to students' Abstraction Ability.

Model R&D yang akan digunakan dalam penelitian ini adalah 4-D yang dikembangkan oleh Thiagarajan dan Semmel (1974: 5). Model 4-D terdiri dari 4 tahap, yaitu: Define, Design, Develop, dan Disseminate.

Research first validates the learning device which includes the validation of the lesson plan (RPP), Student Worksheet (LKDP) Validation, which will be carried out to see the feasibility of the learning tools developed, will then be tested. The development model used to develop learning tools in this study is a modification of the Thiagarajan and Semmel models (1974: 5) known as the 4D model (Four D Model) consists of 4 stages, namely: Define, Design, Develop, and Disseminate.

3. RESULTS AND DISCUSSION

In this chapter the results of the analysis and the results of the development of MEAs-based learning tools are outlined, along with the steps taken in developing these tools. As stated in Chapter I, that the purpose of this study is to develop learning tools that meet valid, practical and effective criteria. In chapter II it has been explained that, the learning tools in this study were compiled and developed based on the Thiagarajan 4-D model but modified by researchers into 3 stages namely define, design, and developThe learning tools referred to in this study include RPP, LKPD, and THB. The results obtained at each phase of the development of learning tools in question can be described below. The R&D model that will be used in this study is the 4-D developed by Thiagarajan and Semmel (1974: 5). The 4-D model consists of 4 stages, namely: Define, Design, Develop, and Disseminate.

Data from the results of trials that have been carried out are then used to see the extent to which the learning tools that have been developed meet the criteria of validity, practicality, and effectiveness. In addition, it will also discuss the constraints experienced during the study and the limitations of the researcher.

A. Validity

Learning tools that have been developed can be used in the learning process after going through the validation stage. According to Nurfathurrahmah in Mustami and Irwansyah, the learning device is said to be valid, if expert judgment shows that the development of the device is based on a strong theory and has internal consistency, namely there is interrelation between the components in the device being developed.

1. Learning Implementation Plan (RPP)

The average validator assessment of the lesson plan which consists of aspects of the format of the lesson plan, the contents of the lesson plan, language and writing, time, method of learning activities, and assessment are 3.24 with a valid category, so that the lesson plan developed can be applied directly in learning activities. Nevertheless there are several aspects that need to be considered in order to produce

a better lesson plan, namely the accuracy of writing the lesson plan component, clarity of the formulation of indicators and the appropriateness of the MEAs Syntax with the steps of learning the scientific approach. Therefore a revision was made based on the advice of the two validators.

In general, the total value of the total validity of the learning implementation plan obtained was M = 3.24, it can be concluded that this value is included in the "Valid" category (2.5 ≤ V <3.5) according to the Trianto validity category. So, in terms of all aspects, the learning implementation plan is stated to meet the validity criteria, the final result of the revised device is the second draft (prototype II) used in the device test.

2. Student Worksheet (LKPD)

The average assessment of LKPD seen from LKS format aspects, LKPD content, LKPD language and design is 3.27 with valid categories according to Trianto's validity category. This means that the LKPD that was compiled was developed based on a strong theoretical rationale and had a strong internal consistency, that is, the interrelationships between components in LKPD and other devices, so that this LKPD could be used in learning activities.

3. Mathematical Abstraction Ability

The average assessment of mathematical abstraction ability is 3.28 with a valid category. This means that mathematical abstraction questions that have been prepared are appropriate to be used in the learning process in the classroom. In making revisions the researcher refers to the results of the validation by following the suggestions and instructions of the validator.

4. Cognitive Assessment Instrument

The average rating of the assessment instruments viewed from the aspects of material, construction and language is 3.38 with a valid category. This means that the appraisal instruments developed have been developed to give the same conclusions that the assessment instruments are good and can be used with a little revision. In making revisions the researcher refers to the results of the validation by following the suggestions and instructions of the validator.

Based on the description above, the developed learning device meets the valid category, because aspects of the learning device (RPP, LKPD, mathematical abstraction ability and cognitive assessment instruments) developed show the average value of validity is 3.29, then the MEAs-based learning device is developed was declared valid (2.5 ≤ V ≤ 3,5). This is in accordance with Trianto's validity criteria that the average value of validity is 2.5 ≤ V ≤ 3.5 indicating that the device developed is valid.

This is consistent with the results of Rajabi, Ekohariadi and Buditjahjanto's research which states that the learning kit has valid criteria if the learning device reflects the consistency between the parts of the learning device arranged and the suitability between the learning objectives, learning material and assessment to be provided. If the learning device that is compiled meets the construct validation and content validation, the learning device is said to be valid. Because all aspects of the assessment are in the valid category, the learning tools can be used at a later stage of development, namely field trials in class learning and then their effectiveness is measured.

In addition to the tools mentioned above, other instruments (observation sheet of the implementation of learning tools, student response sheets and learning outcomes tests) related to this study were also validated. The results of the validation are within the interval limit (2.5 ≤ V <3.5), which means that the validated overall average is in the valid category according to Trianto's validity category, it is the same as Nurfathurrahmah's explanation in the Caliph Mustami and Irwansyah, the learning device is said to be valid , if the expert's assessment shows that the development of the device is based on a strong theory and has internal consistency, that is the interconnection between the components in the device being developed.

4.   CONCLUSION

Based on the formulation of the problem, the results of the study, and the discussion as previously stated, it was found that there was an excellent development of learning tools to give to students in the teaching and learning process.

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