

THE DEVELOPMENT OF ALGEBRA QUESTION BOOK FOR HIGH SCHOOL MATHEMATICS OLYMPIAD TRAINING

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Abstract

The purpose of this research is to produce a Algebra question book for high school mathematics olympiad training that valid. This research is a development research consists of two stages: a preliminary stage includes the analysis and design and formative evaluation in this case just include self- evaluation , expert review, and one - to-one ,that we discuss in this paper. Question book, in the beginning was reviewed by expert in Expert Review stage, and get comment by colleague to see how validity the book is. After that, Question book was revised based on comment and review by validator . In One-to-one stage, Question book tested to two student who have average ability and high ability to know about how usage the question book is. Result of one-to-one stage is student's answer, observation data, and interview response that use to revise Question book. From these results it can be concluded that Algebra Question book for high school mathematics olympiad training that develop is valid.

Keywords : *Question book, Algebra, high school mathematics Olympiad*

1. Introduction

Learning in school especially mathematicematics learning have a purpose for made students who have a form of factual, conceptual, procedural, and metacognitive knowledge in mathematicematics, as well as have the ability to think and follow an effective and creative in the abstract and the concrete in solving problems independently (Kemdikbud, 2013). However, in the implementation of education there are some problems that occur. In fact, the educational objectives can not be

achieved fully. In Olympiad competition that tested the ability of solving the problem, it appears that the ability of Indonesian students is still low. National Science Olympiad (OSN) is one way to improving the quality of compulsory education (basic education), and is an opportunity to find the best student who have achievement in Mathematicematics and Natural Sciences (MIPA) as potential participants in the international Olympiad. (Kemendikbud, 2013). OSN is held every year by Kemendikbud, This is in accordance with the program plan at the same time to improving the quality of education in order to prepare students who have the potential in science to be developed further in order to participate Olympiad in international level.

According to the definition of OSN guidebook published by the Directorate General of Primary Education , OSN is a vehicle for students to develop the academic competition to encourage the spirit of fair competition courage while improving capabilities in science, mathematicematics, and social studies, and in order improve the quality of education (DIKDAS,2013). From the organization of the event OSN, there are difference between the students from Java with other students . It shown in Olympiad, the winner dominated by students from Java (Eddy, 2011). More specifically regarding the lack of problem solving ability of students especially in Sumatra, according to the National Science Olympiad medalist (OSN) 2015 in highschool level inform by the Directorate General of Secondary Education in mathematicematics, there are only three students who came from Sumatera from 30 medalists, one student come from West Sumatera , Aceh and Jambi who won a bronze medal while all the gold medals won by the students who came from Java (Dikmen, 2015).

There are many to students in answer the questions in mathematicematic Olympiad which one is mostly a problem of solving non-routine problems that do tend to be difficult and require the analysis and good understanding about material.

One of the difficulties experienced because there are many students who unfamiliar with Olympiad problem which incidentally is about a problem that involves material enrichment that not every teacher teach (Kusnandi, 2009). In mathematic Olympiads for high school, about being tested is non-routine problem. non-routine problem, is a problem which required to complete further thought because the procedure is not as clear or not the same as the procedures learned in class (Sunarno, 2011). Questions about the Olympiads is the type of problem solving is to test the depth mastery of the students and their problem-solving abilities.

Any comparison between the olympiad problem with routine or usual problem, olympiad problem use any strategies in a problem-solving but ordinary problem whereas no specific strategy used. Problem Olympiad also require modifications in advance to be able to solve problems that required students' thinking and reasoning in changing complicated problems into simpler ones. Problem Olympiad consists of 2 types of questions about the discovery and verification. Coverage of material tested in mathematics Olympiads for high school including Algebra, Geometry, Combinatorics and Number Theory. In mathematic olympiad, Algebra get a dominant content. Algebra also include material that not knowing by student and have many difficult formula and algorithmic.

In preparation for the Olympiads, students should multiply exercises and practice their skills in solving problems. In addition to more exercises in coaching should also be taught the steps in problem solving and problem-solving strategies that can be used along with example problems and exercises. Budhi (2004: 4-54) explains that in solving the problem, there are several strategies completion of which saw patterns, using variables, using the definition or nature, draw a diagram, step back; and counting. Explanation about the settlement measures, problem-solving strategies, example problems and exercises would be even better if not only given through oral but also in writing as outlined in the teaching materials.

In accordance with the definition of instructional materials in the technical guidance curriculum guide (Dikti, 2009), in which teaching materials are all kinds of materials that are used to help teachers / instructors in implementing the teaching and learning activities in the classroom. Teaching materials are good learning tools to be developed because it has a good role and benefits not only for teachers but also for students, with teaching materials to enable students to learn with or without the presence of teachers so that students become more independent. Develop an appropriate teaching materials and the appropriate addition can assist teachers in implementing development activities olympiads would also help a lot and familiarize students with the Olympiads problem because in teaching material ,already there are examples of exercises that can be read by themself if the teacher does not have time to explain.

In preparation for Olympiad, student should have a lot of task, finished more problem and learn formula and more lesson especially for Algebra which often use in many problem in olympiads. Use a question book can training their capability in problem solving and use a question book is nice to do. Based on the explanation above, Develop a Algebra Question book for Mathematic Olympiads training for High School is expected to can improve problem-solving ability of students olympiads.

2. Method

This research is depelopment research that consists of two stages: a preliminary which include analysis and design, while the formative evaluation stage consists of self evaluation, expert reviews, one to one, small group, and a field test. Many Expert give a comment and suggestion for revised Algebra question book that develop. They are Dr. Nila Kesumawati and Dr. Kamid, and also Endro Setyo Cahyo M.Pd, Ismaliani M. Pd, and Jurnaidi M. Pd as colleuge. Subjects in this research are students

from SMA Negeri 1 Gelumbang as one-to-one stage and small group stage subject. Student from SMA Negeri 1 Muara Enim as field test stage subject. To obtain the data carried in expert review stage, this research use walkthrough, in stage one to one use document analysis and observation also in small group stage. This research use tests and interviews in the field test stage. Data results of the expert review stage, one to one and small group stage such as suggestions and comments are used to Question book while in the revision stage of the field test, the data obtained in the form of student answer sheets and then all of data will analyzed with qualitatively .

3. Result and Disussion

Research development consists of two stages: a preliminary stage of the analysis of the design and formative evaluation such as self evaluation, expert review, one-to-one, small group, and a field test stage and revision process based on advice validator and students on a one-to-one and small groups so that the results of this research is form of Algebra Question book for mathematic olympiad traning for high school that valid and practical but in this case, we just discuss about Algebra Question book that valid. Question book validity based on the content, construct, and language.

Question book validity based on the content it shown materials developed in accordance with the Olympiads material where the material development activities for example problems and exercises in the Question book used problem that use in olympiad that held before and some made by researcher which develop with based on problem in olympiad. Expert, Dr. Nila Kesumawati just comment about font and format, the equation and how to representative an equation. About content of Question book, all expert agree if each problem in Question book is suitable with olympiad training. Dr. Kamid just suggest to add more problem, remember if this is a book.

Based constructs developed Question book that is in good order by the characteristics of Question book which Question book complete by description of the material, include example problems, exercises and references in accordance with the criteria Question book so students can use the Question book properly. Dr. Nila suggest if a book must have minimal 40 pages, so as revised researcher add more material, example, and problem also solution in last pages. Also other contents such as introduction, table of content , and reference add to Question book. Dr. Kamid suggest too for add more pages. As prototyping 2, question book was better with have 40 pages without cover and another content.

While based on language, in first prototype, there's so much mistake in font size, font color, and equation in mathematic. Expert give so much suggest about it, to make question book more consistent in font size, font color until equation. After revise, developed Question book have good language and correct where there is no misunderstanding of students and have a double interpretation when they read. It shown when one-to-one stage, student can use question book very well without any problem to understand.

In one-to-one stage, question book given to two student in SMA Negeri 1 Gelumbang who have average ability and high ability to know about how usage the question book is. From one-to-one stage, we can know if student can use and understand even teacher not guide them. In student's answer and interview response that record in video can shown us if student can explore their problem solving ability and make them can solve a problem better than before. Result of one-to-one stage is student's answer, observation data, and interview response that use to revise Question book.

After revise Question book with based on expert suggest, and student's answer, we get Algebra Question book prototype 2 that valid. With the results of the

study, expert review stage and one-to-one stage. it can be concluded that Algebra Question book for mathematic olympiad training for high school was valid .

4. Conclusion and Remark

Through this research , the conclusion was obtained that after the two stage of development research , there are preliminary stage that includes analysis and design prototype and then, formative evaluation includes self- evaluation , expert review, one - to-one , small group , and field test stage . After get result from expert review and one-to-one stage, researcher revise based on suggest from expert and student and get Algebra question book prototype 2 that valid. Algebra Question book for mathematic olympiad training for high school has developed is valid based on content , construct , and language . For other researcher, a good recommendations to develop question book in other content like Geometry, Combinatoric, or Number for mathematic olympiad training for high school.

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